TexasHomeLearning

Sixth Grade

Summer At-Home Learning

Everything you need to provide summer lessons at home.

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Texas Education Agency

Table of Contents

Getting Started

Welcome Texas Families!
The Texas Summer At-Home Learning packet provides four weeks of home learning plans and additional lessons for students. This packet has been designed with flexibility and easy family use in mind to keep students connected to meaningful content during the summer. Although lessons, assignments, and scheduling suggestions are provided, students and families, with support from their schools, may complete the lessons in a way that meets the needs of each individual student.

What's included:

- Introductory guidance to get your student set up to learn
- Four weeks of daily lessons organized by subject
- Additional lessons to extend learning beyond four weeks, if desired
- Curriculum materials for each lesson, including books, articles, worksheets, etc.

To get started, review the **Establishing a Schedule for Learning** and **Learning Goals for Students** sections of this packet. Following a planned schedule with learning objectives makes the learning plan easy to follow.

Packet Overview
The four-week Summer At-Home Learning plan is divided by subject area: reading/language arts, math, science, and social studies. Students can focus on just a few subjects, like reading or math, or on all subjects included in the packet. Schools should help students choose which subject areas to focus on and when.

Each subject area includes sequential lessons with five daily lessons per week beginning with Week 1, Day 1 and ending with Week 4, Day 5, plus a set of additional lessons for students to extend learning up to four more weeks.

Lessons provide detailed instructions and reference the page numbers of materials in this packet, including articles, books, worksheets, and other materials needed to complete the lesson.

First Steps

1. To begin, simply choose a subject and use the table of contents to find that section of the packet.
2. Start with Week 1, Day 1, complete the listed activities, and check off each lesson when finished.
3. Make your way through all lessons in the order presented or as instructed by your school.
4. After completing four weeks of lessons in a specific subject area, continue to the Additional Lessons section for more learning.

For more information, visit TexasHomeLearning.org.

Establishing a Schedule for Learning

It is recommended that students establish a consistent learning schedule that can be followed each day of the four-week learning plan. Having a regular structure can help make daily and weekly activities easier to follow and enhance home learning. For example, a student may start each day off eating breakfast and getting some exercise before beginning the first lesson.

Families are balancing at-home learning with many other priorities so their chosen schedule should help increase student learning while also meeting the needs of the family.

In establishing a consistent routine, families should seek help from schools and consider which subject(s) may require more support for the student while balancing home learning with other family priorities.

The following sample schedules are a starting point. Families should adjust the schedule to meet the needs of the student while accounting for their own availability to help facilitate learning, if needed.

Daily Check-Ins

Connect with your student every day at a time that works well for your household. For example, you may want to check in briefly a few times per day or have just one longer check-in in the morning or evening. The goal of this time is for students to recall and reflect on what they learned during the day.

Use check-in time to spark conversation with questions such as:

- Were you able to complete all the assigned activities?
- What did you learn/practice/read today?
- What was easy or challenging for you?
- Do you have questions for your teacher?

Also use this time to communicate with the student's teachers as needed, send them copies or pictures of student work, or share information about the student's learning progress.

Daily Choice Reading

Thirty minutes of daily choice reading is recommended. The student selects a text of any genre or topic (with approval from caregiver). Choose a book at home or consider these titles:

- *Call of the Wild* by Jack London (fiction)
- *The Giver* by Lois Lowry (fiction)
- *Little Women* by Louisa May Alcott (fiction)
- *The Magician's Nephew* by C.S. Lewis (fiction)
- *A Midsummer's Night Dream* by William Shakespeare (drama)
- *The Old Man and the Sea* by Ernest Hemingway (fiction)

Caregivers are encouraged to talk with students about what they have read:

- Ask your student: What is something new you learned from the book?
- Ask your student to draw something they learned from the book.
- Ask your student to write about the book or respond to a prompt.
- Ask your student to talk about the book with a family member or friend.

Sample Schedules

Subject areas included in this Summer At-Home Learning packet are highlighted in gray.

Sample Schedule 1: Full Day of Learning

This schedule works best when student: needs access to all subjects; works well independently; has help available throughout the day.

Time	Activity
8:00-9:00 a.m.	Outdoor/Indoor Exercise
9:00-9:30 a.m.	Choice Reading
9:30-9:45 a.m.	Break
9:45-10:45 a.m.	**Reading Language Arts**
10:45-11:15 a.m.	Snack and Break
11:15-12:15 p.m.	**Math**
12:15-12:45 p.m.	Lunch
12:45-1:30 p.m.	**Science**
1:30-1:45 p.m.	Break
1:45-2:30 p.m.	**Social Studies**
2:30-3:00 p.m.	Enrichment (Art, Indoor/Outdoor Exercise)
3:00-3:15 p.m.	Daily Check-In

Note: May use Monday–Friday, Monday–Thursday, or alternating days (Mon/Wed/Fri).

Sample Schedule 2: Morning Learning with Reading and Math Only

This schedule works best when student: needs to prioritize reading and math; has help available in the morning.

Time	Activity
8:00-9:00 a.m.	Outdoor/Indoor Exercise
9:00-10:00 a.m.	**Reading Language Arts**
10:00-10:30 a.m.	Snack and Break
10:30-11:30 a.m.	**Math**
11:30-11:45 a.m.	Daily Check-In
11:45 a.m.	Lunch

Note: May shift to an afternoon schedule. May use each day of the week, part of the week, or alternating days (Mon/Wed/Fri).

Sample Schedule 3: Reading-Only Option

This schedule works best when student: has limited time; has limited help available.

Time	Activity
5:00-6:00 p.m.	**Reading Language Arts**
6:00-6:30 p.m.	Choice Reading
6:30 p.m.	Dinner

Note: May schedule time as family schedule allows.

Learning Goals for Students

This Summer At-Home Learning packet provides daily lessons in each of the main academic subjects. While materials are provided for all of these subjects, a student, family, or school may choose to focus on only some of these content areas based on individual academic and scheduling needs.

Reading Language Arts

This packet includes grade-appropriate thematically/topically aligned "text sets" with shorter passages of various genres to build students' background and content knowledge. Students should read, annotate, and write about their reading every day. Printable book options are included in this packet to correspond with the reading lesson plans.

Learning Tips:

- Read and annotate the selected text, deciding to read the passages independently or with a family member.
- Discuss what the passages are about.
- Summarize the passages for yourself to check your understanding.
- Identify text evidence to support your answers when responding to both multiple choice questions and writing prompts.

Math

Students will complete activities and practice problems that cover foundational content and skills for sixth grade math, including:

- Positive rational numbers
- Ratios
- Percent, fraction, and decimal equivalence

Learning Tip: Utilize various problem-solving strategies that have worked in the past.

Science

Students will read selected articles, perform simple investigations, and apply their knowledge of science content. **Learning Tip:** Investigations utilize common household items. If exact materials are unavailable, students can replace with similar materials.

Social Studies

Students will read selected articles and apply their knowledge of social studies content and skills. **Learning Tip:** Readings provide information that can be used to support claims and answer questions.

You are now ready to begin your Summer At-Home Learning Packet!
For more information, visit TexasHomeLearning.org.

Summer At-Home Lesson Plans

IMPORTANT NOTE: Many caregivers are balancing home learning with many other priorities, so families should adjust the schedule to meet their individual needs.

Week 1

☐ Day 1

Resilience and Success: "The Elephant's Child"

- Read and annotate "The Elephant's Child" (p. 42).
- Answer the text dependent questions and the discussion questions.

☐ Day 2

Resilience and Success: "How Fast Can Humans Run?"

- Read and annotate "How Fast Can Humans Run?" (p. 51).
- Write a paragraph that explains the central idea of the article. Use at least two details from the article to support your response.

☐ Day 3

Resilience and Success: "Fog" and "Turn, Turn, My Wheel"

- Read and annotate "Fog" (p. 54) and "Turn, Turn, My Wheel" (p. 57).
- Answer the text dependent questions and the discussion questions.

☐ Day 4

Resilience and Success: "What Olympic Athletes Wear Is Often More About Science Than Style"

- Read and annotate "What Olympic Athletes Wear Is Often More About Science Than Style" (p. 61).
- Write a paragraph describing an investigation that could be conducted to test speed skating uniforms. How can a skater's uniform affect their time in a competition? Support your claim with evidence from the article.

☐ Day 5

Resilience and Success: "Rikki-Tikki-Tavi"

- Read and annotate "Rikki-Tikki-Tavi" (p. 63).
- Answer the text dependent questions and the discussion questions.

Week 2

☐ Day 1

Resilience and Success Text: "NBA to Start Youth Tournament"

- Read and annotate "NBA to Start Youth Tournament" (p. 77).
- Answer the text dependent quiz questions.

☐ Day 2

Resilience and Success: "NBA to Start Youth Tournament"

- Reread "NBA to Start Youth Tournament" (p. 77).
- Write a paragraph explaining the central idea of the text. Use at least two details to support your response.

☐ Day 3

Resilience and Success: "Startup Company Has a Simple Mission: To Make Youth Sports More Accessible"

- Read and annotate "Startup Company Has a Simple Mission: To Make Youth Sports More Accessible" (p. 81).
- Answer the text dependent quiz questions.

☐ Day 4

Resilience and Success: "Startup Company Has a Simple Mission: To Make Youth Sports More Accessible"

- Reread "Startup Company Has a Simple Mission: To Make Youth Sports More Accessible" (p. 81).
- Write a response to the following questions: What are the skills that someone needs to have to pursue a career in youth sports sponsorship? How does youth sports sponsorship affect society in general, specifically athletes and sporting events?

☐ Day 5

Resilience and Success: "U.S. Soccer Group's Project Brings Game to Inner-City Kids in Chicago"

- Read and annotate "U.S. Soccer Group's Project Brings Game to Inner-City Kids in Chicago" (p. 85).
- Answer the text dependent quiz questions.

Week 3

☐ Day 1

Making Change: Day 1 of 5

- Read and annotate “The Scientific Method" (p. 89).
- Answer the text dependent questions and the discussion questions.

☐ Day 2

Making Change: Day 2 of 5

- Read and annotate “SpaceX Founder Wants to Send Humans to Mars as Backup Plan for Civilization” (p. 94).
- Write a paragraph that summarizes the disagreement between any two people or organizations in the article. If you were to support one claim, which would it be and why?

☐ Day 3

Making Change: Day 3 of 5

- Read and annotate “Who is Katherine Johnson?” (p. 97).
- Answer the text dependent questions and the discussion questions.

☐ Day 4

Making Change: Day 4 of 5

- Read and annotate “The History of Cornmeal in American Kitchens is of Comfort, Connection” (p. 103).
- Write a paragraph that explains how cornmeal represents history and heritage and why food is important to people. Use evidence from the article to support your responses.

☐ Day 5

Making Change: Day 5 of 5

- Read and annotate “Rosie the Riveter” (p. 106).
- Answer the text dependent questions and the discussion questions.

Week 4

☐ Day 1

Making Change: Day 1 of 5

- Read and annotate “Apple's Reason to Buy its Latest Watch is Timed to Your Health” (p. 112).
- Answer the text dependent quiz questions.

☐ Day 2

Making Change: Day 2 of 5

- Reread “Apple's Reason to Buy its Latest Watch is Timed to Your Health” (p. 112).
- Write a paragraph that explains the central idea of the article. Use at least two details from the article to support your response.

☐ Day 3

Making Change: Day 3 of 5

- Read and annotate “A Modern Take on the Traditional Tipi” (p. 116).
- Answer the text dependent quiz questions.

☐ Day 4

Making Change: Day 4 of 5

- Reread “A Modern Take on the Traditional Tipi” (p. 116).
- Choose an important detail from the text and write a paragraph explaining how it supports the main idea of the text.

☐ Day 5

Making Change: Day 5 of 5

- Read and annotate “Millennials Prefer to Give Their Time and Talent to Charity, Study finds” (p. 120).
- Answer the text dependent quiz questions.

Additional Lessons

☐ Additional Lesson 1

Community: Day 1 of 5

- Read and annotate “The Alaska Start III” (p. 124).
- Answer the text dependent questions and the discussion questions.

☐ Additional Lesson 2

Community: Day 2 of 5

- Read and annotate “Students Involved in Group Learning Showed Similar Brain-Wave Patterns” (p. 130).
- Write 1-2 paragraphs explaining how you would explain this scientific concept or process to someone who has never heard of this before? Use details from the article to explain the concept or process.

☐ Additional Lesson 3

Community: Day 3 of 5

- Read and annotate “Celebrating Cinco De Mayo” (p. 133).
- Answer the text dependent questions and the discussion questions.

☐ Additional Lesson 4

Community: Day 4 of 5

- Read and annotate “Tech Training Program Aims to Help Students Climb Out of Poverty” (p. 138).
- Write a paragraph explaining the author’s purpose for writing this article and whether they were successful in this purpose. Support your response with specific details from the text.

☐ Additional Lesson 5

Community: Day 5 of 5

- Read and annotate “What Is Earth?” (p. 141).
- Answer the text dependent questions and the discussion questions.

☐ Additional Lesson 6

Community: Day 1 of 5

- Read and annotate “America Is Saving Tons of Food, Thanks to a Student Volunteer’s Great Idea” (p. 146).
- Answer the text dependent quiz questions.

☐ Additional Lesson 7

Community: Day 2 of 5

- Reread “America Is Saving Tons of Food, Thanks to a Student Volunteer’s Great Idea” (p. 146).
- Write a paragraph explaining the author’s viewpoint about the issue of food in schools. Explain how you know what they think using specific details from the text.

☐ Additional Lesson 8

Community: Day 3 of 5

- Read and annotate “East African Runners One Step Ahead” (p. 150).
- Answer the text dependent quiz questions.

☐ Additional Lesson 9

Community: Day 4 of 5

- Reread "East African Runners One Step Ahead" (p. 150).
- Write a persuasive letter in which you describe the theory you agree with and why. Cite evidence to support your belief.

☐ Additional Lesson 10

Community: Day 5 of 5

- Read and annotate "These Middle Schoolers Explore the World on a Plate" (p. 154).
- Answer the text dependent quiz questions.

☐ Additional Lesson 11

Personal Growth: Day 1 of 5

- Read and annotate "The Selfish Giant" (p. 158).
- Answer the text dependent questions and the discussion questions.

☐ Additional Lesson 12

Personal Growth: Day 2 of 5

- Read and annotate "Timekeeping: Why We Need Clocks and Calendars" (p. 165).
- Write a paragraph explaining the central idea of the text. Use at least two details to support your response.

☐ Additional Lesson 13

Personal Growth: Day 3 of 5

- Read and annotate "Feathers" (p. 170).
- Answer the text dependent questions and the discussion questions.

☐ Additional Lesson 14

Personal Growth: Day 4 of 5

- Read and annotate "Curiosity Changes the Brain to Boost Memory and Learning" (p. 174).
- Write a paragraph explaining the central idea of the text. Use at least two details to support your response.

☐ Additional Lesson 15

Personal Growth: Day 5 of 5

- Read and annotate "The Story of the Lazy Boy: A Kachari Folktale" (p. 177).
- Answer the text dependent questions and the discussion questions.

☐ Additional Lesson 16

Education and Knowledge: Day 1 of 5

- Read and annotate "The Difference Between Empathy and Sympathy" (p. 182).
- Answer the text dependent quiz questions.

☐ Additional Lesson 17

Education and Knowledge: Day 2 of 5

- Reread "The Difference Between Empathy and Sympathy" (p. 182).
- Write a paragraph explaining the differences between sympathy and empathy, including the benefits and consequences. Use at least two details to support your response.

☐ Additional Lesson 18

Education and Knowledge: Day 3 of 5

- Read and annotate “All That Jazz: Kids in Dance Classes Don't Get Enough Exercise, Study Says” (p. 186).
- Answer the text dependent quiz questions.

☐ Additional Lesson 19

Education and Knowledge: Day 4 of 5

- Reread “All That Jazz: Kids in Dance Classes Don't Get Enough Exercise, Study Says” (p. 186).
- Write a paragraph explaining the purpose of exercise and how it makes you or your body feel when you exercise.

☐ Additional Lesson 20

Education and Knowledge: Day 5 of 5

- Read and annotate “17th Century Self-Portraits Exhibited as the Original ‘Selfies’” (p. 190).
- Answer the text dependent quiz questions.

Week 1

☐ Day 1

Identifying Positive Rational Numbers

- Complete the Warm-up and Getting Started sections. (p. 194)
- Complete problems in activity 1.1. (p. 195)

☐ Day 2

Writing Positive Rational Numbers

- Complete activity 1.2. (p. 197)

☐ Day 3

Benchmark Fractions

- Complete activity 1.3. (p. 198)

☐ Day 4

Ordering Rational Numbers

- Complete activity 1.4 and Talk the Talk. (p. 200-201)

☐ Day 5

Practice and Review

- Complete the Assignment and Review problems. (p. 204-205)

Week 2

☐ Day 1

Multiplying with Mixed Numbers

- Complete the Warm-up and Getting Started sections. (p. 206-207)
- Complete activity 2.1. (p. 208)

☐ Day 2

Whole Number ÷ Fraction

- Complete activity 2.2 and Talk the Talk. (p. 211)

☐ Day 3

Practice and Review

- Complete the assignment and review problems. (p. 214-215)

☐ Day 4

Fractional Fact Families

- Complete the warmup and getting started sections. (p. 216-217)
- Complete activity 3.1. (p. 218)

☐ Day 5

Fraction Strip Models

- Complete 3.2. (p. 219)

Week 3

☐ Day 1

Dividing Across

- Complete activity 3.3. (p. 220)

☐ Day 2

Multiply by the Reciprocal

- Complete activity 3.4. (p. 222)

☐ Day 3

Dividing with Mixed Numbers

- Complete activity 3.5 and Talk the Talk. (p. 224-226)

☐ Day 4

Practice and Review

- Complete the assignment and review problems. (p. 228-229)

☐ Day 5

Skills Practice: Positive Rational Numbers

- Select 3 problems to practice from each page of skills practice. (p. 230-236)

Week 4

☐ Day 1

Using Drawings to Model Equivalent Ratios

- Complete the warmup and getting started sections. (p. 237-238)
- Complete activity 3.1. (p. 239)

☐ Day 2

Tape Diagrams

- Complete activity 3.2. (p. 241)

☐ Day 3

Rates and Proportions

- Complete activity 3.3. (p. 244)

☐ Day 4

Scaling Up and Scaling Down

- Complete activity 3.4. (p. 248)

☐ Day 5

Double Number Lines

- Complete activity 3.5 and Talk the Talk. (p. 250-254)

Additional Lessons

☐ Additional Lesson 1

Practice and Review

- Complete the assignment and review problems. (p. 255-256)

☐ Additional Lesson 2

Introduction to Equivalent Fractions

- Complete the warmup and getting started sections. (p. 257-258)
- Complete activity 4.1. (p. 259)

☐ Additional Lesson 3

Using Equivalent Ratio Tables

- Complete activity 4.2. (p. 261)

☐ Additional Lesson 4

Parts and Whiles in Ratio Tables

- Complete activity 4.3 and Talk the Talk. (p. 264-266)

☐ Additional Lesson 5

Practice and Review

- Complete the assignment and review problems. (p. 267-268)

☐ Additional Lesson 6

Analyzing Rectangle Ratios

- Complete warmup and getting started sections. (p. 269-271)
- Complete activity 5.1. (p. 272)

☐ Additional Lesson 7

Graphing Equivalent Ratios

- Complete activity 5.2. (p. 274)

☐ Additional Lesson 8

Using Ratio Tables to Solve Problems

- Complete activity 5.3 and Talk the Talk. (p. 278-281)

☐ Additional Lesson 9

Practice and Review

- Complete the assignment and review problems. (p. 283-284)

☐ Additional Lesson 10

Comparing Ratio Graphs

- Complete warmup and getting started sections. (p. 285-286)
- Complete activity 6.1. (p. 287)

☐ Additional Lesson 11

Choosing a Strategy to Solve Ratio Problems

- Complete activity 6.2. (p. 288)

☐ Additional Lesson 12

Comparing Ratios with Double Number Lines

- Complete activity 6.3 (p. 290)

☐ Additional Lesson 13

Additive and Multiplicative Representations

- Complete activity 6.4 and Talk the Talk. (p. 290-294)

☐ Additional Lesson 14

Practice and Review

- Complete assignment and review problems. (p. 297-298)

☐ Additional Lesson 15

Skills Practice - Ratios

- Complete sections I and II. (p. 299-302)

☐ Additional Lesson 16

Skills Practice: Ratios

- Complete sections III and IV. (p. 302-306)

☐ Additional Lesson 17

Determining Equivalence

- Complete warmup and getting started sections. (p. 307-308)
- Complete activity 1.1. (p. 309)

☐ Additional Lesson 18

Reasoning with Ratio and Percent

- Complete activity 1.2. (p. 314)

☐ Additional Lesson 19

Matching Percents, Fractions, and Decimals

- Complete activity 1.3. (p. 315)

☐ Additional Lesson 20

Practice and Review

- Complete assignment and review problems. (p. 319-320)

Week 1

☐ Day 1

Roller Coaster Science: Day 1 of 5

- Read “Everyday Mysteries: Why don’t I fall out of an upside-down roller coaster?” (p. 322)
- Use the information in the article to explain why riders do not fall out of a roller coaster when it turns upside down.

☐ Day 2

Roller Coaster Science: Day 2 of 5

- Reread “Everyday Mysteries: Why don’t I fall out of an upside-down roller coaster?” (p. 322)
- Answer the questions: Why is steel used in the design of most roller coasters? Why can’t the loop in a roller coaster be a perfect circle?

☐ Day 3

Roller Coaster Science: Day 3 of 5

- Read “Dream Jobs: Designing thrilling rides.” (p. 327)
- Describe the steps that go into the design of a roller coaster. Explain what must be considered at each step.

☐ Day 4

Roller Coaster Science: Day 4 of 5

- Perform the experiment and record findings using “Rolling cans down a hill.” (p. 330)
- Write a conclusion that explains how changing variables affects the rolling of a can.

☐ Day 5

Roller Coaster Science: Day 5 of 5

- Create your own design for a roller coaster. Make a drawing of the roller coaster or if you have materials, try creating a model of a roller coaster for a small ball or marble.

Week 2

☐ Day 1

Potential and Kinetic Energy: Day 1 of 5

- Re-Read "How roller coasters work." (p. 334)
- Consider the changes in potential and kinetic energy that occurs along a roller coaster.

☐ Day 2

Potential and Kinetic Energy: Day 2 of 5

- Read "An explanation of two types of energy: potential and kinetic." (p. 337)
- Create a table to compare potential and kinetic energy. List examples of each.

☐ Day 3

Potential and Kinetic Energy: Day 3 of 5

- Think about what you have done today and the ways that potential kinetic energy were used.
- Make a list of examples from your day of using potential and kinetic energy.

☐ Day 4

Potential and Kinetic Energy: Day 4 of 5

- Perform the experiment and record findings for "Experiment: swinging with a pendulum." (p. 341)

☐ Day 5

Potential and Kinetic Energy: Day 5 of 5

- Reread "Experiment: swinging with a pendulum." (p. 341)
- Answer the questions based on your observations from the experiment: Is the period of the longer pendulum longer or shorter than the period of the shorter pendulum? Was this what you excepted? Why or why not? How does energy change from potential to kinetic energy during the swing?

Week 3

☐ Day 1

Force and Motion: Day 1 of 5

- Read “A history of rockets.” (p. 345)
- Create a timeline showing the history and development of the rocket.

☐ Day 2

Force and Motion: Day 2 of 5

- Read “How does gravity pull things down to Earth?” (p. 349)
- Describe gravity and how it impacts life on Earth.

☐ Day 3

Force and Motion: Day 3 of 5

- Consider how we use gravity daily.
- Write a list and describe how you have used gravity to help you today.

☐ Day 4

Force and Motion: Day 4 of 5

- If you have the materials, perform the experiment and record findings for “Experiment: How to build a balloon-powered car.” (p. 353) Many materials can be substituted, be creative and find other options to experiment.

☐ Day 5

Force and Motion: Day 5 of 5

- Hold a race with someone else using adjusted balloon car designs or paper airplanes that you can adjust the design. Describe the changes made to design that resulted in a better balloon car or paper airplane.

Week 4

☐ Day 1

Energy Transformation: Day 1 of 5

- Read "Explaining energy transfer and transformations." (p. 357)
- Use the article to explain how energy transfers and transforms.

☐ Day 2

Energy Transformation: Day 2 of 5

- Look around your home to identify examples of machines or objects that use energy transfer or transformation. List the examples and describe how energy transfers or transforms.

☐ Day 3

Energy Transformation: Day 3 of 5

- Read "Heat, or thermal energy, can be transferred in three ways." (p. 362)
- Describe the three types of thermal energy transfer. List an example of each type.

☐ Day 4

Energy Transformation: Day 4 of 5

- If you have the materials, create a solar oven using "Make It Yourself: Sun s'mores." (p. 366)
- Many materials can be substituted, be creative and find other options to experiment. Test out the solar oven.

☐ Day 5

Energy Transformation: Day 5 of 5

- Consider the use for a solar oven. Draw and label a diagram of a solar oven. Explain the types of thermal energy transfer that occur to work a solar oven.

Additional Lessons

☐ Additional Lesson 1

Land Transformations: Day 1 of 5

- Read “Underwater volcanoes and the ecosystems they create.” (p. 370)
- Explain how submarine volcanoes form.

☐ Additional Lesson 2

Land Transformations: Day 2 of 5

- Reread “Underwater volcanoes and the ecosystems they create.” (p. 370)
- Think about how energy, force, and motion form volcanoes. Add to your explanation about how submarines volcanoes are formed by identifying how force, motion, and energy contribute to formation.

☐ Additional Lesson 3

Land Transformations: Day 3 of 5

- Read “Breaking up is hard to do Africa may eventually split into two continents.” (p. 374)
- Describe how tectonics plates move and why land can split apart.

☐ Additional Lesson 4

Land Transformations: Day 4 of 5

- If you have materials, perform the experiment and record finding for “Experiment: Exploring the erosive energy of waves” (p. 377). Many materials can be substituted, be creative and find other options to experiment.

☐ Additional Lesson 5

Land Transformations: Day 5 of 5

- Think about examples of land transformations in the area you live. List and describe some examples of land transformations. Explain what is causing change to occur.

☐ Additional Lesson 6

Ecosystems: Day 1 of 5

- Read “Ecosystem superheroes: Sea otters help keep coastal waters in check" (p. 380) and describe the role that sea otters play in the environment.

☐ Additional Lesson 7

Ecosystems: Day 2 of 5

- Read “10 interesting things about ecosystems.” (p. 385)
- List and describe the different types of ecosystems described in the reading.

☐ Additional Lesson 8

Ecosystems: Day 3 of 5

- Imagine your home is its own ecosystem. Draw a picture of your home ecosystem and give it a name. Label the unique features of your home ecosystem.

☐ Additional Lesson 9

Ecosystems: Day 4 of 5

- Read “Caught on Camera: The lesser long-nosed bat.” (p. 389)
- Describe the role that the bat plays in the ecosystem and why they are important.

☐ Additional Lesson 10

Ecosystems: Day 5 of 5

- Think about the area you live and the characteristics including plants, animals, and environment.
- Describe the key features that make your area unique and the role that plants and animals play.

☐ Additional Lesson 11

Organization of Life: Day 1 of 5

- Read "The pyramid of life." (p. 392)
- Create a diagram that shows the organization of life from simplest to most complex.

☐ Additional Lesson 12

Organization of Life: Day 2 of 5

- Read "What is biodiversity?" (p. 395)
- Explain what is meant by biodiversity and why it is important.

☐ Additional Lesson 13

Organization of Life: Day 3 of 5

- Think about the different organisms that live in your area.
- List the different organisms you can think of that live in the area.

☐ Additional Lesson 14

Organization of Life: Day 4 of 5

- If you have the materials, create your own small garden using "Experiment: Gardens under glass." (p. 400)
- Many materials can be substituted, be creative and find other options to experiment.

☐ Additional Lesson 15

Organization of Life: Day 5 of 5

- Add components to your glass garden and put in a place to observe over time. You can collect materials from outside.
- List the different organisms present in your garden.
- Observe the glass garden over time and adjust as needed to keep your garden growing and thriving.

☐ Additional Lesson 16

Cells: Day 1 of 5

- Read "Cells and the versatile functions of their parts." (p. 404)
- List and describe the different types of cells in the reading.

☐ Additional Lesson 17

Cells: Day 2 of 5

- Draw a diagram of a cell and label all the parts of the cell you can remember without looking.
- Review the readings from the day before to check the labeling and add organelles you may have missed.

☐ Additional Lesson 18

Cells: Day 3 of 5

- Read "The facts about cells." (p. 409)
- Make a table to compare prokaryotic and eukaryotic cells.

☐ Additional Lesson 19

Cells: Day 4 of 5

- Create a model of a cell.
- Be creative and find materials around the home to create your model.

☐ Additional Lesson 20

Cells: Day 5 of 5

- Label the model you created and share it with someone. Describe functions of the different cell parts labeled.

Week 1

☐ Day 1

Science and Society: Day 1 of 5

- Read and annotate “Atlantic Crossings During the Age of Exploration.” (p. 416)
- Answer the questions: What were the goals? What was the technology during this time and what role did it play?

☐ Day 2

Science and Society: Day 2 of 5

- Reread “Atlantic Crossings During the Age of Exploration.” (p. 416)
- Describe the different groups of people that were exploring by sea. Identify their strengths and weakness related to ocean travel.

☐ Day 3

Science and Society: Day 3 of 5

- Read “The thrill of time travel.” (p. 420)
- Answer the question: What ideas did Einstein introduce that led to speculation of time travel?

☐ Day 4

Science and Society: Day 4 of 5

- Imagine that time travel is possible. Consider where you would go and what you would do.
- Write a short story explaining the travels you would make if you could time travel.

☐ Day 5

Science and Society: Day 5 of 5

- Consider the idea of space travel as the future for explorers.
- Reflect and answer the question: If given the opportunity would you go on a space mission? Why or why not?

Week 2

☐ Day 1

Technology: Day 1 of 5

- Read and annotate "The Nez Perce and their technology." (p. 424)
- Summarize the technologies that the Nez Perce tribe used that was new to the Europeans.

☐ Day 2

Technology: Day 2 of 5

- Read and annotate "Groceries in Arizona are being delivered by robotic vehicles" (p. 429).
- Answer the question: How could self-driving cars benefit people? What are some concerns with self-driving cars?

☐ Day 3

Technology: Day 3 of 5

- Consider the questions: What role has technology played in historical and modern civilizations? How has technology changed and/or remained the same?
- Write your response.

☐ Day 4

Technology: Day 4 of 5

- Return to the response you wrote yesterday about technology and make edits.
- Finalize your response and share with someone.

☐ Day 5

Technology: Day 5 of 5

- Think of a challenge or problem that could be solved with technology and draw a model of your invention.
- Write a summary of the problem you are trying to solve with your invention.

Week 3

☐ Day 1

Geography: Day 1 of 5

- Read and annotate "Ecosystem superheroes: Sea otters help keep coastal waters in check." (p. 432)
- Answer the question: Why were sea otters brought close to extinction?

☐ Day 2

Geography: Day 2 of 5

- Reread "Ecosystem superheroes: Sea otters help keep coastal waters in check." (p. 432)
- Answer the question: How are sea otters important to the ecosystem in which they live? What other factors are contributing to the reduction of sea otter populations?

☐ Day 3

Geography: Day 3 of 5

- Read and annotate "Are Humans to Blame for the for the Disappearance of Earth's Fantastic Beasts?" (p. 437)
- Summarize your findings about what has contributed to different animals becoming extinct based on the article read.

☐ Day 4

Geography: Day 4 of 5

- Think about the article read yesterday and your knowledge of different animals that are now extinct. Select an animal that you think would be interesting to have seen.
- Write a short story about the animal you selected and what you image it would be like if that animal still existed.

☐ Day 5

Geography: Day 5 of 5

- Consider the question: How has the relationship among humans and animals changed or remained the same?
- Respond to the question and provide evidence from the articles you read this week.

Week 4

☐ Day 1

Culture: Day 1 of 5

- Read and annotate “A Year Redacted.” (p. 441)
- After reading this story, write your thoughts about why humans are so interested in the idea of time travel.

☐ Day 2

Culture: Day 2 of 5

- Read and annotate “Food and Agriculture in Ancient Greece.” (p. 445)
- Take the quiz.

☐ Day 3

Culture: Day 3 of 5

- Reread “Food and Agriculture in Ancient Greece.” (p. 445)
- Answer the question: What have other cultures learned from how the Ancient Greeks?

☐ Day 4

Culture: Day 4 of 5

- Consider the question: How do cultures learn and borrow from one another to shape their own practices?
- Write a response using evidence from readings this week.

☐ Day 5

Culture: Day 5 of 5

- Think about how different cultures influence your daily life.
- Write a summary identifying different cultures that influence your everyday activities.

Additional Lessons

☐ Additional Lesson 1

Government and Citizenship: Day 1 of 5

- Read and annotate “Primary Sources: The Bill of Rights.” (p. 449)
- List the first 10 amendments to the Bill of Rights and briefly describe each.

☐ Additional Lesson 2

Government and Citizenship: Day 2 of 5

- Reread “Primary Sources: The Bill of Rights.” (p. 449)
- Consider the importance of each of the 10 amendments and add to what you wrote yesterday about each amendment.

☐ Additional Lesson 3

Government and Citizenship: Day 3 of 5

- Read “Teens learn there is a freedom in telling their stories.” (p. 454)
- Answer the question: What did you learn from this article?

☐ Additional Lesson 4

Government and Citizenship: Day 4 of 5

- Imagine you were tasked with adding three additional rights to the Bill of Rights. What would you add and why?
- Write your response.

☐ Additional Lesson 5

Government and Citizenship: Day 5 of 5

- Reread what you wrote yesterday about adding to the Bill of Rights. Make edits and finalize.
- Share your proposed additions to the Bill of Rights with someone else and ask if they would add the same three.

☐ Additional Lesson 6

Citizenship: Day 1 of 5

- Read and annotate “How Government Works: What is citizenship?” (p. 458)
- Record notes about citizenship including what it means, how to become a citizenship, rights and responsibilities, and losing citizenship.

☐ Additional Lesson 7

Citizenship: Day 2 of 5

- Review the notes recorded yesterday about citizenship.
- Take the quiz. (p. 460)

☐ Additional Lesson 8

Citizenship: Day 3 of 5

- Read and annotate “Rights and responsibilities of U.S. Citizens.” (p. 461)
- Take the quiz.

☐ Additional Lesson 9

Citizenship: Day 4 of 5

- Consider what it means to be a citizen and the rights and responsibilities of U.S. citizenship.
- Answer the question: Which rights and responsibilities are most important to you and explain why?

☐ Additional Lesson 10

Citizenship: Day 5 of 5

- Consider the readings from this week. Reread if needed.
- Answer the question: What did you learn regarding citizenship that you did not know before?

☐ Additional Lesson 11

Influential People: Day 1 of 5

- Read and annotate "Women Leaders: Clara Barton." (p. 466)
- Answer the question: Why was Clara Barton influential?

☐ Additional Lesson 12

Influential People: Day 2 of 5

- Read and annotate "The Explorers: Dr. Mae C. Jemison." (p. 468)
- Answer the question: Why is Dr. Mae C. Jemison an influential person?

☐ Additional Lesson 13

Influential People: Day 3 of 5

- Make a list of people you have studied in history that are influential.
- Describe why you believe each person on the list is influential.

☐ Additional Lesson 14

Influential People: Day 4 of 5

- Consider people in your life that have influenced you.
- Write about one person who has been most influential in your life and explain how they have influenced you.

☐ Additional Lesson 15

Influential People: Day 5 of 5

- Share your writing from yesterday about a person who has been influential in your life. If you can, share what you wrote with the person you wrote about.

☐ Additional Lesson 16

Economics: Day 1 of 5

- Read and annotate "How to save money as a teenager." (p. 471)
- Take the quiz.

☐ Additional Lesson 17

Economics: Day 2 of 5

- Reread "How to save money as a teenager." (p. 471)
- Write a list of ways you can help to save money. Consider ways you can help save money for your family.

☐ Additional Lesson 18

Economics: Day 3 of 5

- Read and annotate “Teen entrepreneur in Peru runs a bank for kids, helps environment.” (p. 476)
- Answer the questions: What motivates you? Is there a way to combine your interest with a way to save money or help others?

☐ Additional Lesson 19

Economics: Day 4 of 5

- Read and annotate “Learn about your college and school options.” (p. 480)
- Answer the question: Based on what you are interested in, what option seems the best to you and why?

☐ Additional Lesson 20

Economics: Day 5 of 5

- Consider the following: What can you start doing now to help plan and save for the future.
- Write a plan for yourself about how you would like to begin preparing for your future career goals. Share your plan with someone else and ask them to help you work on the plan you developed.

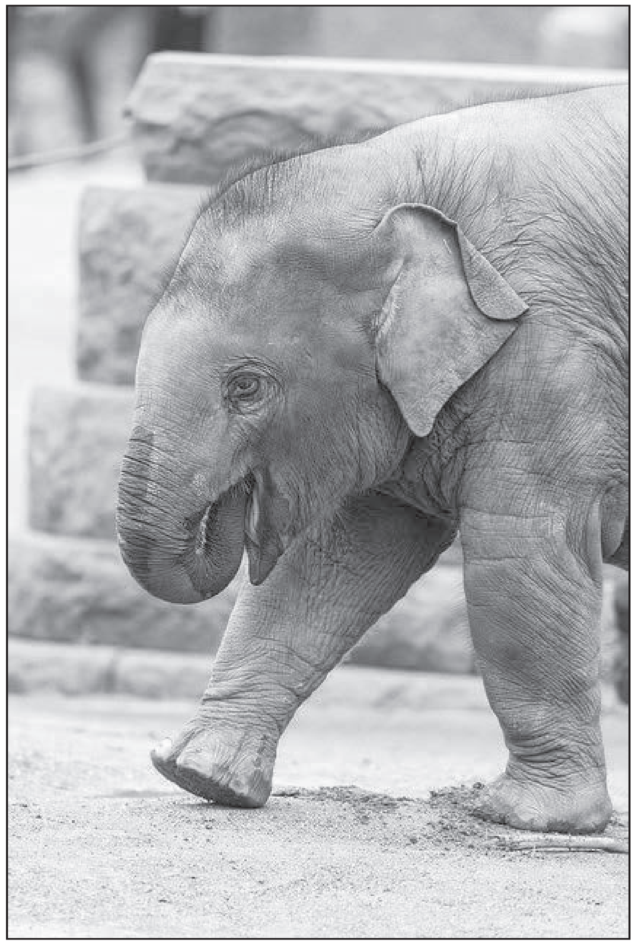
Reading Language Arts

Name: ______________________ Class: ______________________

The Elephant's Child

By Rudyard Kipling
1902

Rudyard Kipling (1865-1936) was an English author and poet, perhaps best known for The Jungle Book, *which also starred anthropomorphic animals as its cast. The following is taken from his collection called* Just So Stories, *and tells the mythical tale of how elephants developed long trunks. As you read, take notes on the purpose of Kipling's narrative style.*



"Walking baby elephant" by Tambako The Jaguar is licensed under CC BY-ND 2.0.

[1] In the High and Far-Off Times the Elephant, O Best Beloved, had no trunk. He had only a blackish, bulgy nose, as big as a boot, that he could wriggle about from side to side; but he couldn't pick up things with it. But there was one Elephant—a new Elephant—an Elephant's Child—who was full of 'satiable curtiosity[1], and that means he asked ever so many questions. And he lived in Africa, and he filled all Africa with his 'satiable curtiosities. He asked his tall aunt, the Ostrich, why her tail-feathers grew just so, and his tall aunt the Ostrich spanked him with her hard, hard claw. He asked his tall uncle, the Giraffe, what made his skin spotty, and his tall uncle, the Giraffe, spanked him with his hard, hard hoof. And still he was full of 'satiable curtiosity! He asked his broad aunt, the Hippopotamus, why her eyes were red, and his broad aunt, the Hippopotamus, spanked him with her broad, broad hoof; and he asked his hairy uncle, the Baboon, why melons tasted just so, and his hairy uncle, the Baboon, spanked him with his hairy, hairy paw. And still he was full of 'satiable curtiosity! He asked questions about everything that he saw, or heard, or felt, or smelt, or touched, and all his uncles and his aunts spanked him. And still he was full of 'satiable curtiosity!

One fine morning in the middle of the Precession of the Equinoxes[2] this 'satiable Elephant's Child asked a new fine question that he had never asked before. He asked, "What does the Crocodile have for dinner?" Then everybody said, "Hush!" in a loud and dretful[3] tone, and they spanked him immediately and directly, without stopping, for a long time.

1. **Insatiable** ***(adjective):*** impossible to satisfy
2. "Precession of the Equinoxes" refers to the Earth's gradual rotation on its axis.
3. An archaic form of "dreadful," or something which causes fear or unpleasantness

By and by, when that was finished, he came upon Kolokolo Bird sitting in the middle of a wait-a-bit thorn-bush, and he said, “My father has spanked me, and my mother has spanked me; all my aunts and uncles have spanked me for my ’satiable curtiosity; and still I want to know what the Crocodile has for dinner!”

Then Kolokolo Bird said, with a mournful[4] cry, “Go to the banks of the great grey-green, greasy Limpopo River, all set about with fever-trees, and find out.”

[5] That very next morning, when there was nothing left of the Equinoxes, because the Precession had preceded[5] according to precedent[6], this ’satiable Elephant’s Child took a hundred pounds of bananas (the little short red kind), and a hundred pounds of sugar-cane (the long purple kind), and seventeen melons (the greeny-crackly kind), and said to all his dear families, “Goodbye. I am going to the great grey-green, greasy Limpopo River, all set about with fever-trees, to find out what the Crocodile has for dinner.” And they all spanked him once more for luck, though he asked them most politely to stop.

Then he went away, a little warm, but not at all astonished, eating melons, and throwing the rind about, because he could not pick it up.

He went from Graham’s Town to Kimberley, and from Kimberley to Khama’s Country, and from Khama’s Country he went east by north, eating melons all the time, till at last he came to the banks of the great grey-green, greasy Limpopo River, all set about with fever-trees, precisely as Kolokolo Bird had said.

Now you must know and understand, O Best Beloved, that till that very week, and day, and hour, and minute, this ’satiable Elephant’s Child had never seen a Crocodile, and did not know what one was like. It was all his ’satiable curtiosity.

The first thing that he found was a Bi-Coloured-Python-Rock-Snake curled round a rock.

[10] “’Scuse me,” said the Elephant’s Child most politely, “but have you seen such a thing as a Crocodile in these promiscuous[7] parts?”

“Have I seen a Crocodile?” said the Bi-Coloured-Python-Rock-Snake, in a voice of dretful scorn. “What will you ask me next?”

“’Scuse me,” said the Elephant’s Child, “but could you kindly tell me what he has for dinner?”

Then the Bi-Coloured-Python-Rock-Snake uncoiled himself very quickly from the rock, and spanked the Elephant’s Child with his scalesome, flailsome tail.

“That is odd,” said the Elephant’s Child, “because my father and my mother, and my uncle and my aunt, not to mention my other aunt, the Hippopotamus, and my other uncle, the Baboon, have all spanked me for my ’satiable curtiosity—and I suppose this is the same thing.”

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4. **Mournful** ***(adjective):*** expressing sadness, regret, or grief
5. **Precede** ***(verb):*** to come before (something) in time
6. **Precedent** ***(noun):*** an earlier event or action that is regarded as an example or guide
7. the author could also be using “promiscuous” to mean “wild”

[15] So he said good-bye very politely to the Bi-Coloured-Python-Rock-Snake, and helped to coil him up on the rock again, and went on, a little warm, but not at all astonished, eating melons, and throwing the rind about, because he could not pick it up, till he trod on what he thought was a log of wood at the very edge of the great grey-green, greasy Limpopo River, all set about with fever-trees.

But it was really the Crocodile, O Best Beloved, and the Crocodile winked one eye—like this!

"'Scuse me," said the Elephant's Child most politely, "but do you happen to have seen a Crocodile in these promiscuous parts?"

Then the Crocodile winked the other eye, and lifted half his tail out of the mud; and the Elephant's Child stepped back most politely, because he did not wish to be spanked again.

"Come hither, Little One," said the Crocodile. "Why do you ask such things?"

[20] "'Scuse me," said the Elephant's Child most politely, "but my father has spanked me, my mother has spanked me, not to mention my tall aunt, the Ostrich, and my tall uncle, the Giraffe, who can kick ever so hard, as well as my broad aunt, the Hippopotamus, and my hairy uncle, the Baboon, and including the Bi-Coloured-Python-Rock-Snake, with the scalesome, flailsome tail, just up the bank, who spanks harder than any of them; and so, if it's quite all the same to you, I don't want to be spanked any more."

"Come hither, Little One," said the Crocodile, "for I am the Crocodile," and he wept crocodile-tears[8] to show it was quite true.

Then the Elephant's Child grew all breathless, and panted, and kneeled down on the bank and said, "You are the very person I have been looking for all these long days. Will you please tell me what you have for dinner?"

"Come hither, Little One," said the Crocodile, "and I'll whisper."

Then the Elephant's Child put his head down close to the Crocodile's musky, tusky mouth, and the Crocodile caught him by his little nose, which up to that very week, day, hour, and minute, had been no bigger than a boot, though much more useful.

[25] "I think," said the Crocodile—and he said it between his teeth, like this—"I think to-day I will begin with Elephant's Child!"

At this, O Best Beloved, the Elephant's Child was much annoyed, and he said, speaking through his nose, like this, "Led go! You are hurtig be!"

Then the Bi-Coloured-Python-Rock-Snake scuffled down from the bank and said, "My young friend, if you do not now, immediately and instantly, pull as hard as ever you can, it is my opinion that your acquaintance in the large-pattern leather ulster[9]" (and by this he meant the Crocodile) "will jerk you into yonder limpid[10] stream before you can say Jack Robinson."

8. "Crocodile tears" is a phrase which often refers to fake or insincere crying.
9. an overcoat
10. **Limpid** ***(adjective):*** transparent; clear and unclouded

This is the way Bi-Coloured-Python-Rock-Snakes always talk.

Then the Elephant's Child sat back on his little haunches, and pulled, and pulled, and pulled, and his nose began to stretch. And the Crocodile floundered into the water, making it all creamy with great sweeps of his tail, and he pulled, and pulled, and pulled.

[30] And the Elephant's Child's nose kept on stretching; and the Elephant's Child spread all his little four legs and pulled, and pulled, and pulled, and his nose kept on stretching; and the Crocodile threshed his tail like an oar, and he pulled, and pulled, and pulled, and at each pull the Elephant's Child's nose grew longer and longer—and it hurt him hijjus[11]!

Then the Elephant's Child felt his legs slipping, and he said through his nose, which was now nearly five feet long, "This is too butch for be!"

Then the Bi-Coloured-Python-Rock-Snake came down from the bank, and knotted himself in a double-clove-hitch round the Elephant's Child's hind legs, and said, "Rash and inexperienced traveller, we will now seriously devote ourselves to a little high tension, because if we do not, it is my impression that yonder self-propelling man-of-war with the armour-plated upper deck" (and by this, O Best Beloved, he meant the Crocodile), "will permanently vitiate[12] your future career."

That is the way all Bi-Coloured-Python-Rock-Snakes always talk.

So he pulled, and the Elephant's Child pulled, and the Crocodile pulled; but the Elephant's Child and the Bi-Coloured-Python-Rock-Snake pulled hardest; and at last the Crocodile let go of the Elephant's Child's nose with a plop that you could hear all up and down the Limpopo.

[35] Then the Elephant's Child sat down most hard and sudden; but first he was careful to say "Thank you" to the Bi-Coloured-Python-Rock-Snake; and next he was kind to his poor pulled nose, and wrapped it all up in cool banana leaves, and hung it in the great grey-green, greasy Limpopo to cool.

"What are you doing that for?" said the Bi-Coloured-Python-Rock-Snake.

"'Scuse me," said the Elephant's Child, "but my nose is badly out of shape, and I am waiting for it to shrink."

"Then you will have to wait a long time," said the Bi-Coloured-Python-Rock-Snake. "Some people do not know what is good for them."

The Elephant's Child sat there for three days waiting for his nose to shrink. But it never grew any shorter, and, besides, it made him squint. For, O Best Beloved, you will see and understand that the Crocodile had pulled it out into a really truly trunk same as all Elephants have to-day.

[40] At the end of the third day a fly came and stung him on the shoulder, and before he knew what he was doing he lifted up his trunk and hit that fly dead with the end of it.

11. "Hideous!"
12. to hurt or impair

"'Vantage[13] number one!" said the Bi-Coloured-Python-Rock-Snake. "You couldn't have done that with a mere-smear nose. Try and eat a little now."

Before he thought what he was doing the Elephant's Child put out his trunk and plucked a large bundle of grass, dusted it clean against his fore-legs, and stuffed it into his own mouth.

"'Vantage number two!" said the Bi-Coloured-Python-Rock-Snake. "You couldn't have done that with a mear-smear nose. Don't you think the sun is very hot here?"

"It is," said the Elephant's Child, and before he thought what he was doing he schlooped up a schloop of mud from the banks of the great grey-green, greasy Limpopo, and slapped it on his head, where it made a cool schloopy-sloshy mud-cap all trickly behind his ears.

[45] "'Vantage number three!" said the Bi-Coloured-Python-Rock-Snake. "You couldn't have done that with a mere-smear nose. Now how do you feel about being spanked again?"

"'Scuse me," said the Elephant's Child, "but I should not like it at all."

"How would you like to spank somebody?" said the Bi-Coloured-Python-Rock-Snake.

"I should like it very much indeed," said the Elephant's Child.

"Well," said the Bi-Coloured-Python-Rock-Snake, "you will find that new nose of yours very useful to spank people with."

[50] "Thank you," said the Elephant's Child, "I'll remember that; and now I think I'll go home to all my dear families and try."

So the Elephant's Child went home across Africa frisking and whisking his trunk. When he wanted fruit to eat he pulled fruit down from a tree, instead of waiting for it to fall as he used to do. When he wanted grass he plucked grass up from the ground, instead of going on his knees as he used to do. When the flies bit him he broke off the branch of a tree and used it as fly-whisk; and he made himself a new, cool, slushy-squshy mud-cap whenever the sun was hot. When he felt lonely walking through Africa he sang to himself down his trunk, and the noise was louder than several brass bands.

He went especially out of his way to find a broad Hippopotamus (she was no relation of his), and he spanked her very hard, to make sure that the Bi-Coloured-Python-Rock-Snake had spoken the truth about his new trunk. The rest of the time he picked up the melon rinds that he had dropped on his way to the Limpopo—for he was a Tidy Pachyderm[14].

One dark evening he came back to all his dear families, and he coiled up his trunk and said, "How do you do?" They were very glad to see him, and immediately said, "Come here and be spanked for your 'satiable curtiosity."

"Pooh," said the Elephant's Child. "I don't think you peoples know anything about spanking; but I do, and I'll show you." Then he uncurled his trunk and knocked two of his dear brothers head over heels.

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13. advantage
14. Pachyderm is a term used to refer to animals such as elephants, rhinos, and hippos.

[55] "O Bananas!" said they, Where did you learn that trick, and what have you done to your nose?"

"I got a new one from the Crocodile on the banks of the great grey-green, greasy Limpopo River," said the Elephant's Child. "I asked him what he had for dinner, and he gave me this to keep."

"It looks very ugly," said his hairy uncle, the Baboon.

"It does," said the Elephant's Child. "But it's very useful," and he picked up his hairy uncle, the Baboon, by one hairy leg, and shoved him into a hornet's nest.

Then that bad Elephant's Child spanked all his dear families for a long time, till they were very warm and greatly astonished. He pulled out his tall Ostrich aunt's tail-feathers; and he caught his tall uncle, the Giraffe, by the hind-leg, and dragged him through a thorn-bush; and he shouted at his broad aunt, the Hippopotamus, and blew bubbles into her ear when she was sleeping in the water after meals; but he never let any one touch Kolokolo Bird.

[60] At last things grew so exciting that his dear families went off one by one in a hurry to the banks of the great grey-green, greasy Limpopo River, all set about with fever-trees, to borrow new noses from the Crocodile. When they came back nobody spanked anybody any more; and ever since that day, O Best Beloved, all the Elephants you will ever see, besides all those that you won't, have trunks precisely like the trunk of the 'satiable Elephant's Child.

I keep six honest serving-men:
(They taught me all I knew)
Their names are What and Where and When
And How and Why and Who.
I send them over land and sea,
I send them east and west;
But after they have worked for me,
I give them all a rest.

I let them rest from nine till five.
For I am busy then,
As well as breakfast, lunch, and tea,
For they are hungry men:
But different folk have different views:
I know a person small—
She keeps ten million serving-men,
Who get no rest at all!
She sends 'em abroad on her own affairs,
From the second she opens her eyes—
One million Hows, two million Wheres,
And seven million Whys!

Text-Dependent Questions

Directions: For the following questions, choose the best answer or respond in complete sentences.

1. PART A: Which of the following best describes a central idea of the passage?
    A. Curiosity killed the cat.
    B. Curiosity can open up new doors and opportunities.
    C. Asking questions is not as informative as pursuing answers.
    D. You can't always rely on people to teach you everything.

2. PART B: Cite evidence from the text to support the answer to Part A.

3. What does the word "'satiable" or "insatiable" most likely mean as used in paragraph 1?
    A. Cannot be satisfied
    B. Restless
    C. Hungry
    D. Appeased

4. What advantages does the new trunk bring the Elephant's Child?

5. Consider the author's tone and narrative style, such as the use of repetition and the references to "O Best Beloved." How do these components contribute to the purpose of the story?

6. What does the poem at the end of the story contribute to the overall theme?
    A. Its sing-song form adds to the overall sense of child-like wonder.
    B. It concludes the story as a sort of nursery rhyme, reflecting the genre of children's literature and therefore the theme of children and their questioning minds.
    C. The poem's discussion of questioning minds (with questions in the form of workmen) contributes to the theme of curiosity, especially in an ever-curious child.
    D. The contrast between the poem's speaker and the woman with "ten-million serving men" contributes to the theme of a "normal" adult curiosity and the almost hyperactive searching minds of children.

Discussion Questions

Directions: Brainstorm your answers to the following questions in the space provided. Be prepared to share your original ideas in a class discussion.

1. Curiosity killed the cat, or so the saying goes. How does curiosity drive the action of the story? Is it an ultimately positive or negative trait for the elephant's child to possess?

2. In the story, all of the animals spank the elephant's child when it asks questions, perhaps because they are afraid of the answers. How can fear be used to manipulate someone – particularly a child – and what are the consequences of this fear? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

3. Why do people succeed—is it through traits like curiosity, physical advantages like the elephant's long trunk, or something else? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

newsela

How fast can humans run?

By ThoughtCo.com, adapted by Newsela staff on 04.16.18
Word Count **832**
Level **1070L**

Image 1. Usain Bolt of Jamaica competes in the Men's 4x100 Metres Relay during day nine of the 16th IAAF World Athletics Championships London 2017 at The London Stadium on August 12, 2017, in London, United Kingdom. Photo by: Andy Lyons/Getty Images for IAAF

The fastest person on record so far is the Jamaican athlete Usain Bolt. He ran the 100-meter sprint at the 2008 Summer Olympics in Beijing, China, in a world record of 9.58 seconds. That works out to be about 23.4 miles per hour over the course of the race. For a brief period during that sprint, Bolt reached an astounding 40 feet per second (27.51 mph).

As a physical activity, running is very different from walking. In running, a person's legs flex and the muscles stretch and then contract during acceleration. As the runner's muscles release and absorb energy, the overall energy in the person's body changes and leads to increased speed.

What Makes An Elite Runner?

Scholars believe that the fastest runners — the elite sprinters like Bolt — are those who use a low amount of energy for every foot that they run, compared to other people. The ability to do that is influenced by a number of different factors, including their age, sex and distribution of muscles. The fastest of the elite runners are young men.

The way in which a person's body moves in time and space is called biomechanics. The possible speed of a runner is influenced by their biomechanics, especially how their legs move as they run. Many different factors could influence a person's running speed, including how much time the foot spends touching the ground, how far the legs swing and the angle and distance of the stride.

In particular, sprint runners maximize their acceleration and top speed by applying more force relative to their body weight. Their ankles move faster and they take more steps per minute.

Long-Distance Runners

When considering speed, sports researchers also look at long-distance runners, who race distances between 3 and 26 miles. The fastest of these runners use considerable plantar pressure, which is the amount of pressure the foot puts on the ground. Changes in biomechanical factors, or how the legs move over time and space, also seem to have a significant effect.

As with sprinters, the fastest group in marathon running is men aged between 25 and 29. Those men have an average speed between 558 and 577 feet per minute. This information was gathered from the marathons that were run in Chicago and New York between 2012 and 2016.

The New York City marathon runs in waves. There are four groups of runners who begin the race roughly 30 minutes apart. As a result, statistics are available for runner speeds at 3-mile segments throughout the race. Researcher Zhenquan Lin and his team used that data to show that one factor of speed is competition. Runners increase speed and change positions more frequently at the end of the race.

The Upper Limits

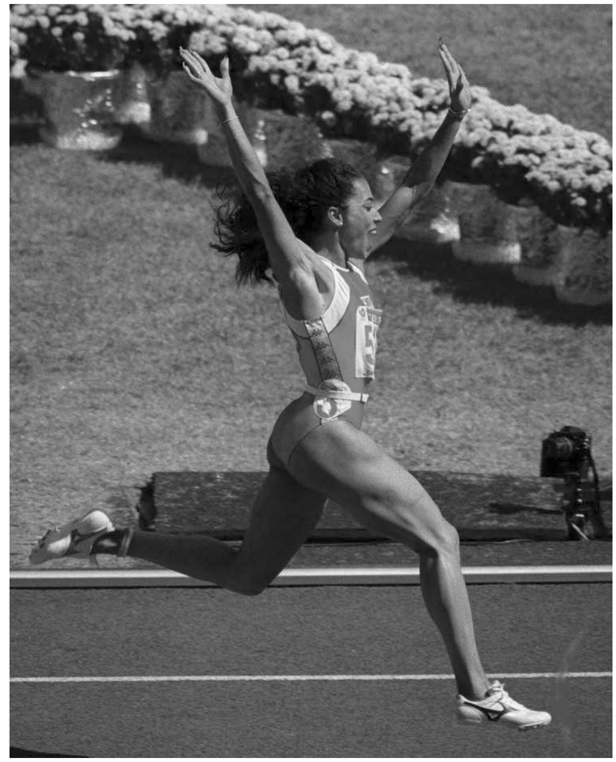
In comparison to other animals, humans are very slow. The fastest animal on record is the cheetah, which can run up to 70 mph. Even Usain Bolt can only attain a fraction of that.

Recent research on the most elite runners has led sports medicine expert Peter Weyand and his team to suggest that the upper limit might reach 35–40 mph. So far though, no one has been willing to confirm that in an official publication. In other words, scientists still need to find more proof.

Statistics

According to Rankings.com, the fastest three male sprinters in the world today are Usain Bolt, Tyson Gay and Asafa Powell. Bolt and Powell are Jamaican, and Gay is American. Bolt set the 100-meter record at the 2008 Summer Olympic Games in Beijing, China, completing the race in 9.58

seconds. His speed was 34.25 feet per second. Gay's fastest time is 9.69 seconds. Powell's is 9.72 seconds.



The fastest three female sprinters are Florence Griffith Joyner, Carmelita Jeter and Marion Jones, who are all American. Joyner's fastest time in the 100-meter was 10.49 seconds, set in the 1988 Olympics in Seoul, South Korea, at a speed of 31.27 feet per second. Jeter's fastest time is 10.64 seconds. Jones' is 10.65 seconds.

The three fastest male marathon runners are, according to Runners World, Dennis Kimetto of Kenya, Kenenisa Bekele of Ethiopia and Elud Kipchoge of Kenya. Kimetto set the record for fastest marathon time at the Berlin Marathon in 2014. He completed the 26.2-mile race in just 2 hours, 2 minutes and 57 seconds. Bekele finished the Berlin Marathon in 2:03:03 in 2016. Kipchoge ran the London Marathon in 2:03:05 in 2016.

The three fastest female marathon runners are Paula Radcliffe of England, Mary Keitany of Kenya and Tirunesh Dibaba of Kenya. Radcliffe completed the 2003 London Marathon in 2:15:25. Keitany completed the 2017 London Marathon in 2:17:01. Dibaba finished the same race in 2:17:56.

Name: ______________________ Class: ______________________

Fog

By Carl Sandburg
1916

Carl Sandburg (1878-1967) was an American poet, writer, and editor who won three Pulitzer Prizes: two for his poetry and one for his biography of Abraham Lincoln. His poem "Fog" is inspired by the fog he saw one day over the Chicago harbor. As you read, pay attention to how Sandburg uses imagery to describe what he sees.

The fog comes
on little cat feet.

It sits looking
over harbor and city
on silent haunches[1]
and then moves on.

1. the upper part of an animal's leg

Text-Dependent Questions

Directions: For the following questions, choose the best answer or respond in complete sentences.

1. PART A: Which statement best explains the metaphor “little cat feet” in line 2?
   A. The fog comes noisily.
   B. The fog comes happily.
   C. The fog comes sneakily.
   D. The fog comes gracefully.

2. PART B: Which detail from the text best supports the answer to Part A?
   A. “sits looking” (line 3)
   B. “harbor and city” (line 4)
   C. “silent haunches” (line 5)
   D. “moves on” (line 6)

3. Which of the following best describes the narrator’s opinion toward the fog?
   A. reflective because the speaker analyzes the fog as it rolls over the city
   B. anxious because the speaker cannot control the fog
   C. excited because fog is an unusual sight for the speaker’s city
   D. depressed because the fog has had a gloomy impact on the city

4. Which of the following statements best describes a theme in the poem?
   A. There is always conflict between humans and nature.
   B. Natural events will happen without human interference.
   C. Nature’s control can be dangerous for humans.
   D. Humans must learn to either tame nature or live with it.

5. Using examples from the text, describe the tone the author uses in this poem and how he creates it.

Discussion Questions

Directions: Brainstorm your answers to the following questions in the space provided. Be prepared to share your original ideas in a class discussion.

1. In this poem, the author uses a familiar animal to describe a natural occurrence (fog). How does this technique develop the poem's vivid imagery?

2. What other examples from poetry or literature employ similar techniques of using human or animal characteristics to describe non-living things?

Name: ____________________ Class: ____________________

Turn, Turn, My Wheel

By Henry Wadsworth Longfellow
1893

Henry Wadsworth Longfellow (1807-1882) was an American poet and educator. Longfellow is best known for his poem, "Paul Revere's Ride." In the following poem, a speaker describes watching a potter work. As you read, take notes on what words that the speaker uses to describe the potter and his work.

Turn, turn, my wheel! Turn round and round
Without a pause, without a sound:
So spins the flying world away!
This clay, well mixed with marl[1] and sand,
Follows the motion of my hand;
For some must follow, and some command,
Though all are made of clay!

Thus sang the Potter at his task
Beneath the blossoming hawthorn-tree,
While o'er his features, like a mask,
The quilted sunshine and leaf-shade
Moved, as the boughs[2] above him swayed,
And clothed him, till he seemed to be
A figure woven in tapestry,
So sumptuously[3] was he arrayed[4]
In that magnificent attire
Of sable[5] tissue flaked with fire.
Like a magician he appeared,
A conjurer[6] without book beard;
And while he plied[7] his magic art —
For it was magical to me —
I stood in silence and apart,
And wondered more and more to see
That shapeless, lifeless mass of clay
Rise up to meet the master's hand,
And now contract and now expand,
And even his slightest touch obey.

"potter's hands" by clurross is licensed under CC BY-NC-ND 2.0

1. a type of soil
2. branches of a tree
3. **Sumptuous *(adjective):*** splendid or expensive-looking
4. displayed or arranged in a particular way
5. black
6. a wizard or magician
7. to practice something with care and attention

Text-Dependent Questions

Directions: For the following questions, choose the best answer or respond in complete sentences.

1. PART A: How does the poet use personification in "Turn, Turn, My Wheel"?
   A. The poet gives the tree human qualities to show that it respects and wants to protect the potter.
   B. The poet gives the potter's wheel human qualities to show how it turns smoothly in order to please the potter.
   C. The poet gives the potter's clothing human qualities to show how it responds to the potter's energetic movement.
   D. The poet gives the clay human qualities to show that it is compliant with the potter's demands.

2. PART B: Which TWO lines from the poem support the answer to Part A?
   A. "Without a pause, without a sound" (Line 2)
   B. "Follows the motion of my hand" (Line 5)
   C. "The quilted sunshine and leaf-shade" (Line 11)
   D. "A figure woven in tapestry" (Line 14
   E. "In that magnificent attire" (Line 16)
   F. "And even his slightest touch obey" (Line 27)

3. PART A: In line 22 of "Turn, Turn, My Wheel," the speaker stands "in silence and apart" as the potter creates his work. Why is the speaker "silent"?
   A. The speaker is in awe of the potter's power and skill.
   B. The speaker is frightened of the potter's magical powers.
   C. The speaker dislikes the final product.
   D. The speaker wants to ask a question but is nervous.

4. PART B: Which line from "Turn, Turn, My Wheel" helps explain the speaker's response in Part A?
   A. "Of sable tissue flaked with fire." (Line 17)
   B. "For it was magical to me —" (Line 21)
   C. "That shapeless, lifeless mass of clay" (Line 24)
   D. "And now contract and now expand," (Line 26)

5. PART A: How does the first stanza (Lines 1-7) of "Turn, Turn, My Wheel" contribute to the development of its theme?
   A. It demonstrates how happy the potter is to be outdoors.
   B. It explains why the potter prefers the kind of clay he is using.
   C. It shows that the potter knows he can control the clay.
   D. It suggests that the potter wants to work as quickly and efficiently as possible.

6. PART B: Which lines from the poem also support the answer to Part A? Select TWO answers.

   A. “Beneath the blossoming hawthorn-tree” (Line 9)
   B. “The quilted sunshine and leaf-shade” (Line 11)
   C. “Like a magician he appeared” (Line 18)
   D. “That shapeless, lifeless mass of clay” (Line 24)
   E. “Rise up to meet the master’s hand” (Line 25)
   F. “And even his slightest touch obey” (Line 27)

Discussion Questions

Directions: Brainstorm your answers to the following questions in the space provided. Be prepared to share your original ideas in a class discussion.

1. In the context of the poem, why do people succeed? Why is the potter successful? What does the speaker find so unique about the potter's talent and craft?

2. In the context of the poem, how can we achieve happiness? Why does watching the potter bring the speaker happiness? Cite examples from the text, your own experience, and other literature, art, or history in your answer.

3. In the context of the poem, how do we understand the world around us? How does the potter use clay to understand the world around him? Cite examples from the text, your own experience, and other literature, art, or history in your answer.

What Olympic athletes wear is often more about science than style

By Rachel Feltman, Washington Post, adapted by Newsela staff on 01.29.18

Word Count **568**

Level **MAX**

Image 1: Thomas Hong (right) gets low to the ice for his short-track event last month at the Olympic trials. He also sports a suit that aims to help Hong go faster by reducing resistance, known as drag, from the air. Photo from: U.S. Speedskating

When you tune into the 2018 Winter Olympics next month, you'll see plenty of painstakingly picked pieces of clothing. In some cases, the outfits do more than just make competitors look snazzy: They can actually help them go faster.

You'll notice such high-tech duds during speed-skating events, where athletes zip around ice rinks. It takes a lot of coordination to pick up speed while balancing on a blade — especially in short-track events, where skaters race all at once in a pack that is prone to painful pileups. So every sliver-of-a-second counts. But how can a suit speed you up?

Wave your hand around. You might feel some air blowing past you, but you probably don't feel that it's slowing you down. Imagine doing the same thing in a pool. You would feel resistance from the water. That's called drag. Air drags on you less than water, but drag it does.

Unfortunately for speed skaters, the human body isn't especially aerodynamic (AIR-oh-di-NAM-ick), which means we're not good at moving through air without encountering drag. Even strands of hair can catch air and slow us down. That's why swimmers often shave their bodies. It makes them better at slipping through water.

A skater's suit covers the body so that lumpy, bumpy skin isn't getting dragged through the air. Smooth surfaces such as nylon and spandex make the body sleeker, which makes it more aerodynamic.

Many countries, including the United States, take that idea even further.

When designers at Under Armour crafted the U.S. suits for 2014, they spent more than two years testing more than 100 kinds of fabric in about 250 combinations. Using different materials meant designers had to be strategic about sewing them together. They did not want any bulging seams to increase a skater's drag. They also wanted to minimize friction, or the force of two surfaces rubbing against each other. That way, skaters lost less speed as their thighs moved past each other and when their arms rubbed against their bodies.

Designers at Under Armour also added tiny bumps to their speed-skating suits. That sounds like it would increase drag, but those ridges keep skaters speedy for the same reason that golf balls whiz through the sky: The air above each dimple forms a little whirlpool, spinning quickly. That makes the surface move through the air as if it is on ball bearings! This adds a tiny lick of speed.

Despite all that work, Under Armour's 2014 speed-skating suits didn't get much praise. In fact, the designs received some of the blame when U.S. skaters performed poorly. Most experts say the outfits weren't responsible for those lagging times. Still, athletes were so worried about it that the team switched to old suits for the rest of their events.

That just goes to show how important comfort and confidence are to performance. Norway's team recently announced that its members would be wearing blue suits because they skated faster in them than red ones. Unless they're bluffing, the only explanation for that improvement is that they simply feel faster in blue — which could make them skate faster.

So when you watch your favorite winter event, take a moment to appreciate the gold medalist's fashion choices. They're probably the result of years of research.

Name: ______________________ Class: ______________________

Rikki-Tikki-Tavi

By Rudyard Kipling
1893

Rudyard Kipling (1865-1936) was an English journalist, short-story writer, poet, and novelist. Kipling's most popular work is his collection of short stories titled The Jungle Book*. "Rikki-Tikki-Tavi" is a short story from* The Jungle Book *about the adventures of a young mongoose. As you read, take notes on how the characters react to danger during the story.*

"Yellow Mongoose" by Colin Frankland is licensed under CC BY-NC 2.0.

At the hole where he went in
Red-Eye called to Wrinkle-Skin.
Hear what little Red-Eye saith:[1]
"Nag, come up and dance with death!"

Eye to eye and head to head,
(Keep the measure, Nag.)
This shall end when one is dead;
(At thy pleasure, Nag.)
Turn for turn and twist for twist —
(Run and hide thee, Nag.)
Hah! The hooded Death has missed!
(Woe[2] betide[3] thee, Nag!)

[1] This is the story of the great war that Rikki-tikki-tavi fought single-handed, through the bath-rooms of the big bungalow in Segowlee cantonment.[4] Darzee, the tailor-bird, helped him, and Chuchundra, the musk-rat, who never comes out into the middle of the floor, but always creeps round by the wall, gave him advice; but Rikki-tikki did the real fighting.

He was a mongoose, rather like a little cat in his fur and his tail, but quite like a weasel in his head and his habits. His eyes and the end of his restless nose were pink; he could scratch himself anywhere he pleased, with any leg, front or back, that he chose to use; he could fluff up his tail till it looked like a bottle-brush, and his war-cry, as he scuttled through the long grass, was: *"Rikk-tikk-tikki-tikki-tchk!"*

One day, a high summer flood washed him out of the burrow where he lived with his father and mother, and carried him, kicking and clucking, down a roadside ditch. He found a little wisp of grass floating there, and clung to it till he lost his senses. When he revived, he was lying in the hot sun on the middle of a garden path, very draggled[5] indeed, and a small boy was saying: "Here's a dead mongoose. Let's have a funeral."

1. said
2. great sorrow
3. happen to
4. "Cantonment" refers to a military garrison or camp.

“No,” said his mother; “let’s take him in and dry him. Perhaps he isn’t really dead.”

[5] They took him into the house, and a big man picked him up between his finger and thumb, and said he was not dead but half choked; so they wrapped him in cotton-wool, and warmed him, and he opened his eyes and sneezed.

“Now,” said the big man (he was an Englishman who had just moved into the bungalow); “don’t frighten him, and we’ll see what he’ll do.”

It is the hardest thing in the world to frighten a mongoose, because he is eaten up from nose to tail with curiosity. The motto of all the mongoose family is “Run and find out”; and Rikki-tikki was a true mongoose. He looked at the cotton-wool, decided that it was not good to eat, ran all around the table, sat up and put his fur in order, scratched himself, and jumped on the small boy’s shoulder.

“Don’t be frightened, Teddy,” said his father. “That’s his way of making friends.”

“Ouch! He’s tickling under my chin,” said Teddy.

[10] Rikki-tikki looked down between the boy’s collar and neck, snuffed at his ear, and climbed down to the floor, where he sat rubbing his nose.

“Good gracious,” said Teddy’s mother, “and that’s a wild creature! I suppose he’s so tame because we’ve been kind to him.”

“All mongooses are like that,” said her husband. “If Teddy doesn’t pick him up by the tail, or try to put him in a cage, he’ll run in and out of the house all day long. Let’s give him something to eat.”

They gave him a little piece of raw meat. Rikki-tikki liked it immensely, and when it was finished he went out into the verandah[6] and sat in the sunshine and fluffed up his fur to make it dry to the roots. Then he felt better.

“There are more things to find out about in this house,” he said to himself, “than all my family could find out in all their lives. I shall certainly stay and find out.”

[15] He spent all that day roaming over the house. He nearly drowned himself in the bath-tubs, put his nose into the ink on a writing table, and burnt it on the end of the big man’s cigar, for he climbed up in the big man’s lap to see how writing was done. At nightfall he ran into Teddy’s nursery to watch how kerosene-lamps were lighted, and when Teddy went to bed Rikki-tikki climbed up too; but he was a restless companion, because he had to get up and attend to every noise all through the night, and find out what made it. Teddy’s mother and father came in, the last thing, to look at their boy, and Rikki-tikki was awake on the pillow. “I don’t like that,” said Teddy’s mother; “he may bite the child.” “He’ll do no such thing,” said the father. “Teddy’s safer with that little beast than if he had a bloodhound to watch him. If a snake came into the nursery now – ”

But Teddy’s mother wouldn’t think of anything so awful.

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5. **Draggle** ***(verb):*** to make wet and dirty by dragging
6. a roofed, open-aired porch, often partly enclosed by a railing

Early in the morning Rikki-tikki came to early breakfast in the verandah riding on Teddy's shoulder, and they gave him banana and some boiled egg; and he sat on all their laps one after the other, because every well-brought-up mongoose always hopes to be a house-mongoose some day and have rooms to run about in, and Rikki-tikki's mother (she used to live in the General's house at Segowlee) had carefully told Rikki what to do if ever he came across white men.

Then Rikki-tikki went out into the garden to see what was to be seen. It was a large garden, only half cultivated[7] with bushes as big as summer-houses of Marshal Niel roses, lime and orange trees, clumps of bamboos, and thickets of high grass. Rikki-tikki licked his lips. "This is a splendid hunting-ground," he said, and his tail grew bottle-brushy at the thought of it, and he scuttled up and down the garden, snuffing here and there till he heard very sorrowful voices in a thorn-bush.

It was Darzee, the tailor-bird, and his wife. They had made a beautiful nest by pulling two big leaves together and stitching them up the edges with fibres, and had filled the hollow with cotton and downy fluff. The nest swayed to and fro, as they sat on the rim and cried.

[20] "What is the matter?" asked Rikki-tikki.

"We are very miserable," said Darzee. "One of our babies fell out of the nest yesterday, and Nag ate him."

"H'm!" said Rikki-tikki, "that is very sad — but I am a stranger here. Who is Nag?"

Darzee and his wife only cowered down in the nest without answering, for from the thick grass at the foot of the bush there came a low hiss – a horrid cold sound that made Rikki-tikki jump back two clear feet. Then inch by inch out of the grass rose up the head and spread hood of Nag, the big black cobra, and he was five feet long from tongue to tail. When he had lifted one-third of himself clear of the ground, he stayed balancing to and fro exactly as a dandelion-tuft balances in the wind, and he looked at Rikki-tikki with the wicked snake's eyes that never change their expression, whatever the snake may be thinking of.

"Who is Nag?" said he. "*I* am Nag. The great god Brahm put his mark upon all our people when the first cobra spread his hood to keep the sun off Brahm as he slept. Look, and be afraid!"

[25] He spread out his hood more than ever, and Rikki-tikki saw the spectacle-mark on the back of it that looks exactly like the eye part of a hook-and-eye fastening. He was afraid for the minute; but it is impossible for a mongoose to stay frightened for any length of time, and though Rikki-tikki had never met a live cobra before, his mother had fed him on dead ones, and he knew that all a grown mongoose's business in life was to fight and eat snakes. Nag knew that too, and at the bottom of his cold heart he was afraid.

"Well," said Rikki-tikki, and his tail began to fluff up again, "marks or no marks, do you think it is right for you to eat fledglings[8] out of a nest?"

7. **Cultivate *(verb):*** to prepare and use land for crops or gardening
8. A "fledgling" is a young bird that is just learning to fly.

Nag was thinking to himself, and watching the least little movement in the grass behind Rikki-tikki. He knew that mongooses in the garden meant death sooner or later for him and his family, but he wanted to get Rikki-tikki off his guard. So he dropped his head a little, and put it on one side.

“Let us talk,” he said. “You eat eggs. Why should not I eat birds?”

“Behind you! Look behind you!” sang Darzee.

[30] Rikki-tikki knew better than to waste time in staring. He jumped up in the air as high as he could go, and just under him whizzed by the head of Nagaina, Nag’s wicked wife. She had crept up behind him as he was talking, to make an end of him; and he heard her savage hiss as the stroke missed. He came down almost across her back, and if he had been an old mongoose he would have known that then was the time to break her back with one bite; but he was afraid of the terrible lashing return-stroke of the cobra. He bit, indeed, but did not bite long enough, and he jumped clear of the whisking tail, leaving Nagaina torn and angry.

“Wicked, wicked Darzee!” said Nag, lashing up as high as he could reach toward the nest in the thornbush; but Darzee had built it out of reach of snakes, and it only swayed to and fro.

Rikki-tikki felt his eyes growing red and hot (when a mongoose’s eyes grow red, he is angry), and he sat back on his tail and hind legs like a little kangaroo, and looked all round him, and chattered with rage. But Nag and Nagaina had disappeared into the grass. When a snake misses its stroke, it never says anything or gives any sign of what it means to do next. Rikki-tikki did not care to follow them, for he did not feel sure that he could manage two snakes at once. So he trotted off to the gravel path near the house, and sat down to think. It was a serious matter for him.

If you read the old books of natural history, you will find they say that when the mongoose fights the snake and happens to get bitten, he runs off and eats some herb that cures him. That is not true. The victory is only a matter of quickness of eye and quickness of foot, – snake’s blow against mongoose’s jump, – and as no eye can follow the motion of a snake’s head when it strikes, that makes things much more wonderful than any magic herb. Rikki-tikki knew he was a young mongoose, and it made him all the more pleased to think that he had managed to escape a blow from behind. It gave him confidence in himself, and when Teddy came running down the path, Rikki-tikki was ready to be petted.

But just as Teddy was stooping, something flinched a little in the dust, and a tiny voice said: “Be careful. I am death!” It was Karait, the dusty brown snakeling that lies for choice on the dusty earth; and his bite is as dangerous as the cobra’s. But he is so small that nobody thinks of him, and so he does the more harm to people.

[35] Rikki-tikki’s eyes grew red again, and he danced up to Karait with the peculiar rocking, swaying motion that he had inherited from his family. It looks very funny, but it is so perfectly balanced a gait that you can fly off from it at any angle you please; and in dealing with snakes this is an advantage. If Rikki-tikki had only known, he was doing a much more dangerous thing that fighting Nag, for Karait is so small, and can turn so quickly, that unless Rikki bit him close to the back of the head, he would get the return-stroke in his eye or lip. But Rikki did not know: his eyes were all red, and he rocked back and forth, looking for a good place to hold. Karait struck out. Rikki jumped sideways and tried to run in, but the wicked little dusty gray head lashed within a fraction of his shoulder, and he had to jump over the body, and the head followed his heels close.

Teddy shouted to the house: "Oh, look here! Our mongoose is killing a snake"; and Rikki-tikki heard a scream from Teddy's mother. His father ran out with a stick, but by the time he came up, Karait had lunged out once too far, and Rikki-tikki- had sprung, jumped on the snake's back, dropped his head far between his fore-legs, bitten as high up the back as he could get hold, and rolled away. That bite paralyzed Karait, and Rikki-tikki was just going to eat him up from the tail, after the custom of his family at dinner, when he remembered that a full meal makes a slow mongoose, and if wanted all his strength and quickness ready, he must keep himself thin.

He went away for a dust-bath under the castor-oil bushes, while Teddy's father beat the dead Karait. "What is the use of that?" thought Rikki-tikki. "I have settled it all"; and then Teddy's mother picked him up from the dust and hugged him, crying that he had saved Teddy from death, and Teddy's father said that he was a providence,[9] and Teddy looked on with big scared eyes. Rikki-tikki was rather amused at all the fuss, which, of course, he did not understand. Teddy's mother might just as well have petted Teddy for playing in the dust. Rikki was thoroughly enjoying himself.

That night, at dinner, walking to and fro among the wine-glasses on the table, he could have stuffed himself three times over with nice things; but he remembered Nag and Nagaina, and though it was very pleasant to be patted and petted by Teddy's mother, and to sit on Teddy's shoulder, his eyes would get red from time to time, and he would go off into his long war-cry of "Rikk-tikk-tikki-tikki-tchk!"

Teddy carried him off to bed, and insisted on Rikki-tikki sleeping under his chin. Rikki-tikki was too well bred to bite or scratch, but as soon as Teddy was asleep he went off for his nightly walk round the house, and in the dark he ran up against Chuchundra, the muskrat, creeping round by the wall. Chuchundra is a broken-hearted little beast. He whimpers and cheeps all the night, trying to make up his mind to run into the middle of the room, but he never gets there.

[40] "Don't kill me," said Chuichundra, almost weeping. "Rikki-tikki, don't kill me."

"Do you think a snake-killer kills musk-rats?" said Rikki-tikki scornfully.

"Those who kill snakes get killed by snakes," said Chuchundra, more sorrowfully than ever. "And how am I to be sure that Nag won't mistake me for you some dark night?"

"There's not the least danger," said Rikki-tikki; "but Nag is in the garden, and I know you don't go there."

"My cousin Chua, the rat, told me –" said Chuchundra, and then he stopped.

[45] "Told you what?"

"H'sh! Nag is everywhere, Rikki-tikki. You should have talked to Chua in the garden."

"I didn't – so you must tell me. Quick Chuchundra, or I'll bite you!"

Chuchundra sat down and cried till the tears rolled off his whiskers. "I am a very poor man," he sobbed. "I never had spirit enough to run out into the middle of the room. H'sh! I musn't tell you anything. Can't you hear, Rikki-tikki?"

9. protective care provided by God(s)

Rikki-tikki listened. The house was as still as still, but he thought he could just catch the faintest *scratch-scratch* in the world, – a noise as faint as that of a wasp walking on a window-pane, – the dry scratch of a snake's scales on brick-work.

[50] "That's Nag or Nagaina," he said to himself; "and he is crawling into the bath-room sluice.[10] You're right Chuchundra; I should have talked to Chua."

He stole off to Teddy's bath-room, but there was nothing there, and then to Teddy's mother's bathroom. At the bottom of the smooth plaster wall there was a brick pulled out to make a sluice for the bath-water, and as Rikki-tikki stole in by the masonry[11] curb where the bath is put, he heard Nag and Nagaina whispering together outside in the moonlight.

"When the house is emptied of people," said Nagaina to her husband, "*he* will have to go away, and then the garden will be our own again. Go in quietly, and remember that the big man who killed Karait is the first one to bite. Then come out and tell me, and we will hunt for Rikki-tikki together."

"But are you sure that there is anything to be gained by killing the people?" said Nag.

"Everything. When there were no people in the bungalow, did we have any mongoose in the garden? So long as the bungalow is empty, we are king and queen of the garden; and remember that as soon as our eggs in the melon-bed hatch (as they may tomorrow), our children will need room and quiet."

[55] "I had not thought of that," said Nag. "I will go, but there is no need that we should hunt for Rikki-tikki afterward. I will kill the big man and his wife, and the child if I can, and come away quietly. The bungalow will be empty, and Rikki-tikki will go."

Rikki-tikki tingled all over with rage and hatred at this, and then Nag's head came through the sluice, and his five feet of cold body followed it. Angry as he was, Rikki-tikki was very frightened as he saw the size of the big cobra. Nag coiled himself up, raised his head, and looked into the bath-room in the dark, and Rikki could see his eyes glitter.

"Now, if I kill him here, Nagaina will know; and if I fight him on the open floor, the odds are in his favour. What am I to do?" said Rikki-tikki-tavi.

Nag waved to and fro, and then Rikki-tikki heard him drinking from the biggest water-jar that was used to fill the bath. "That is good," said the snake. "Now, when Karait was killed, the big man had a stick. He may have that stick still, but when he comes in to bathe in the morning he will not have a stick. I shall wait here till he comes. Nagaina – do you hear me? – I shall wait here in the cool till daytime."

There was no answer from outside, so Rikki-tikki knew Nagaina had gone away. Nag coiled himself down, coil by coil, round the bulge at the bottom of the water-jar, and Rikki-tikki stayed still as death. After an hour he began to move, muscle by muscle, toward the jar. Nag was asleep, and Rikki-tikki looked at his big back, wondering which would be the best place for a good hold. "If I don't break his back at the first jump," said Rikki, "he can still fight; and if he fights – O Rikki!" He looked at the thickness of the neck below the hood, but that was too much for him; and a bite near the tail would only make Nag savage.

10. A "sluice" is a sliding gate or other device for controlling the flow of water.
11. "Masonry" in this context refers to stonework.

[60] "It must be the head," he said at last; "the head above the hood; and when I am once there, I must not let go."

Then he jumped. The head was lying a little clear of the water-jar, under the curve of it; and, as his teeth met, Rikki braced his back against the bulge of the red earthenware[12] to hold down the head. This gave him just one second's purchase, and he made the most of it. Then he was battered to and fro as a rat is shaken by a dog – to and fro on the floor, up and down, and round in great circles; but his eyes were red, and he held on as the body cart-whipped[13] over the floor, upsetting the tin dipper and the soap-dish and the flesh-brush, and banged against the tin side of the bath. As he held he closed his jaws tighter and tighter, for he made sure he would be banged to death, and, for the honour of his family, he preferred to be found with his teeth locked. He was dizzy, aching, and felt shaken to pieces when something went off like a thunderclap just behind him; a hot wind knocked him senseless, and red fire singed his fur. The big man had been wakened by the noise, and had fired both barrels of a shot-gun into Nag just behind the hood.

Rikki-tikki held on with his eyes shut, for now he was quite sure he was dead; but the head did not move, and the big man picked him up and said: "It's the mongoose again, Alice; the little chap has saved our lives now." Then Teddy's mother came in with a very white face, and saw what was left of Nag, and Rikki-tikki dragged himself to Teddy's bedroom and spent half the rest of the night shaking himself tenderly to find out whether he was really broken into forty pieces, as he fancied.

When morning came he was very stiff, but well pleased with his doings. "Now I have Nagaina to settle with, and she will be worse than five Nags, and there's no knowing when the eggs she spoke of will hatch. Goodness! I must go and see Darzee," he said.

Without waiting for breakfast, Rikki-tikki ran to the thorn-bush where Darzee was singing a song of triumph at the top of his voice. The news of Nag's death was all over the garden, for the sweeper had thrown the body on the rubbish-heap.

[65] "Oh, you stupid tuft of feathers!" said Rikki-tikki angrily. "Is this the time to sing?"

"Nag is dead – is dead – is dead!" sang Darzee. "The valiant[14] Rikki-tikki caught him by the head and held fast. The big man brought the bang-stick, and Nag fell in two pieces! He will never eat my babies again."

"All that's true enough; but where's Nagaina?" said Rikki-tikki, looking carefully round him.

"Nagaina came to the bath-room sluice and called for Nag," Darzee went on; "and Nag came out on the end of a stick – the sweeper picked him up on the end of a stick and threw him upon the rubbish-heap. Let us sing about the great, the red-eyed Rikki-tikki!" and Darzee filled his throat and sang.

"If I could get up to your nest, I'd roll all your babies out!" said Rikki-tikki. "You don't know when to do the right thing at the right time. You're safe enough in your nest there, but it's war for me down here. Stop singing a minute, Darzee."

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12. "Earthenware" is pottery of baked or hardened clay.
13. A "cart whip" is a heavy short-handled horsewhip.
14. **Valiant** ***(adjective):*** possessing or showing courage or determination

[70] "For the great, the beautiful Rikki-tikki's sake I will stop," said Darzee. "What is it, O Killer of the terrible Nag?"

"Where is Nagaina, for the third time?"

"On the rubbish-heap by the stables, mourning for Nag. Great is Rikki-tikki with the white teeth."

"Bother my white teeth! Have you ever heard where she keeps her eggs?"

"In the melon-bed, on the end nearest the wall, where the sun strikes nearly all day. She hid them there weeks ago."

[75] "And you never thought it worthwhile to tell me? The end nearest the wall, you said?"

"Rikki-tikki, you are not going to eat her eggs?"

"Not eat exactly; no. Darzee, if you have a grain of sense you will fly off to the stables and pretend that your wing is broken, and let Nagaina chase you away to this bush. I must get to the melon-bed, and if I went there now she'd see me."

Darzee was a feather-brained little fellow who could never hold more than one idea at a time in his head; and just because he knew that Nagaina's children were born in eggs like his own, he didn't think at first that it was fair to kill them. But his wife was a sensible bird, and she knew that cobra's eggs meant young cobras later on; so she flew off from the nest, and left Darzee to keep the babies warm, and continue his song about the death of Nag. Darzee was very like a man in some ways.

She fluttered in front of Nagaina by the rubbish heap, and cried out, "Oh, my wing is broken! The boy in the house threw a stone at me and broke it." Then she fluttered more desperately than ever.

[80] Nagaina lifted up her head and hissed, "You warned Rikki-tikki when I would have killed him. Indeed and truly, you've chosen a bad place to be lame[15] in." And she moved toward Darzee's wife, slipping along over the dust.

"The boy broke it with a stone!" shrieked Darzee's wife.

"Well! It may be some consolation[16] to you when you're dead to know that I shall settle accounts with the boy. My husband lies on the rubbish-heap this morning, but before the night the boy in the house will lie very still. What is the use of running away? I am sure to catch you. Little fool, look at me!"

Darzee's wife knew better than to do *that*, for a bird who looks at a snake's eyes gets so frightened that she cannot move. Darzee's wife fluttered on, piping sorrowfully, and never leaving the ground, and Nagaina quickened her pace.

Rikki-tikki heard them going up the path from the stables, and he raced for the end of the melon-patch near the wall. There, in the warm litter about the melons, very cunningly hidden, he found twenty-five eggs, about the size of a bantam's[17] eggs, but with whitish skin instead of shell.

15. **Lame *(adjective):*** unable to move normally because of an injury
16. **Consolation *(noun):*** comfort received by a person after a loss or disappointment

[85] "I was not a day too soon," he said; for he could see the baby cobras curled up inside the skin, and he knew that the minute they were hatched they could each kill a man or a mongoose. He bit off the tops of the eggs as fast as he could, taking care to crush the young cobras, and turned over the litter from time to time to see whether he had missed any. At last there were only three eggs left, and Rikki-tikki began to chuckle to himself, when he heard Darzee's wife screaming:

"Rikki-tikki, I led Nagaina toward the house, and she has gone into the verandah, and – oh, come quickly – she means killing!"

Rikki-tikki smashed two eggs, and tumbled backward down the melon-bed with the third egg in his mouth, and scuttled to the verandah as hard as he could put foot to the ground. Teddy and his mother and father were there at early breakfast; but Rikki-tikki saw that they were not eating anything. They sat stone-still, and their faces were white. Nagaina was coiled up on the matting by Teddy's chair, within easy striking-distance of Teddy's bare leg, and she was swaying to and fro singing a song of triumph.

Teddy's eyes were fixed on his father, and all his father could do was to whisper, "Sit still, Teddy. You mustn't move. Teddy, keep still."

Then Rikki-tikki came up and cried: "Turn round Nagaina; turn and fight!"

[90] "All in good time," said she, without moving her eyes. "I will settle my account with you presently. Look at your friends, Rikki-tikki. They are still and white; they are afraid. They dare not move, and if you come a step nearer I strike."

"Look at your eggs," said Rikki-tikki, "in the melon-bed near the wall. Go and look, Nagaina."

The big snake turned half round, and saw the egg on the verandah. "Ah-h! Give it to me," she said.

Rikki-tikki put his paws one on each side of the egg, and his eyes were blood-red. "What price for a snake's egg? For a young cobra? For a young king-cobra? For the last – the very last of the brood? The ants are eating all the others down by the melon-bed."

Nagaina spun clear round, forgetting everything for the sake of the one egg; and Rikki-tikki saw Teddy's father shoot out a big hand, catch Teddy by the shoulder, and drag him across the little table with the teacups, safe and out of reach of Nagaina.

[95] "Tricked! Tricked! Tricked! Rikk-*tchk-tchk!*" chuckled Rikki-tikki. "The boy is safe, and it was I – I – I that caught Nag by the hood last night in the bathroom." Then he began to jump up and down, all four feet together, his head close to the floor. "He threw me to and fro, but he could not shake me off. He was dead before the big man blew him in two. I did it. *Rikki-tikki-tchk-tchk*! Come then, Nagaina, Come and fight with me. You shall not be a widow long."

Nagaina saw that she had lost her chance of killing Teddy, and the egg lay between Rikki-tikki's paws. "Give me the egg, Rikki-tikki. Give me the last of my eggs, and I will go away and never come back," she said, lowering her hood.

17. a small breed of chicken

"Yes, you will go away, and you will never come back; for you will go to the rubbish-heap with Nag. Fight, widow! The big man has gone for his gun! Fight!"

Rikki-tikki was bounding all round Nagaina, keeping just out of reach of her stroke, his little eyes like hot coals. Nagaina gathered herself together, and flung out at him. Rikki-tikki jumped up and backward. Again and again and again she struck, and each time her head came with a whack on the matting of the verandah, and she gathered herself together like a watch-spring. Then Rikki-tikki danced in a circle to get behind her, and Nagaina spun round to keep her head to his head, so that the rustle of her tail on the matting sounded like dry leaves blown along by the wind.

He had forgotten the egg. It still lay on the verandah, and Nagaina came nearer and nearer to it, till at last, while Rikki-tikki was drawing breath, she caught it in her mouth, turned to the verandah steps, and flew like an arrow down the path, with Rikki-tikki behind her. When the cobra runs for her life, she goes like a whip-lash flicked across as horse's neck.

[100] Rikki-tikki knew that he must catch her, or all the trouble would begin again. She headed straight for the long grass by the thorn-bush, and as he was running Rikki-tikki heard Darzee still singing his foolish little song of triumph. But Darzee's wife was wiser. She flew off her nest as Nagaina came along, and flapped her wings about Nagaina's head. If Darzee had helped they might have turned her; but Nagaina only lowered her hood and went on. Still, the instant's delay brought Rikki-tikki up to her, and as she plunged into the rat-hole where she and Nag used to live, his little white teeth were clenched on her tail, and he went down with her – and very few mongooses, however wise and old they may be, care to follow a cobra into its hole. It was dark in the hole; and Rikki-tikki never knew when it might open out and give Nagaina room to turn and strike at him. He held on savagely, and struck out his feet to act as brakes on the dark slope of the hot, moist earth.

Then the grass by the mouth of the hole stopped waving, and Darzee said: "It is all over with Rikki-tikki! We must sing his death song. Valiant Rikki-tikki is dead! For Nagaina will surely kill him underground."

So he sang a very mournful song that he made up on the spur of the minute, and just as he got to the most touching part the grass quivered again, and Rikki-tikki, covered with dirt, dragged himself out of the hole leg by leg, licking his whiskers. Darzee stopped with a little shout. Rikki-tikki shook some of the dust out of his fur and sneezed. "It is all over," he said. "The widow will never come out again." And the red ants that live between the grass stems heard him, and began to troop down one after another to see if he had spoken the truth.

Rikki-tikki curled himself up in the grass and slept where he was – slept and slept till it was late in the afternoon, for he had done a hard day's work.

"Now," he said, when he awoke, "I will go back to the house. Tell the Coppersmith, Darzee, and he will tell the garden that Nagaina is dead."

[105] The Coppersmith is a bird who makes a noise exactly like the beating of a little hammer on a copper pot; and the reason he is always making it is because he is the town-crier to every Indian garden, and tells all the news to everybody who cares to listen. As Rikki-tikki went up the path, he heard his "attention" notes like a tiny dinner-gong; and then the steady "*Ding-dong-tock!* Nag is dead – *dong!* Nagaina is dead! *Ding-dong-tock!*" That set all the birds in the garden singing, and frogs croaking; for Nag and Nagaina used to eat frogs as well as little birds.

When Rikki got to the house, Teddy and Teddy's mother (she still looked very white, for she had been fainting) and Teddy's father came out and almost cried over him; and that night he ate all that was given him till he could eat no more, and went to bed on Teddy's shoulder, where Teddy's mother saw him when she came to look late at night.

"He saved our lives and Teddy's life," she said to her husband. "Just think, he saved all our lives!"

Rikki-tikki woke up with a jump, for all the mongooses are light sleepers.

"Oh, it's you," said he. "What are you bothering for? All the cobras are dead; and if they weren't, I'm here."

[110] Rikki-tikki had a right to be proud of himself; but he did not grow too proud, and he kept that garden as a mongoose should keep it, with tooth and jump and spring and bit, till never a cobra dared show its head inside the walls.

Text-Dependent Questions

Directions: For the following questions, choose the best answer or respond in complete sentences.

1. PART A: Which statement best expresses a theme of the story?
   A. With the support of friends and family, anything is possible.
   B. Acting courageously in the face of danger leads to rewards.
   C. Some relationships are doomed from the start.
   D. It takes some people longer to build trust than others.

2. PART B: Which TWO details from the story best support the answer to Part A?
   A. "Darzee, the tailor-bird, helped him, and Chuchundra, the musk-rat, who never comes out into the middle of the floor,"(Paragraph 1)
   B. "He knew that mongooses in the garden meant death sooner or later for him and his family, but he wanted to get Rikki-tikki off his guard." (Paragraph 27)
   C. "for he made sure he would be banged to death, and, for the honour of his family, he preferred to be found with his teeth locked." (Paragraph 61)
   D. "and very few mongooses, however wise and old they may be, care to follow a cobra into its hole." (Paragraph 100)
   E. Darzee said: "It is all over with Rikki-tikki! We must sing his death song. Valiant Rikki-tikki is dead! For Nagaina will surely kill him underground." (Paragraph 101)
   F. "and that night he ate all that was given him till he could eat no more, and went to bed on Teddy's shoulder" (Paragraph 107)

3. What is the relationship between the poem at the beginning and the rest of the story?
   A. The poem describes Nagaina's inner thoughts before she is introduced as a character.
   B. The poem reveals that Rikki-tikki will be victorious in his fight against the cobras.
   C. The poem explains how cobras and mongooses get along in the wild when humans are not around.
   D. The poem shows how the cobras could have killed Rikki-tikki if they were quicker during the fight.

4. How does Rikki-tikki's decision to destroy Nagaina's eggs contribute to the story?
   A. Nagaina leaves the garden after she learns that her eggs have been destroyed, which makes the garden safe again.
   B. It makes the other animals turn on Rikki-tikki and refuse to help him defeat Nagaina.
   C. When Nagaina is about to bite Teddy, Rikki-tikki is able to distract her by telling her there is only one egg left.
   D. Rikki-tikki successfully prevents the birth of future cobras, and this makes family happy.

5. How does Rikki-tikki respond to the cobras, and what does this reveal about his character?

Discussion Questions

Directions: Brainstorm your answers to the following questions in the space provided. Be prepared to share your original ideas in a class discussion.

1. In your opinion, which character in the story was the bravest? What about their actions made them brave?

2. In the story, different characters face different fears. How does fear influence how we act? Cite evidence from this text, your own experience, and other literature, art, or history in your answer

NBA to start youth tournament

By Tim Bontemps, Washington Post, adapted by Newsela staff on 01.02.18
Word Count **781**
Level **MAX**

Image 1: NBA all-star Russell Westbrook of the Oklahoma City Thunder coached students from St. John Fisher School as part of a "Junior NBA" day. Photo by: Lucas Oleniuk/Toronto Star via Getty Images

Each summer, America turns its eyes to Williamsport, Pennsylvania, home of the Little League World Series. Fans watch youth baseball players from around the country and the world take part in the competition that has grown into a wildly popular spectacle — not to mention one that is financially successful.

The NBA has taken notice.

The league will soon announce the creation of the Jr. NBA World Championship. It hopes that, in time, this event will become the NBA's version of what the Little League World Series has become for baseball.

"I think what we were really focused on was developing a new model for this kind of basketball event," said Kathy Behrens. She is the NBA's president of social responsibility and player programs. Behrens said that the NBA had been working with USA Basketball over the past year and a half to develop a set of standards and guidelines for youth basketball. "This tournament, I think, represents in a way that nothing else that we've done before does," she said.

The event will take place August 7 to 12, 2018, at the ESPN Wide World of Sports Complex inside Disney World. It will feature top boys' and girls' teams age 14 and younger from around the United States and the world.

"Obviously, we know that what happens on the court is incredibly important, but we think this is going to be an event that will help kids really understand and embrace the values that we talk about around our game: teamwork, respect, determination," Behrens said. "We are going to have a community service element. There will be life skills programming available that the kids will be participating in.

"We think there are a lot of special elements to what we are going to be doing, and it really does make it the first-of-its-kind basketball competition around the world."

The NBA's Jr. World Championship will follow the model of the Little League World Series. Teams will qualify for the championship rounds via a variety of regional tournaments. Half will come from American qualifying tournaments from eight created regions: Central, Mid-Atlantic, Midwest, Northeast, Northwest, South, Southeast and West. The other half will come from eight international regions: Africa and Middle East, Asia Pacific, Canada, China, Europe, India, Mexico and South America. Those 16 teams will then compete in the championship event at Disney World.

For some time now, NBA Commissioner Adam Silver has emphasized youth basketball as a priority moving forward. And along those lines, it is notable that all coaches participating in the event will be required to be trained and licensed by USA Basketball or basketball's international governing body, FIBA. Where they must be trained will depend on whether the teams are representing a region from the United States or an international location.

It's clear the NBA sees this as an opportunity to get involved in the framework of youth basketball. The league is also hoping to potentially loosen some of the grip that AAU has come to have over the sport. The tournament is only for 14-and-under teams at the moment. But the league could add other age ranges in the future.

"The schedule will be different than most of these elite tournaments," Behrens said. "We think that this is a model for youth basketball. Our commitment, as Adam has said, is to get more involved in youth basketball, not less, so this is one big way to do that."

The league also looks to benefit from this venture financially. The Little League World Series has become a fixture on ESPN's calendar each summer. The NBA is expecting its tournament to be televised as well, though where and how is still being determined.

It also isn't coincidental that the tournament will take place in one of the few dormant times on the NBA calendar: early August. Currently only the WNBA and some international charity ventures take place in that month. This is another opportunity for the league to continue its quest to make the sport a 365-days-a-year enterprise.

"That is definitely our goal, that August will be a high point on the calendar for youth basketball," Behrens said. "Certainly, we have enormous respect and affection for the Little League World

Series and what they have built, and we'd be lucky to have the same kind of event."

Whether the Jr. NBA World Championship can become as wide-ranging as the Little League World Series remains to be seen. But by starting the event, it's clearly what the NBA is hoping it will turn into.

Quiz

1 Which selection from the article shows Behrens' MAIN opinion about the Jr. NBA World Championship?

(A) Behrens said that the NBA had been working with USA Basketball over the past year and a half to develop a set of standards and guidelines for youth basketball.

(B) "We are going to have a community service element. There will be life skills programming available that the kids will be participating in."

(C) "We think there are a lot of special elements to what we are going to be doing, and it really does make it the first-of-its-kind basketball competition around the world."

(D) "That is definitely our goal, that August will be a high point on the calendar for youth basketball," Behrens said.

2 Read the following statement.

The NBA hopes to make money from the Jr. NBA World Championship.

Which sentence from the article provides the BEST support for the above statement?

(A) The event will take place August 7 to 12, 2018, at the ESPN Wide World of Sports Complex inside Disney World.

(B) For some time now, NBA Commissioner Adam Silver has emphasized youth basketball as a priority moving forward.

(C) The league is also hoping to potentially loosen some of the grip that the AAU has come to have over the sport.

(D) The NBA is expecting its tournament to be televised as well, though where and how is still being determined.

3 What is the MOST likely reason the author included the information about the Little League World Series?

(A) The author wanted to highlight another tournament that emphasizes community service.

(B) The author wanted to show the different rules for basketball and baseball competitions.

(C) The author wanted to describe a tournament that has not yet had as much success at the Jr. NBA.

(D) The author wanted to help explain what influenced the NBA to start the Jr. NBA World Championship.

4 Read the paragraph below.

It also isn't coincidental that the tournament will take place in one of the few dormant times on the NBA calendar: early August. Currently only the WNBA and some international charity ventures take place in that month. This is another opportunity for the league to continue its quest to make the sport a 365-days-a-year enterprise.

Why did the author include this paragraph?

(A) to emphasize that the NBA is trying to get people to watch the Jr. NBA World Championship on TV

(B) to illustrate why the Jr. NBA World Championship has been scheduled for August

(C) to highlight the importance of community service and charity to the Jr. NBA

(D) to describe how the NBA plans to make the Jr. NBA World Championship its most important event of the year

Startup company has a simple mission: To make youth sports more accessible

By Philadelphia Inquirer, adapted by Newsela staff on 08.22.17
Word Count **902**
Level **1070L**

Evan Brandoff (orange shirt) and Zubin Teherani (white tank top) lead an employee team huddle at their office. Photo: Jessica Griffin/Philadelphia Inquirer/TNS

PHILADELPHIA, Pennsylvania — Evan Brandoff and Zubin Teherani are two single guys in their mid-20s sharing an apartment in the city, free of family responsibilities. In other words, they have no kids.

Yet, they work on behalf of children daily as founders of the startup company LeagueSide. Written on the white board in the conference room of their work space is this mission statement: “To make youth sports more accessible.”

Their method is to help sports organizations reach beyond the traditional sources of funds for uniforms, equipment and more. Money usually comes from local businesses like mom-and-pop pizza shops, hardware stores and players’ parents. LeagueSide helps groups to land sponsorships from regional and national companies.

“We want to give every single child the opportunity in the United States to be able to play organized sports,” said Brandoff, 25. He is LeagueSide’s chief executive.

Staff And Moneys Raised Are Both Growing

Since being launched in 2015, LeagueSide will have helped to secure about $2 million in funding for 600 leagues in 16 states by year's end, Brandoff said. Half of that funding will have come this year, he said. He declined to reveal how much that money the company keeps.

Its staff of 12 is expected to expand to 20 over the next few months. However, it still would not be big enough for LeagueSide to reach its goal of opening regional offices. So LeagueSide soon plans to seek $3 million to $5 million from investors. Last year, it raised $750,000 from investors.

Teherani, 26, is LeagueSide's chief operating officer. "What is so exciting as we grow," he said, is not only is it a company that is worth a great deal of money, it is also giving back money to communities.

Basketball Game Sparks An Idea

The idea came to Brandoff a couple of years ago when he was in Detroit, Michigan, with the Venture for America program. He was working for Benzinga.com, a financial media company.

While volunteering at a basketball tournament, he noticed the attention of parents to the players on the court — and saw the sales opportunity. He also recognized that companies wanting to reach that audience could help reduce the cost of youth sports for families.

Reaching youth sports audiences requires a monumental effort, even for large companies. LeagueSide estimates that there are 38 million kids playing youth sports in the United States. There are many sports leagues, mostly run by volunteers.

With its sponsorships, LeagueSide can "reach families in an engaged setting." Efforts include banners, coupons, coach-of-the-year contests, group email and social-media posts, Brandoff said.

"Through LeagueSide," he said, "brands can reach families in their most engaged and happy setting when their kids are creating memories."

Thousands of Families Have Been Helped

The sponsorships are intended to let leagues lower fees for families and cover the costs for kids whose parents cannot afford to pay. Brandoff said LeagueSide's work has benefited more than 500,000 families. Help has come in the form of lower fees or coupons and gift cards to sponsoring businesses. Brandoff said "thousands of kids" who could not afford to join a league have gotten the opportunity because of LeagueSide sponsors.

Felix Agosto is chief executive of MVP360 Community Programs, a youth sports nonprofit group. Working in some of Philadelphia's neediest neighborhoods, he said he has kept the cost to register at around $40 a sport. Agosto said this is despite growth since he started the programs in 2012.

"The more kids we have, the more costs," Agosto said. He is a father of two who does not like to ask parents to raise funds because they are already paying fees. Agosto figured there was no harm in trying LeagueSide, especially when he found out that it did not require him to sell anything.

MVP360 does have to do two social-media posts, send out two emails to parents and hang a banner at sporting events — all naming LeagueSide sponsors. For MVP360, those have been a health care network, a law office, and a medical center. Their contributions have ranged from $1,500 to $2,500 per sports program, Agosto said.

The emails he sends parents usually contain something relevant relating to sports from the sponsors, such as tips on avoiding injuries. LeagueSide creates the content of the emails.

“This is actually cost-effective for us, for the parents and for the companies,” Agosto said. He said the sponsors are “reaching an audience they might not necessarily reach with a TV ad or a newspaper ad.”

Molding A "Small Universe"

That view is shared by Jamison Young, a marketing manager for Smoothie King, a company specializing in blended drinks and healthy snacks. Smoothie King is based near New Orleans, Louisiana.

While radio has a broad reach, its audience often is “hearing a message and forgetting about it,” Young said.

LeagueSide “allows us to make this small universe of moms, dads, coaches and athletes,” Young said.

“They see a banner at the field every Saturday and then, at home, they will get an email from the league containing a Smoothie King coupon," he said. On another Saturday, he said, store owners will be at the field with samples.

So far, Smoothie King is happy, Young said. He cited a survey last year showing that 41 percent of people who had never heard of or visited a Smoothie King before the season had become customers.

Quiz

1. Which paragraph in the section "Basketball Game Sparks An Idea" describes different approaches LeagueSide takes to get the attention of audiences at youth sporting events?

2. Which section of the article BEST explains what youth sports programs must do when they work with LeagueSide?

   (A) Introduction [paragraphs 1-4]

   (B) "Staff And Money Raised Are Both Growing"

   (C) "Thousands Of Families Have Been Helped"

   (D) "Molding A 'Small Universe'"

3. Which of the following MOST influenced Evan Brandoff to start the company LeagueSide?

   (A) the number of people he saw attending a basketball tournament

   (B) the amount of attention that parents paid to their children playing in a basketball tournament

   (C) the number of sports leagues that are run by volunteers

   (D) the amount of effort it takes for large companies to reach youth sports audiences with advertising

4. Which answer choice BEST explains how LeagueSide helped a marketing manager for Smoothie King?

   (A) It allowed the manager to advertise his company's products to a small audience in a more thorough way.

   (B) It showed the manager how to use the radio to advertise his company's products to a broad audience.

   (C) It told the manager to put up banners at sports fields and send emails to parents to advertise his company's products.

   (D) It conducted a survey for the manager to show who was buying his company's products as a result of advertising.

U.S. soccer group's project brings game to inner-city kids in Chicago

By Washington Post, adapted by Newsela staff on 12.15.17

Word Count **814**

Level **940L**

Men play a pickup soccer game in a Washington, D.C., park. Although many have grown accustomed to playing pickup soccer in any open patch of concrete or field throughout the city, such spaces are starting to vanish. Photo by: Jahi Chikwendiu/The Washington Post/Getty Images

Growing up in New York, first in Brooklyn and then North Babylon, Ed Foster-Simeon played basketball whenever he wanted. Basketball courts could be found in most neighborhoods and schools.

Friends got together and played pickup games for hours, learning and loving the game through boyhood experiences. There was nothing official about it: kids developed their own style and chemistry without adult supervision.

"I didn't see a coach until I was in eighth grade," he recalled in a recent interview.

Decades later, Foster-Simeon is president and chief executive of the U.S. Soccer Foundation, which aims to make soccer popular. Now, he is applying the lessons of street basketball to soccer.

Soccer Mini-Pitches Planned In Some Chicago Communities

On December 6, he joined Chicago Mayor Rahm Emanuel and former U.S. men's and women's national soccer team players for an announcement: 50 mini-pitches will be built over three years in the city's underserved, poorer neighborhoods.

Mini-pitches are outdoor hard surfaces, the size of a tennis court. The smaller fields help kids develop technical skill and creativity. They're similar to pickup basketball in parks and schools around the country. Foster-Simeon says this will make more soccer players. The new mini-pitches will bring the game to children who otherwise do not have the opportunity or resources to play regularly.

"Creating The Access And Opportunity" For Kids

"Growing up with basketball, no one had to tell us to compete," he said. "You didn't want to lose; you wanted to stay on the court. We think that same soccer culture exists here in this country. It's just creating the access and opportunity."

The issue of expanding opportunity and developing players comes at a time when the U.S. soccer community is still hurt because the national men's team did not qualify for the World Cup this fall.

The community is looking to reach youths, particularly in minority communities, who have slipped through the cracks. Many say club soccer programs are too costly, keeping away hopeful players.

For Some Kids, "Pay To Play Doesn't Work For Them"

"Pay to play doesn't work for them," Foster-Simeon said. "Neither does the idea of, 'Let's get in the minivan and go to the soccer complex for practice.' It doesn't work for a large number of children. So creating opportunities in the neighborhood where kids live and creating a safe place for them to play, we think solves a number of problems."

Mini-pitches take away the high costs, Foster-Simeon said. "Kids are getting introduced to the game, having a chance to play and developing a love for it.

"Some of those kids will be good - there's no question ..." he said.

Ten mini-pitches opened in New York in October, with 40 more on the way. They will open in places such as Philadelphia and Los Angeles in the future. The goal is to build 1,000 nationwide by 2026.

Soccer Foundation Targets Poor, Neglected Areas

The Washington-based U.S. Soccer Foundation was founded in 1994. The United States hosted the World Cup soccer events that year. They earned enough money to set aside $50 million to make the Foundation. The nonprofit group's mission is to grow the sport by giving money to communities and soccer organizations, and by establishing sports-based youth programs, particularly in poorer, neglected areas.

Each pitch costs $60,000 and takes about three weeks to build. The Chicago effort will begin when the weather gets better in the spring.

The December 6 ceremony included, among others, former U.S. stars Brian McBride and Kristine Lilly. McBride is an Illinois native, who played fo the U.S. men's team in three World Cups. Lilly is a New York native, who played for the U.S. women's team in five World Cups.

Pro Soccer Team Chicago Fire Joins Efforts

The project has enlisted the Chicago Park District and the Chicago Fire, a Major League Soccer (MLS) team. Major League Soccer is the men's professional soccer league.

The pitches will help give young people in Chicago "places to play and learn one of the world's most exciting and popular games," Emanuel said in a statement. "This partnership provides a great opportunity for our youth to stay active, and gain teamwork and leadership skills." Such skills will help later in life, he said.

Germany identified the benefits of mini-pitches after it hosted the 2006 World Cup, building more than 1,000 around the country.

In recent years, MLS teams have been involved in mini-pitch openings.

The U.S. foundation's Soccer for Success, an after-school program, uses the outdoor spaces to introduce the game to children. And in their free time, those same kids just might return for pickup soccer.

"I wouldn't underestimate the value of getting kids playing soccer in that kind of format," Foster-Simeon said of playground facilities. "The tight spaces on the mini-pitch, their skill development will naturally develop. It has to - or you lose the ball."

Quiz

1 Which of the following sentences from the section "Creating The Access And Opportunity For Kids" BEST develops a central idea of the article?

(A) "Growing up with basketball, no one had to tell us to compete," he said.

(B) The issue of expanding opportunity and developing players comes at a time when the U.S. soccer community is still hurt because the national men's team did not qualify for the World Cup this fall.

(C) The community is looking to reach youths, particularly in minority communities, who have slipped through the cracks.

(D) Many say club soccer programs are too costly, keeping away hopeful players.

2 Read the following sentence from the section "Soccer Foundation Targets Poor, Neglected Areas."

> *The nonprofit group's mission is to grow the sport by giving money to communities and soccer organizations, and by establishing sports-based youth programs, particularly in poorer, neglected areas.*

Which central idea of the article is MOST supported by the sentence above?

(A) Competitive soccer is financially inaccessible for some people in poorer communities.

(B) The U.S. Soccer Foundation wants more kids to play private competitive soccer.

(C) The U.S. Soccer Foundation hopes that new after-school programs will help to popularize the sport.

(D) Rahm Emanuel hopes to make soccer just as popular a sport as basketball.

3 How does the article introduce the role of the U.S. Soccer Foundation in developing the sport?

(A) by including a personal story from the childhood of the foundation's chief executive

(B) by recounting the failure of the U.S. men's team this fall to qualify for the World Cup

(C) by stating details about the foundation's budget for the new project

(D) by describing when it was founded and what its original purpose was

4 How is the Chicago Fire involved in the U.S. Soccer Foundation's project to build mini-pitches?

(A) The team is running an after-school skills camp for poorer kids.

(B) The team is advertising the new soccer facilities at its games.

(C) The team supports the construction of the new soccer facilities.

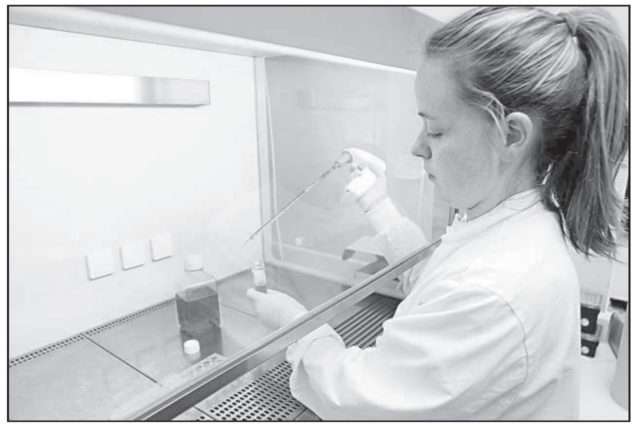
(D) The team will be recruiting players from the new soccer facilities.

Name: ______________________ Class: ______________________

The Scientific Method

By Barrett Smith
2017

In this informational text, Barrett Smith explains the steps of the Scientific Method, a process that scientists use while conducting experiments. As you read, take notes on each step of the Scientific Method.



"test tube" by The Open University is licensed under CC BY-NC-ND 2.0.

[1] The Scientific Method is the name for the steps that scientists follow when conducting an experiment. The Scientific Method was developed by the ancient Greeks and has been refined[1] by scientists ever since. Sometimes scientists modify[2] these steps depending on the type of experiment, and sometimes they have to back up and repeat steps. But it's important to follow these steps because they allow us to test things in the most accurate and valid[3] way possible.

These are the typical steps that scientists would go through in order to complete the Scientific Method:

Ask a question

Usually experiments start when people ask questions about things they see around them. The scientific method will help you answer those questions. When picking a question to study, it is best to start with a question that has an answer that can be measured. For example, how does caffeine, a substance found in coffee, affect plant growth? It will be easy to measure how much a plant grows over time using a ruler.

Construct a hypothesis

A hypothesis is a scientific term for an educated guess. When forming your hypothesis, you can often fill in an if ____ , then ____ statement. For example, if plants are watered with coffee, then they will grow faster. You should do background research on the topic while constructing your hypothesis so that your guess can be well-informed.

1. **Refine** ***(verb):*** to improve something by making small changes
2. **Modify** ***(verb):*** to make partial or minor changes to something
3. **Valid** ***(adjective):*** based on truth or fact

Test your hypothesis with an experiment

[5] It is important that your experiment is a fair and valid test of your hypothesis. You should make sure that you only change one condition in your experiment at a time and keep all other conditions the same. In our example, you would want to make sure that the only thing you change is what you water the plants with. You would use the same type of seeds in each plant, the same type of soil, and keep them in the same place where they will get the same amount of sunlight. If one plant gets more sunlight than another one, you won't know for sure if it was the sunlight or the coffee that made it grow faster. You also need to repeat the experiment several times to make sure the results were not random. This is called having multiple trials.

Analyze Data

Collect your measurements and analyze[4] them to see if they support your hypothesis. You can put your measurements in a chart or a graph to help you. It is important to think about what type of graph works best for your data.[5] A line graph would work well to present the data from our experiment, as it can show how the plant heights changed over time. Bar graphs and pie charts are also very useful graphs.

Communicate results

You might present your results on a display board or write about them in a final report. You will want to share the question you asked and your hypothesis and then explain your experiment. You will often be asked to present a list of materials and the steps of your experiment — this is called the procedure. Finally, you will present your data through charts and graphs and write a conclusion. The conclusion will state whether your hypothesis was true or not. Even if your results do not support your hypothesis, your experiment is still valid if you followed the scientific method!

Here are some important terms that scientists use when conducting experiments:

Variable — In experiments, the things that change are called variables. There are three kinds of variables: independent, dependent, and controlled.

Independent Variable — The independent variable is the one variable that the scientist changes during the experiment. In our experiment, the independent variable was what you used to water the plants. Again, it is important that this is the only thing you change in the experiment so your results are valid.

[10] *Dependent Variable* — The dependent variable is the thing scientists are looking to see change as a result of the independent variable. In our example, how much the plant grows is the dependent variable.

4. **Analyze** ***(verb):*** to study or determine the nature and relationship of the parts of something
5. **Data** ***(noun):*** facts and statistics collected together for analysis

Control — The control is an experiment where nothing is changed and offers a baseline to compare to the experiments in which something has been changed. In our experiment, the control would be a plant that you water with water. This way you can compare the other parts of the experiment to the control to see how much your independent variable affects it.

When you decide to conduct an experiment, whether it be for school, a science fair, or just to test out questions you have about the world, make sure to follow the scientific method and only change the independent variable so that your results will be valid. When you finish your experiment, don't forget to do multiple trials. If you find your results don't prove your hypothesis, you can do some more research and create a new hypothesis and experiment. If your results do prove your hypothesis, keep asking questions and you can conduct further experiments to more deeply understand the subject and the world around you.

Text-Dependent Questions

Directions: For the following questions, choose the best answer or respond in complete sentences.

1. PART A: Which statement expresses the text's central idea?
    - A. The Scientific Method gives scientists a process to help them make sense of the world and determine what is true.
    - B. The Scientific Method's simple process children use to make sense of the world around them.
    - C. The Scientific Method is not perfect, but it is currently the only way humans can make sense of the world around them.
    - D. The Scientific Method is difficult for many people to grasp due to its strict steps and discouragement of creativity.

2. PART B: Which quote from the text best supports the answer to Part A?
    - A. "The Scientific Method was developed by the ancient Greeks and has been refined by scientists ever since." (Paragraph 1)
    - B. "Usually experiments start when people ask questions about things they see around them. The scientific method will help you answer those questions." (Paragraph 3)
    - C. "You will often be asked to present a list of materials and the steps of your experiment — this is called the procedure." (Paragraph 7)
    - D. "make sure to follow the scientific method and only change the independent variable so that your results will be valid." (Paragraph 12)

3. What is the author's purpose for including the experiment regarding the effects of coffee on plant growth?
    - A. to show students the benefits of drinking coffee
    - B. to emphasize how easy it is to use the Scientific Method
    - C. to prove that a scientist's hypothesis can be anything, even something silly
    - D. to give students a real-world example of the Scientific Method

4. How does the conclusion contribute to the development of ideas in the text (Paragraph 12)?

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Discussion Questions

Directions: Brainstorm your answers to the following questions in the space provided. Be prepared to share your original ideas in a class discussion.

1. If you could conduct any experiment you wanted to using the Scientific Method, what would you test and why?

2. How does the Scientific Method help scientists better understand the world? How does the Scientific Method compare to other ways in which scientists study the world? Cite examples from the text, your own experience, and other literature, art, or history in your answer.

3. In your opinion, what are the benefits and disadvantages to using the Scientific Method? Cite examples from the text, your own experience, and other literature, art, or history in your answer.

SpaceX founder wants to send humans to Mars as backup plan for civilization

By Hannah Devlin, The Guardian, adapted by Newsela staff on 06.22.17
Word Count **803**
Level **950L**

Concept art of sending the SpaceX Dragon to Mars. Elon Musk has revealed new details of his vision for a city on Mars populated by a million people. Photo by: SpaceX via Flickr

As far as home planets go, Earth meets the criteria. It's got oxygen, water, food and lovely views. However, there are risks to consider. What if a nuclear war, an asteroid crash or other disaster made it impossible for humans to keep living here?

Elon Musk is one step ahead. Last year, the SpaceX founder and CEO outlined his ambition to send humans to Mars as a backup for civilization. Now, the billionaire businessman has provided more details of his vision to make humans a multi-planetary species. His paper on it was published in the journal New Space.

His paper outlines early plans for a gigantic spacecraft. It is designed to carry 100 passengers.

“The thrust level is enormous,” the paper states. “We are talking about a lift-off thrust of 13,000 tons.”

Looking For (Rich) Volunteers To Pioneer Mars

Creating a self-sustained civilization of around 1 million people is the ultimate goal. It would take 40 to 100 years, based on the plans. Before full colonization, though, Musk needs to get the first pioneers to the red planet.

The situation is summed up by a Venn diagram. On one side are people willing to get on the Mars rocket. On the other side are those who could afford it, with no one in both groups. One estimate of the cost is $10 billion per person.

Musk says we need to move those two groups together. If the cost could be dropped to the cost of an average U.S. house price, he predicts people would start to sign up in big enough numbers to kick off the project. “Given that Mars would have a labor shortage for a long time, jobs would not be in short supply,” he says.

The paper strikes a cheerful, even humorous tone and doesn’t get excessively bogged down in technical detail. One section, titled “Why Mars,” spells out that the Red Planet is essentially the best of a bad lot. Musk writes that Venus is a high-pressure hot acid bath. “So, it would be really difficult to make things work on Venus.”

Musk Says Mars Would Be "Quite Fun"

The moon is dismissed for being too small. “I actually have nothing against going to the moon, but I think it is challenging to become multi-planetary on the moon because it is much smaller than a planet.”

“It would be quite fun to be on Mars because you would have gravity that is about 37 percent of that of Earth, so you would be able to lift heavy things,” he adds. He predicts that the time it would take to travel from Earth to Mars could eventually be cut to 30 days.

The spaceship’s design is summed up as “not that complicated” in some ways. Critics might point out that runs contrary to the reputation of this field of science.

The paper points out that money will remain a challenge. “We have to figure out how to improve the cost of trips to Mars by 5 million percent,” it says.

Cutting Space-Flight Costs

Musk has some ideas on how to cut down the costs. Reusing rockets could reduce the cost of space flight tremendously. Refilling fuel in orbit rather than after landing could bring considerable savings too.

Space scientists remain skeptical about the vision, however.

In a recent interview, Ellen Stofan, former NASA chief scientist, dismissed the idea that there would ever be a mass move of humans to another planet. She added that trumpeting the idea risked distracting from the problems faced on our home planet. “Job one is to keep this planet habitable. There isn’t a planet B,” she said.

Mark McCaughrean works for the European Space Agency. Commenting on Twitter, he was critical of the Mars colonization plan. It’s an effort to get people to invest, pumped up by the excitement of "fanboys brought up on comic book sci-fi," he tweeted. McCaughrean sees it as a way to escape the problems humans have caused on this planet. He called it "a kind of modern day manifest destiny."

Don't Abandon Earth Just Yet

"I'm less concerned about making humans a multi-planetary species than I am about making the Earth a sustainable multi-species planet," McCaughrean added.

Professor Andrew Coates works on the ExoMars rover at University College in London's Mullard Space Science Laboratory. He said that the question of whether present or past life existed on Mars needed to be answered before a manned mission is considered. People arriving could cause harm. Going there would be a type of vandalism, he said.

What is the schedule for the project? Musk has been intentionally fuzzy about the timeline. "If things go super-well, it might be in the 10-year time frame, but I do not want to say that is when it will occur," the paper said.

Name: ______________________ Class: ______________________

Who Is Katherine Johnson?

By NASA
2017

Katherine Johnson (1918-2020) was an African American physicist and mathematician who worked at NASA during the early years of the space program. In this biography, the NASA Science Team describes Johnson's early life and her time working on their space missions. As you read, take notes on the challenges Johnson faced along her career path.

"NASA research mathematician Katherine Johnson is photographed at her desk at Langley Research Center in 1966" by NASA is in the public domain.

[1] Katherine Johnson was an African-American mathematician who worked for NASA from 1953 until 1986. She was a human computer. In a time when minorities held very few jobs in mathematics and science, Johnson was a trailblazer. Her work in calculating the paths for spaceships to travel was monumental[1] in helping NASA successfully put an American in orbit around Earth. Then her work helped to land astronauts on the moon.

What Was Katherine Johnson's Early Life Like?

Katherine Johnson was born in 1918 in White Sulphur Springs, West Virginia. As a very young girl, she loved to count things. She counted everything, from the number of steps she took to get to the road to the number of forks and plates she washed when doing the dishes.

Johnson was born with a love for mathematics. At a young age, she was very eager to go to school. Even when she was in her 90s, Johnson could vividly[2] recall watching her older siblings go to school, wishing so much that she could go with them. When Johnson finally did start school, she so excelled that by age 10, she was in high school. By age 15, she'd started college!

1. **Monumental** ***(adjective):*** great in importance, extent, or size
2. **Vivid** ***(adjective):*** producing strong or intense mental images

What Did She Study in College?

At West Virginia State College, Johnson became immersed[3] in the math program. She loved being surrounded by smart people, she said, and knew all of the professors and students on campus. One of her math professors, the renowned Dr. William W. Schiefflin Claytor, recognized Johnson's bright and inquisitive[4] mind. "You'd make a great research mathematician," he told her. (A research mathematician does many things, one of which is solving large math problems.) Then Claytor helped her become one.

[5] Johnson said, "Many professors tell you that you'd be good at this or that, but they don't always help you with that career path. Professor Claytor made sure I was prepared to be a research mathematician." Claytor made sure that Johnson took all of the math classes she needed to pursue her life's passion. He even created a class about the geometry of outer space — just for her. Geometry is the study of lines, angles and shapes.

At age 18, Johnson graduated with very high grades and degrees in mathematics and French.

What Did She Do After College?

When Johnson graduated from college, the United States was still segregated. During this time, "segregation" meant that different races were separated from each other in many places and activities. African-Americans were rarely able to have jobs in mathematics and science. It was also very unusual for women of any race to have degrees in mathematics. At that time, the only professional job available to Johnson after graduation was teaching. She taught school for a number of years but stopped when she married and had children. In 1952, she started teaching again to support her family after her husband became ill.

How Did She Get to NASA?

When Johnson was 34 years old, she applied for a job at the National Advisory Committee for Aeronautics, or NACA. NACA was the name of the government agency that later became NASA. In the early to mid-1950s, NACA was just beginning its work on studying space. NACA was hiring women — including African-Americans — to be "computers." These female computers calculated the mathematics for the engineers who were working on the space program. The first time Johnson applied, all of the jobs were already filled. She was disappointed, but she didn't give up. Johnson applied the following year, and that time the agency offered her a job. She took it and worked with a large group of women who were all computers like her.

What Did She Do for NASA?

As Johnson worked on math problems with the other female computers, she would ask questions. She didn't want to just do the work — she wanted to know the "hows" and the "whys," and then the "why nots." By asking questions, Johnson began to stand out.

3. **Immerse** ***(verb):*** to involve oneself deeply in a particular activity or interest
4. **Inquisitive** ***(adjective):*** curious

[10] Women were not allowed to attend meetings with the male engineers and scientists. Johnson wanted to go to these meetings to learn more about the projects, so she went. She became known for her training in geometry and began to work with teams made up of men. Eventually, she was recognized as a leader, and the men increasingly relied on her to have the answers they needed.

In 1958, NACA officially became NASA. Shortly thereafter, Johnson became part of the space team. She began calculating the flight path, or trajectory path, for the rocket to put the first American in space in 1961. That American was astronaut Alan Shepard. The engineers knew when and where they wanted Shepard's space capsule to land, but the tricky part was to calculate when and where the rocket would have to launch. Johnson figured it out! And in February 1962, her calculations helped put the first American into orbit around Earth. His name was John Glenn.

In September 1962, President John F. Kennedy charged the country to send a man to the moon. The math calculations for sending a man to the moon were similar to those for putting a man into orbit. But this time, a lot more calculations were involved. This mission would include a crew of three astronauts launching from Earth to the moon; two astronauts landing on the moon; and then all three returning successfully back to Earth.

Johnson worked with the NASA team to figure out where and when the rocket needed to be launched to put it on the right path to land on the moon. Once again, Johnson's calculations were instrumental in NASA's success. With the information she provided, astronauts walked on the moon for the first time on July 20, 1969. They returned safely to Earth on July 24, 1969. All of this happened, in part, because of Johnson and her love of mathematics.

What Did She Do After NASA?

Katherine Johnson retired from NASA in 1986. In 2016, she received honorary doctorates in science from West Virginia University and West Virginia State University.

[15] After her retirement, she enjoyed traveling, playing bridge (a card game), and spending time with her family and friends. She also liked to talk to students about school. She often told students to keep studying and to work hard. She encouraged students to learn more about mathematics and science — and to never give up on their dreams.

Katherine Johnson passed away in 2020, at the age of 101.

Text-Dependent Questions

Directions: For the following questions, choose the best answer or respond in complete sentences.

1. PART A: Which of the following statements best describes the central idea of the text?
   A. Katherine Johnson overcame racial and gender discrimination and became one of the top mathematicians at NASA.
   B. Katherine Johnson wanted to work for NASA, but her status as an African American woman prevented her from doing so.
   C. Katherine Johnson was responsible for designing the first space probe sent to the Moon.
   D. Katherine Johnson had a difficult childhood, but after beginning work at NASA, she faced less discrimination.

2. PART B: Which section from the text best supports the answer to Part A?
   A. “In a time when minorities held very few jobs in mathematics and science, Johnson was a trailblazer.” (Paragraph 1)
   B. “Johnson could vividly recall watching her older siblings go to school, wishing so much that she could go with them.” (Paragraph 3)
   C. “As Johnson worked on math problems with the other female computers, she would ask questions.” (Paragraph 9)
   D. “She encouraged students to learn more about mathematics and science — and to never give up on their dreams.” (Paragraph 15)

3. Which statement best describes the effect of the words “immersed” and “inquisitive” on the meaning of paragraph 4?
   A. They suggest that Katherine Johnson would ask questions of other students to study more effectively.
   B. They suggest that Katherine Johnson was exceeding the expectations her family had set for her.
   C. They show that Katherine Johnson’s professors were committed to helping her succeed in her career.
   D. They show that Katherine Johnson approached the study of mathematics with energy and enthusiasm.

4. PART A: How do the details about Johnson’s early life in paragraphs 2-3 help us understand her later success?
   A. Her struggles in school show how much she developed during her early life before working for NASA.
   B. By describing her love of counting, the text shows that Johnson was always passionate about math.
   C. Johnson’s enrollment in college at just 15 years old emphasizes how different she was from her peers.
   D. Johnson’s early academic success made her later accomplishments seem less impressive in comparison.

5. PART B: Which detail from paragraphs 2-3 best supports the answer to Part A?
    A. “She counted everything, from the number of steps she took to get to the road to the number of forks and plates she washed when doing the dishes.” (Paragraph 2)
    B. “At a young age, she was very eager to go to school.” (Paragraph 3)
    C. “Johnson could vividly recall watching her older siblings go to school, wishing so much that she could go with them.” (Paragraph 3)
    D. “she so excelled that by age 10, she was in high school. By age 15, she’d started college!” (Paragraph 3)

6. How do paragraphs 6-8 contribute to the development of ideas about Johnson’s life?

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Discussion Questions

Directions: Brainstorm your answers to the following questions in the space provided. Be prepared to share your original ideas in a class discussion.

1. From an early age, Johnson loved math and science. In the context of the text, what is the goal of education? Is it more important for education to help people achieve their career goals or to inspire a love of learning? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

2. For the majority of Johnson's early life, many places in the U.S. were still strictly segregated. In the context of the text, what are the effects of prejudice? How did prejudice impact Johnson's pursuit of her career? What lessons can be learned from Johnson's response to prejudice?

3. In your experience, how do we define the roles of men and women? How has Katherine Johnson helped expand the role of women — particularly African American women — in math and science? How does the larger society benefit when men and women have equal opportunities? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

The history of cornmeal in American kitchens is of comfort, connection

By Rebecca Powers, Washington Post, adapted by Newsela staff on 03.28.19

Word Count **852**

Level **1040L**

Made from the author's family recipe, Edna's Cornbread was named for Rebecca Powers' grandmother. Photo by: Stacy Zarin Goldberg for The Washington Post

"It's a shame you don't have a food heritage," a woman once said to me at a dinner party.

The fellow guest had Hungarian roots. She seemed to be dismissing my generations-deep American tradition as bland.

I thought of how much I loved being called to dinner for my mother's cornbread and beans. Half the appeal was the dessert afterward: honey on warm, buttered cornbread.

Warm, Sweet Cornmeal

If you and your ancestors have lived in the Americas long enough, your DNA is dusted with cornmeal, an ingredient with Mesoamerican, Native American and African roots. The yellow and white kernels have passed through the hands of indigenous, or native, and enslaved people. They've been eaten by colonists and noted chefs. They have populated a food family tree that's anything but bland.

Cornmeal and its many kitchen creations — cornbread, mush, johnnycakes, spoon bread, spider bread, pudding — inspire strong allegiances.

Its most well-known result is cornbread. This treat can be had with or without sugar, part wheat flour or not, white meal or yellow, buttermilk or sweet.

What's important is that cornbread is a comfort food. Leftover bread, crumbled into a glass or bowl, soaked with milk or buttermilk, and drizzled with honey is an enduring favorite. "Corn cup" is what Nashville-based pastry chef and writer Lisa Donovan says her father called his regular glass of milk-doused, day-old cornbread.

Culinary historian Michael Twitty notes the hearty nature of the classic quick bread.

"My first solid food was cornbread mashed up in potlikker, the stock left over from a pot of Southern greens," Twitty writes in his award-winning book, "The Cooking Gene." That mixture, he says, is "the oldest baby food known to black people in America, going back to the days of slavery."

Not Just A Fixture In The South

Cornmeal and its creations are practically a religion in the South. Still, ground maize commands affection across the continent. In New England, Rhode Island claims johnnycakes, and in Boston, brown bread is made with the grains wheat, rye and cornmeal.

The Smithsonian's National Museum of African American History is in Washington D.C. So is the National Museum of the American Indian. They both have cornmeal-based offerings in their restaurants.

In Detroit, Michigan, cornbread is a constant companion of soul food and barbecue. I fondly recall Friday lunches at Maxie's Deli in Detroit's old Irish neighborhood. Cops, reporters, high-society ladies and lawyers filled counter stools for a bowl of fish chowder. It was served with a hunk of fluffy cornbread and some conversation with the beloved owner.

Maxie's is no more. However, one recent morning, I sampled the cornmeal mush special at Zingerman's Roadhouse in Ann Arbor, Michigan. A waitress placed a bowl of soft, flecked mush, served with syrup, on my table. It was subtly sweet.

Local, Heirloom Varieties

The humble, rustic cornmeal is becoming even livelier. Millers and chefs are carefully on a quest to find, bring back, preserve, grind and cook heirloom varieties that were thought to be forever lost.

Greg Johnsman is founder of Geechie Boy Mill in Edisto Island, South Carolina. He says when you taste an heirloom that's local to your area, "It's like shaking your great-granddaddy's hand."

He and others who grow and mill old varieties discuss cornmeal like wine experts talk wine.

Glenn Roberts is founder of the organic, heirloom Anson Mills in South Carolina. He uses terms that wine experts often do when he describes certain cornmeals. Roberts lists tasting notes: "Floral, nuttiness, vanillin, stone fruit, spice nutmeg, cumin."

In North Carolina, David Bauer is founder and miller of the Farm and Sparrow Craft Mill and Collection of Grains.

Sometimes cornmeal is used in a bread dough and fermented with yeast or sourdough, he says. When this happens, "it steams the bread from the inside as the loaf bakes, giving off its distinct aromas and creating an extremely moist interior," Bauer, an experienced baker, explained. "If the dough is rolled in cornmeal or polenta, it creates a crackly, crunchy texture that smells like sweet popcorn."

Donovan suggests a relaxed approach when cooking with it.

"Start with someone else's recipe, but don't be afraid to play around," she says. "Throw some poblanos in there," she says. Poblanos are a mild chili pepper from Puebla, Mexico.

"My grandmother was of Zuni/Mexican descent," she adds. "I base a lot of food on my own personal history."

Ancestral Eating

In the Americas, cornmeal may be the most indigenous of ingredients. It has spiraled across regions and among ethnicities and races.

"Cornmeal, for me, is ancestral, historical; it's the starch of my people," Twitty told me recently. "It's associated with slavery. It's associated with hardscrabble — poverty and the frontier. But this is the food that fed Aztec and Mayan kings and African royalty."

Hunger for kinship has us walking through history museums and tracing our family trees using online software. However, that search for human connection might just begin and end in the kitchen.

As Johnsman says, "When you bring a skillet of uncut cornbread to the table, it just makes people so happy."

Name: ______________________ Class: ______________________

Rosie the Riveter

By Barrett Smith
2017

While many people do not know who Rosie the Riveter truly was, her image continues to inspire women today. In this informational text, Barrett Smith discusses the beginning of Rosie and how she impacted women during World War II. As you read, take notes on why the image of Rosie the Riveter was created, and how it inspired women during World War II.

[1] Rosie the Riveter is not an actual person but an idea that represents an era in history and the women who were part of that era. A riveter is someone who uses a rivet gun to attach metal parts, but not all Rosie the Riveters were actual riveters. Rosie the Riveter is an idea that represents all of the American women who worked in factories, shipyards, and other manufacturing plants during World War II to help the American war effort. She has also come to represent women's economic power and feminism, which is the movement that fights for the equal rights of women.

"Rosie-the-Riveter" by SBT4NOW is licensed under CC BY-SA 2.0.

Women in the Workforce

Before World War II, most married women were housewives and stay-at-home moms. This meant that they were dependent on their husbands for money, food, and other resources. The few women who went to work tended to be of lower class backgrounds and held domestic-type jobs that people considered "appropriate" for women, such as cleaning and clerk work with low pay. Many women lost their jobs during the Great Depression or gave them up to create opportunities for more men to work.

When the United States entered World War II after the bombing of Pearl Harbor, most American men were conscripted[1] to fight in the military. This left no one to work in the factories and shipyards but they were still needed to produce weapons and supplies for the war effort. Companies and the American government started recruiting women to fill the jobs that in the past had been seen as only for men.

1. required by law to serve in the armed forces

The Rosie the Riveter image and idea were used during the war by companies and the American government to encourage housewives to join the workforce. It was considered improper, at the time, for high class women to work so Rosie the Riveter was made to show a feminine woman who only works because her country needs her.

The Story Behind the Name

[5] The term “Rosie the Riveter” was first used in a 1942 song written by Redd Evans and John Jacob Loeb. The song describes Rosie as a worker on an assembly line, working hard even while other women were out at the bar. Rosie earns an award for her hard work and dedication to the American war effort. Rosie the Riveter isn’t a real person but the writers of the Rosie the Riveter song were inspired by a real woman — Rosalind P. Walters, a rich woman who worked in a factory building a fighter plane called the F4U Corsair Fighter. This song became a hit and the term “Rosie the Riveter” became known across the United States.

The Story Behind the Image

The iconic[2] image that most people associate with Rosie the Riveter today is the “We Can Do It” poster created by J. Howard Miller in 1942. In this poster, a woman in a red bandanna is rolling up her sleeve with the slogan “We Can Do It!” above her. However, this poster was not actually very well known during World War II, and it was not used to recruit women to work. The “We Can Do It” poster was produced by Westinghouse Company's War Production Coordinating Committee and put up inside their factories to motivate both male and female employees to work harder. It wasn’t until after the war, in the 1980s, that the poster was rediscovered and became associated with the feminist movement.

In 1943, the famous visual artist Norman Rockwell created an image of Rosie the Riveter that was used as the cover of Saturday Evening Post. This image was widely distributed and very popular, and it was used during the war for war bond[3] drives. In this image, a woman is holding a rivet gun and a lunch box that says “Rosie” on it. It is believed that Rockwell was inspired by the Rosie the Riveter song when creating this image.

The Impact

Many Americans consider the Rosie the Riveter era as a time when all Americans came together to help the war movement. However, this isn’t entirely true. While the war gave many white women the opportunity to work, it wasn’t until 1943 that black men started to be hired and not until 1945 that black women started to be trained as welders.[4] This eventual integration,[5] however, did have a lasting impact on the civil rights movement as well as the feminist movement. White and black people worked alongside each other doing the same jobs and had to learn to negotiate that sudden integration (in a time when they still did not share the same water fountains, toilets, or public schools).

2. **Iconic** ***(adjective):*** very popular or famous
3. loans to the government to help fund war efforts
4. a person who fuses metal together
5. the mixing together of people who used to be separated along the lines of race, gender, or any other label

The Rosie the Riveter era, though not as unified as people make it out to be, provided both white women and black people with the opportunity to prove that they could do the work that white men could do. The economic empowerment of the Rosie the Riveter era and the opening up of jobs to women and black people were temporary — when the war ended, men returned to their jobs, and many women returned to being housewives. However, the impact of the Rosie the Riveter era and idea was lasting in American culture and provided the foundation for later feminist movements.

Text-Dependent Questions

Directions: For the following questions, choose the best answer or respond in complete sentences.

1. PART A: Which of the following identifies a main idea in the text?
    A. Rosie's image and what she stood for inspired women to take on jobs formerly reserved for men.
    B. The image of Rosie was responsible for dividing the nation more than unifying it because black men and black women still faced many restrictions.
    C. Rosie's powerful image is the sole reason that black and white women felt that it was acceptable to enter the workforce.
    D. The image and ideas behind Rosie were originally intended to convince women to spend money on war bonds.

2. PART B: Which detail from the text best supports the answer to Part A?
    A. "The Rosie the Riveter image and idea were used during the war by companies and the American government to encourage housewives to join the workforce." (Paragraph 4)
    B. "This image was widely distributed and very popular and it was used during the war for war bond drives. In this image, a woman is holding a rivet gun and a lunch box that says 'Rosie' on it." (Paragraph 7)
    C. "While the war gave many white women the opportunity to work, it wasn't until 1943 that black men started to be hired and not until 1945 that black women started to be trained as welders." (Paragraph 8)
    D. "The economic empowerment of the Rosie the Riveter era and the opening up of jobs to women and black people were temporary — when the war ended, men returned to their jobs, and many women returned to being housewives." (Paragraph 9)

3. PART A: Which of the following describes how the author introduces Rosie the Riveter in the text?
    A. The author provides information on the person who inspired Rosie.
    B. The author outlines the ideas that Rosie stands for.
    C. The author describes what Rosie physically looks like.
    D. The author emphasizes the lasting effects Rosie has had on women.

4. PART B: Which quote from the text best supports the answer to Part A?
    A. "A riveter is someone who uses a rivet gun to attach metal parts, but not all Rosie the Riveters were actual riveters." (Paragraph 1)
    B. "She has also come to represent women's economic power and feminism, which is the movement that fights for the equal rights of women." (Paragraph 1)
    C. "Companies and the American government started recruiting women to fill the jobs that in the past had been seen as only for men." (Paragraph 3)
    D. "The Rosie the Riveter image and idea were used during the war by companies and the American government to encourage housewives to join the workforce." (Paragraph 4)

5. What connection does the author draw between World War II and the civil rights movement?

Discussion Questions

Directions: Brainstorm your answers to the following questions in the space provided. Be prepared to share your original ideas in a class discussion.

1. How did WWII shift the roles of men and women? How did the roles of women before WWII compare to their roles after? How would the expectations regarding women during WWII compare to expectations today? Cite examples from the text, your own experience, and other literature, art, or history in your answer.

2. How do you think WWII contributed to the public's changing views on women's capabilities and rights? In what ways are women still required to prove themselves today? Cite examples from the text, your own experience, and other literature, art, or history in your answer.

3. How was Rosie's image able to create change in both the women's rights movement and the civil rights movement? Why do you think her image continues to be popular in representing change?

Apple's reason to buy its latest watch is timed to your health

By Associated Press, adapted by Newsela staff on 09.24.18

Word Count **889**

Level **1030L**

Apple CEO Tim Cook discusses the new Apple Watch 4 at the Steve Jobs Theater during an event to announce new products September 12, 2018, in Cupertino, California. Photo: Marcio Jose Sanche/AP

Apple is trying to transform its smartwatch. The California-based company wants to change the watch into a tool for better health by slowly evolving it into a medical device.

The fourth version of the Apple Watch, called Series 4, will be released in late September. The Apple Watch will add features that allow it to take high-quality heart readings and detect when the wearer falls. It is part of Apple's long-in-the-making strategy to give people a distinct reason to buy the watch. Right now, it mostly does things smartphones already do.

Since the Apple Watch was launched in April 2015, most people have not figured out why they need to buy one. Apple does not release sales figures, but estimates suggest the company shipped roughly 18 million watches in 2017. For comparison, Apple sold 216 million iPhones last year. That's almost 12 times as many.

Worldwide, about 48 million smartwatches are expected to be sold this year. It is estimated that nearly 1.9 billion phones will be sold, according t the research company Gartner.

Apple Watch Zeros In On Health

Tim Cook, the CEO who leads Apple, has long emphasized the watch's health and fitness-tracking capabilities. The original version featured a heart-rate sensor that fed data into fitness and workout apps. It allowed the apps to suggest new goals and offer digital rewards for fitness accomplishments.

Two years later, Apple called its watch "the ultimate device for a healthy life." Apple emphasized water resistance for swimmers and built-in GPS for tracking runs or cycling workouts. In February, the company announced that the watch would track skiing and snowboarding runs. The device could track both speed and steepness.

The latest version, revealed on September 12, is even more focused on health. It now takes electrocardiograms, or EKGs, which measure the electrical activity of the heart. EKGs can help detect heart problems. The watch will also monitor for irregular heartbeats and can detect when the wearer has fallen, the company said.

EKGs are important tests of heart health and typically require a visit to the doctor. The feature was praised onstage by Ivor Benjamin, a heart doctor who is president of the American Heart Association. He said such real-time data would change the way doctors work.

Straight From The Heart

Tuong Nguyen works for Gartner. His job is to study data about how different companies do business. He said the feature could turn smartwatches into a more practical everyday product. Right now, they are more of a luxury, he said.

It could also lead some health insurance plans to help pay for the cost of an Apple Watch, Nguyen said. That would help to cover the $400 starting price for a device that still requires a companion iPhone, which can now cost more than $1,000.

Apple's watch will use new sensors on the back and on the watch dial. A new app will say whether each reading is normal or not. It will alert wearers if they show signs of atrial fibrillation. This is an irregular heart rate that increases the risk of heart complications, such as stroke and heart failure.

Apple says the heart data can be shared with doctors through a PDF file. It's not yet clear how ready doctors are to receive a possible flood of new EKG data from patients, though. It is also not clear how useful they will find the electronic files.

Weighing The Apple Watch's Benefits

Eric Topol is a heart doctor and director of the Scripps Research Translational Institute in California. He warned that the EKG feature could lead to patients taking more tests than necessary. It could result in unnecessary prescriptions for blood thinners and burden doctors with calls from patients who likely do not need treatment.

He said the feature will probably save some lives and prevent strokes with early detection of heart trouble. However, the number of benefits compared with the costs might or might not be worth it, he said. It is too soon to tell.

Apple said the EKG feature will be available to U.S. customers later this year.

Fall detection could also be significant, especially for elderly users. The new Apple Watch claims to be able to tell the difference between a trip and a fall, and when a fall occurs, it will suggest calling 911. If it receives no response within a minute, the watch will automatically place an emergency call and message friends and family listed as emergency contacts.

Only certain Apple Watch models support cellular calls. Those that do not can still make emergency calls when near a paired iPhone or Wi-Fi service, though.

Apple says it monitored about 2,500 people. It measured how they fell off ladders, missed a step while walking or got their legs caught in their pants while getting dressed. It used that data to separate real falls from other heavy wrist movements, such as clapping and hammering.

The feature is available immediately worldwide and will turn on automatically for users age 65 and older. Younger people can activate it in the settings.

The new Apple Watch still lacks one feature found in rival wrist gadgets. It lacks the ability to analyze sleep quality. Also, battery life in the new watch remains at 18 hours, meaning it needs a nightly recharge.

Quiz

1 Which two of the following sentences from the article include CENTRAL ideas of the article?

1. *The California-based company wants to change the watch into a tool for better health by slowly evolving it into a medical device.*
2. *The original version featured a heart-rate sensor that fed data into fitness and workout apps.*
3. *However, the number of benefits compared with the costs might or might not be worth it, he said.*
4. *Those that do not can still make emergency calls when near a paired iPhone or Wi-Fi service, though.*

(A) 1 and 2

(B) 1 and 3

(C) 2 and 4

(D) 3 and 4

2 Which statement would be MOST important to include in a summary of the article?

(A) Apple sold 216 million iPhones and 18 million smartwatches last year.

(B) The new Apple Watch will cost $400 and will require a companion iPhone.

(C) Apple monitored 2,500 people to do research for the watch's new health features.

(D) The new Apple Watch will allow people to send EKG data to their doctors.

3 How does the author point out a weakness in Tim Cook's argument that the Apple Watch has impressive health and fitness tracking capabilities?

(A) by identifying certain features that even the new model lacks

(B) by explaining how the new heart sensors will likely help wearers

(C) by comparing the viewpoints of different heart doctors

(D) by criticizing the feature that automatically turns on for users older than 65

4 What is the author's purpose for writing this article?

(A) to persuade the reader to buy the new Apple Watch

(B) to compare the old and new models of the Apple Watch

(C) to describe the mixed reactions to the new Apple Watch's health features

(D) to explain what kind of research Apple used to design the fall-detection sensor

A modern take on the traditional tipi

By Smithsonian.com, adapted by Newsela staff on 03.19.18
Word Count **888**
Level **1030L**

Manifestipi, 2016 by ITWÉ Collective. Courtesy of ITWÉ and Collection Majudia. This special installation is part of the exhibition “Transformer: Native Art in Light and Sound” at the Smithsonian’s National Museum of the American Indian, George Gustav Heye Center in New York City. Photo: Joshua Voda/National Museum of the American Indian.

Even with different surroundings, colors and materials, some symbols are immediately recognizable. That’s the case with the five neon-colored tipis that anchor an exhibit called “Manifestipi.”

The exhibit is currently on view at the Smithsonian’s National Museum of the American Indian’s George Gustav Heye Center, which is located in New York City.

The 8-foot-tall structures are made of frosted plexiglass. They look nothing like what we think of as a traditional tipi, or tepee as it is also spelled, but are clearly that. They were created by ITWÉ Collective, a trio of artists based in Winnipeg and Montreal, Canada.

“You see the tipi, you immediately recognize it — but the artists are doing something very unconventional with the form,” says Kathleen Ash-Milby. She helps to manage exhibits at the National Museum of the American Indian. “These are plexiglass, the colors are constantly shifting. It’s not a traditional palette you might normally associate with native people.”

Making The Tipi "Accessible To All"

The exhibit shows tension between tradition and change. Sounds created by musician Michel Germain, who worked with ITWÉ, fill the room. On the wall, historic images and illustrations of native people are played in a loop with bright streaks and patches of color added by the artists. The colors of the tipis drift from pink to blue to orange.

“We have been evolving tremendously, and the tipi still remains a powerful symbol of our culture,” says artist Caroline Monnet, who is of the Algonquin North American Indian people and French. She is a member of the ITWÉ trio. The others are Kevin Lee Burton, of the Swampy Cree people, and Sébastien Aubin, who is Cree and Metis. The artists all have native heritage, but it is important to remember that there are many different native peoples and cultures, Monnet says. "We are challenging the tipi as a stereotypical symbol of our culture and therefore making it fun and accessible to all," she says.

Change Is Empowering

The title "Manifestipi" brings to mind the 19th-century belief in “Manifest Destiny.” U.S. settlers believed it was their God-given right to take over Native American lands throughout North America. Now, the artists of ITWÉ aim to change the idea of “manifestation” into something empowering for indigenous, or native, people.

Burton talks about what the name means to him. “To try not to get caught up in a downward spiral or wallow in self-hatred," he said. "We’re engaging in conversation from a different angle, trying to step toward another future: What is inside your heart, celebrating your culture, yourself, your identity, your nation, your history — and making a present tense.”

Monnet has said that “Manifestipi was created with the aim of opening up dialogue" and "taking up space as indigenous people." It was also meant to invite other nations to be part of their manifestation, she says.

Diverse Backgrounds Create Unique Art

The artists laid out the work in a circle, like a gathering place. A circle is painted onto the room’s floor and suggests the open dialogue that the artists hope will take place here.

The layout reflects the approach that ITWÉ has developed for all its projects since it was formed in 2010. Each member is empowered to speak their mind and to share ideas. The three members have different backgrounds and artistic interests. Together, they are able to create art that is distinct from their individual work.

Burton has a background in filmmaking, new media and community work, Monnet says. Aubin comes from a graphic design view and she brings experience in visual arts and filmmaking, she says. “Together, we weave our respective interests, expertise and cultural background to create new works.”

Use Your Imagination

The exhibit has changed quite a bit over time. ITWÉ created the original Manifestipi in 2013 as an outdoor work in Winnipeg, Canada.

In the outdoor version, the video was projected onto trees. Dry ice was used to imitate a fire burning inside a tipi. Made of metal poles, wires and rope, it was "less refined than the work we have now," Burton says.

In this first version, the trio created its own camp using materials from city surroundings, making a type of city tipi, Monnet said. "We wanted to take back territories and space. We wanted to occupy space and grounds."

Burton adds that this work reimagined the location as if it were still the home of indigenous people.

"We couldn't just go and chop down trees," he says, "but we sourced the wiring and metal rods for the tipis from local sellers." It was a process of gathering local materials, he says.

Nomadic Theme Has A Purpose

After the outdoor exhibition, Manifestipi was shown at three galleries throughout Canada. The design changed and the number of tipis expanded from one to five. In 2016, ITWÉ worked with engineers to manufacture the current versions of the neon-colored structures.

The art was made more transportable. The importance of making the work easy to move was not just for convenience, but emphasized the theme of the nomadic lifestyle of those who had to migrate over the seasons.

Ash-Milby says that it aims to help viewers rethink what is meant by "tradition." Rather than as something that's in the past, "tradition is really about things being in motion and changing."

Quiz

1 Which section highlights the changes that have been made to the "Manifestipi" exhibit since it was first shown outdoors in Canada?

(A) "Making The Tipi Accessible To All"

(B) "Change Is Empowering"

(C) "Use Your Imagination"

(D) "Nomadic Theme Has A Purpose"

2 Read the paragraph from the introduction [paragraphs 1-4].

> *“You see the tipi, you immediately recognize it — but the artists are doing something very unconventional with the form,” says Kathleen Ash-Milby. She helps to manage exhibits at the National Museum of the American Indian. “These are plexiglass, the colors are constantly shifting. It’s not a traditional palette you might normally associate with native people.”*

What conclusion is BEST supported by this paragraph?

(A) The tipis in the Manifestipi exhibit are both similar to and different from traditional tipis.

(B) Most people who look at the tipis in the Manifestipi exhibit fail to realize that they are looking at tipis.

(C) The tipis in the Manifestipi exhibit have much in common with the tipis made by native people.

(D) Most of the people who come to see the Manifestipi exhibit are artists and American Indians.

3 What is the MAIN reason the author includes the section "Making The Tipi Accessible To All"?

(A) to explain that music is part of the Manifestipi exhibit

(B) to describe the different colors of the tipis in the Manifestipi exhibit

(C) to explain the choice of the tipi as the focus of the Manifestipi exhibit

(D) to describe the tribes of the people who created the Manifestipi exhibit

4 The section "Diverse Backgrounds Create Unique Art" includes information about the layout of the Manifestipi exhibit.

How does this information help develop the MAIN idea of the article?

(A) It shows how the layout is part of the purpose of the exhibit.

(B) It explains that three people created the layout for the exhibit.

(C) It shows that the layout has been used by other exhibits as well.

(D) It explains when the layout for the exhibit was first developed.

Millennials prefer to give their time and talent to charity, study finds

By Pittsburgh Post-Gazette, adapted by Newsela staff on 12.22.15

Word Count **747**

Level **1080L**

Suzanne Haines Walsh, 60, who is homeless, left, gets a meal from volunteers working with the nonprofit group Love Thy Neighbor Inc. AP/Lynne Sladky

PITTSBURGH, Pa. — Earlier this month, on the national day of charity known as Giving Tuesday, about 100 employees of Dick's Sporting Goods showed up at the Sarah Heinz House in Pittsburgh. They were there to clean, paint and decorate for the holidays.

Millions of people worldwide marked Giving Tuesday by making online donations to charities. Meanwhile, the group from Dick's worked side by side at the Sarah Heinz House with middle-school students who participate in clubs, lessons and other activities at the nonprofit facility. The group from Dick's included many people in their 20s and 30s, who are known as millennials.

"They completely cleaned and beautified gyms, kitchen areas and classrooms," said Deb Hopkins. She is the executive director of Pittsburgh Cares. The organization matches businesses and individuals with volunteer opportunities.

Being involved in a hands-on activity that helps a group in need is often as fulfilling for millennials as giving money, she said. "(Millennials) really want to see a direct impact."

Giving From The Ground Up

Giving Tuesday was launched in 2012. It was started as something different from the shopping frenzy between Thanksgiving Day and and the following Monday, which is called Cyber Monday because of all the online shopping done that day. This year, Giving Tuesday generated an estimated $116.7 million from nearly 700,000 donors, according to its founders, the 92nd Street Y in New York.

It also sparked a wave of volunteerism like the spruce-up at Sarah Heinz House. According to a study released this month, millennials are more likely to give when charities provide such on-the-ground opportunities.

Millennials see giving their time, skills and network to a cause as just as important as giving money, said Derrick Feldmann. He is the lead researcher for The Millennial Impact Project. The project studied how nine nonprofits conducted their Giving Tuesday fundraising campaigns.

Based in Indianapolis, the project was launched in 2009 to study millennial behavior. Its research on millennial giving is funded by the Case Foundation, which is run by philanthropists Steve and Jean Case. Steve Case was a co-founder of America Online.

The project decided to study Giving Tuesday, said Feldmann, because it is a relatively new digital-based program. It has relied mainly on social media to generate contributions.

“It looks and feels like millennials should be a part of it and would be highly involved … so we try to find out whether that’s true or not.”

Going Beyond Social Media

The researchers recruited nine nonprofits. These included Rutgers and Otterbein universities, the University of North Carolina and WBEZ public radio in Chicago. They studied the nonprofits' marketing efforts leading up to Giving Tuesday and how they promoted it the day of the event.

Nonprofits that used digital-only campaigns limited to emails and social media posts “didn’t get the highest response rate” from millennials, Feldmann said.

But when nonprofits linked Giving Tuesday to actual events, they got the biggest response from millennials, he said.

The University of North Carolina (UNC) offers one example. A student-giving council and a young graduate leadership council hosted on-campus Giving Tuesday events.

UNC created its own Twitter hashtag, "#TarHeelTuesday," for the day. It also encouraged students to volunteer with a student ambassadors program and to share their photos on Snapchat.

The university raised about $236,000. Its goal was only $150,000. About $23,000 came from millennials, who accounted for 29 percent of all donors.

A combination of digital, community and self-organizing strategies that let millennials "own that day and experience it firsthand will get a good response,” Feldmann said.

Learning The Habit Of Giving

In addition to the Dick's event at Sarah Heinz House, Pittsburgh Cares organized other Giving Tuesday activities, including some involving sorting and packaging toys for the U.S. Marine Corps' Toys for Tots program.

An evening event at the regional Toys for Tots storage facility was designed for families. The idea was to let children help their parents choose and pack toys for boys and girls in need.

"Millennials very much want their children involved," Hopkins said. "I get four or five calls a day from people looking for volunteer opportunities for kids as young as 5 years old."

The idea of linking giving to hands-on participation in charitable causes is not limited to millennials, though, she said.

"I wouldn't say they want that experience more than other people. They are more tech savvy, but we see a tremendous amount of activity among baby boomers and our retired and senior volunteers."

Quiz

1 Read the following excerpt.

> *Being involved in a hands-on activity that helps a group in need is often as fulfilling for millennials as giving money, she said. "(Millennials) really want to see a direct impact."*

Which answer choice is the BEST definition of "fulfilling" as used in the sentence?

(A) useful

(B) doable

(C) acceptable

(D) meaningful

2 Read this sentence about Giving Tuesday from the section "Giving From The Ground Up."

> *It also sparked a wave of volunteerism like the spruce-up at Sarah Heinz House. According to a study released this month, millennials are more likely to give when charities provide such on-the-ground opportunities.*

Which definition has the CLOSEST meaning to the phrase "sparked a wave"?

(A) to create a pleasant surprise

(B) to create a major problem

(C) to cause a large response

(D) to cause an immediate reaction

3 What does the section "Learning The Habit Of Giving" contribute to the article?

(A) a discussion of the volunteering activities of various age groups

(B) a comparison between children and their parents who volunteer

(C) an explanation of different volunteer opportunities for readers

(D) a comparison between millennials and earlier generations of volunteers

4 Which of the following BEST describes the article's organization overall?

(A) It discusses the pros and cons of a current phenomenon.

(B) It investigates the causes of a current phenomenon.

(C) It provides an account of someone's personal experience with a current phenomenon.

(D) It contrasts a current phenomenon with similar events in previous generations.

Name: ________________________ Class: ________________________

The Alaska Start III

By Robert Groves
2010

Robert Groves served as the Director of the United States Census Bureau between 2009 and 2012. In this blog entry, Groves describes conducting the United States Census in Noorvik, Alaska. The United States Census is conducted every 10 years and collects important information on the population of the United States. The information collected is important because it determines how many seats each state has in the U.S. House of Representatives and the distribution of federal funds to communities. As you read, take notes on how the community responds to Groves' visit.

[1] We flew to Noorvik mid-morning on Monday, January 25, a 10-seat plane — full of state dignitaries.[1] The temperature at landing was a balmy[2] 7 ° F. The one-strip airport is about one mile from the village. There were two dog sleds nearby, one for the lieutenant governor and one for me. My musher[3] was a 12-year old student, who, after we moved out of the congestion of the airport, stopped and allowed me to mush the team for a bit of time. Great fun; the lead dog was instantly responsive to his commands, and even though my training was limited to about 45 seconds, it was a blast.

"NASS-2010_Census Worker" by U.S. Department of Agriculture is licensed under CC BY-ND 2.0.

We arrived at the school to see the entire student body out on the portico[4] of the school, applauding the arrival of the census to Noorvik (wouldn't it be great if every city in the US greeted census workers with such enthusiasm?). I met the elders of the village, who were assembled in the Inupiat[5] culture room, now used to instruct the children in their native language.

We visited a few classrooms where I found that the kids were totally on top of why the census is done, how often it's done, and how it benefits the country.

I also participated in a few satellite uplink interviews with various media, accompanied by a 12th grade student who talked about how the census fits into Noorvik's future.

[5] At 1 p.m., I rode with the mayor of Noorvik on an ATV to visit the very first household to be enumerated[6] in the 2010 Census. I knocked on the door and was ushered in. We completed the interview in just a few minutes; I exited to see a whole slew[7] of press people down the road. I was happy to announce, "One down; 309 million more to go!"

1. a person who holds a high rank or office
2. pleasantly warm
3. the driver of a dogsled
4. a structure consisting of a roof supported by columns, typically attached as a porch to a building
5. a member of a native group of people in Alaska
6. to be counted

I returned to the school, which is clearly the hub of social activity in the small village, to have lunch with the school children. More interviews with press; a large gathering in the gymnasium with the entire village assembled; an exchange of gifts; speeches; native dancing.

The 2010 Census has begun — in a remote[8] village of Alaska, with one household, and the support and love of the thousands of residents. It will continue for several months — in big cities, in small towns, in institutions, among the homeless, for the rich, and for the poor.

The country is on its way to being counted!

7. **Slew** ***(noun):*** a large number of something
8. **Remote** ***(adjective):*** distant

Text-Dependent Questions

Directions: For the following questions, choose the best answer or respond in complete sentences.

1. PART A: How does the following sentence from paragraph 2 contribute to the reader's understanding of the blog entry? "We arrived at the school to see the entire student body out on the portico of the school, applauding the arrival of the census to Noorvik (wouldn't it be great if every city in the US greeted census workers with such enthusiasm?)."
   A. by showing that the school is the most important building in the village
   B. by describing the excitement the community has for its role in the census
   C. by indicating that the students would be collecting information for the census
   D. by explaining that the students were eager to share parts of their tribal culture

2. PART B: Why does the author include the following statement in parentheses? "...(wouldn't it be great if every city in the US greeted census workers with such enthusiasm?)."
   A. to contrast a positive census experience with previous census experiences
   B. to show that he is concerned about completing the census in time
   C. to defend the way he has responded to residents in other communities
   D. to compare the residents of large cities to the residents of isolated villages

3. PART A: What is a central idea of the blog entry?
   A. Leaders should express their support for the census process.
   B. The census is more important to small villages than it is to large cities.
   C. The census is important to all people regardless of their status or location.
   D. Schools should educate all students about the history of the national census.

4. PART B: How does the author convey the central idea?
   A. by including quotes from interviews with television reporters
   B. by emphasizing the unique rituals of the people in the village
   C. by using one village to symbolize the entire national census
   D. by showing how important the media is to the census

5. PART A: Based on the information in the blog entry, what is the main responsibility of a census taker?
   A. to research effective educational programs for small villages
   B. to gather data about people across the nation
   C. to choose which families receive important visitors
   D. to report on how residents survive in remote areas

6. PART B: Which activity discussed in the blog entry illustrates the main responsibility of a census taker?
   A. accompanying important government officials
   B. speaking with students in classrooms
   C. visiting households to collect information with the help of residents
   D. exchanging gifts with village residents

7. PART A: Which statement is supported by evidence found in the blog entry?
   A. The people of Noorvik feel the census is important to their village.
   B. The census in Noorvik will be finished quickly.
   C. Noorvik was chosen by the Census Bureau because of its unusual weather.
   D. The village of Noorvik is easily reached by travelers.

8. PART B: Which evidence from the blog entry supports the answer to Part A?
   A. “The temperature at landing was a balmy 7° F.” (Paragraph 1)
   B. “The one-strip airport is about one mile from the village.” (Paragraph 1)
   C. “accompanied by a 12th grade student who talked about how the census fits into Noorvik’s future.” (Paragraph 4)
   D. “see a whole slew of press people down the road.” (Paragraph 5)

9. PART A: Which is the author’s main purpose for writing the blog entry “The Alaska Start III”?
   A. to defend the census process to people who are critical of it
   B. to provide a description of how one group of citizens responded to the census
   C. to instruct census workers on the correct way to collect information from citizens
   D. to provide specific benefits of participating in the census

10. PART B: Which quotation from the blog best expresses the author’s purpose for writing?
   A. “We flew to Noorvik mid-morning on Monday, January 25, a 10-seat plane — full of state dignitaries.” (Paragraph 1)
   B. “I met the elders of the village, who were assembled in the Inupiat culture room, now used to instruct children in their native language.” (Paragraph 2)
   C. “I returned to the school, which is clearly the hub of social activity in the small village, to have lunch with the school children.” (Paragraph 6)
   D. “More interviews with press; a large gathering in the gymnasium with the entire village assembled; an exchange of gifts; speeches; native dancing.” (Paragraph 6)

11. PART A: Which is a summary of the blog entry “The Alaska Start III”?
   A. Dr. Robert Groves was a citizen of the village of Noorvik, Alaska, who greeted a census worker for the 2010 Census. This small village was among the last in the United States to be counted.
   B. The village of Noorvik, Alaska, greeted Dr. Robert Groves, who visited schools and brought gifts. Dr. Groves faced many challenges during his visit.
   C. Dr. Robert Groves visited Noorvik, Alaska, to count the first household for the 2010 Census. The citizens of Noorvik were excited about the arrival of the census.
   D. The village of Noorvik, Alaska, was discovered in 2010 by Dr. Robert Groves. Prior to this visit, the village did not know about the census and had likely never been counted in the survey.

12. PART B: Which additional evidence from the blog entry could be paraphrased and included in the answer to Part A?

   A. “There were two dog sleds nearby, one for the lieutenant governor and one for me.” (Paragraph 1)

   B. “At 1 p.m., I rode with the mayor of Noorvik on an ATV to visit the very first household to be enumerated in the 2010 Census.” (Paragraph 5)

   C. “I knocked on the door and was ushered in.” (Paragraph 5)

   D. “It will continue for several months — in big cities, in small towns, in institutions, among the homeless, for the rich, and for the poor.” (Paragraph 7)

Discussion Questions

Directions: Brainstorm your answers to the following questions in the space provided. Be prepared to share your original ideas in a class discussion.

1. Why do you think the people of Noorvik are excited about Groves' visit to their village? Have you ever experienced a visit from an exciting visitor?

2. In the context of the text, what makes America unique? Why is the census an important part of America? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

3. In the context of the text, what should the future look like? How would ensuring that more people are counted in the census affect America's future? How would communities like Noorvik benefit from the census?

Students involved in group learning showed similar brain-wave patterns

By Los Angeles Times, adapted by Newsela staff on 05.03.17

Word Count **786**

Level **1090L**

Edgewood Middle School students extract strawberry DNA during the Technology Needs Teens program at Harford Community College in Bel Air, Maryland. A new study has detected similarities in brain-wave patterns when students work together. Photo: U.S. Army photo by Conrad Johnson

Thanks to research outside the laboratory, scientists have learned that people change when they interact with others. Friendships are connected to good health. Couples who stay together long enough may even begin to look alike.

In the wilds of a New York City biology classroom, a new study has captured another group phenomenon known to exist in labs but never before seen in humans' natural habitat. It's called group brain synchrony. Group brain synchrony is when people's brain waves work in very similar ways at the same time.

Neurons, or brain cells, process and transmit information through electrical and chemical signals. The human brain has about 100 billion neurons. Everything we think, feel and do is a result of communication between them. When many neurons communicate with each other at the same time, synchronized electrical pulses are produced. These are called brain waves, and scientists measure them to learn more about how our brains work.

Brain waves are measured in frequency, which is the number of electrical pulses in a certain amount of time. Generally, scientists use the unit hertz (Hz), which is equal to one pulse per second. Different brain-wave patterns have different names depending on their frequency. “Theta” waves, for example, are 4 to 7 Hz, or pulses per second. This pattern is associated with daydreaming or feeling sleepy, while the “Beta” wave pattern, with a range of 12 to 30 Hz, is the most common frequency when we’re awake.

Measuring Brain-Wave Patterns

Scientists use a machine called an electroencephalograph, or EEG, to measure brain-wave patterns. The EEG readings are displayed as waves. Each wave represents electrical pulses inside the brain. When people experience group brain synchrony, the brain-wave patterns on their EEG readings will appear very similar.

Researchers at New York University gave 12 high school seniors portable EEG machines that gathered the students’ brain-wave readings. The researchers observed the students' brain-wave activity during one semester of a biology class. The researchers reported that when students were most engaged with each other and participating in group learning activities, the readings on their EEGs tended to show very similar brain-wave patterns.

That group brain synchrony happened the most when students liked their teacher. Individual students who reported feeling connected to their classmates were most likely to fall into synchrony with classmates during group learning.

The new research suggests that neural synchrony may also reflect something more than just shared attention. According to neuroscientist Suzanne Dikker, who worked on the study, it showed up in social dynamics among class members as well. This is notable since group learning might have made for a less common experience.

How To Train Your Brain

Something similar to a process known as "entrainment" could be at play here. Using what we know about brain waves, we can actually change how our brains work. In brain-wave "entrainment," audio or visual stimulation can train our brains to follow a certain wave pattern. For instance, brain waves of 2 Hz usually happen when we’re sleeping. If someone is having trouble sleeping, special audio recordings of the 2 Hz frequency can make the brain follow along.

When two or more people are engaged socially with one another, that, too, appears to involve something resembling "entrainment." It seems that when everyone in a room is paying attention to the same thing, their brain waves will start to be in sync. Like an audio recording, the electrical pulses in one brain can influence those of another – even though we can't see or hear them.

Indeed, Dikker noted that the project itself was explicitly designed as an effort to gather information in a natural setting. The researchers first gave the students a crash course in neuroscience. After enlisting their support in designing the experiment, they helped students craft a few of their own.

“They loved it — at least they said they did,” Dikker said. Except during lack of student attention around college-application time and the appearance of “senioritis” toward the end of the semester, “they really owned the project,” she said.

Possibilities For More Research

The idea that neural synchrony in groups can be detected and measured with portable EEGs, and then analyzed to find patterns, is new. It opens a number of possibilities for future research, Dikker added.

The researchers are now designing larger projects. They hope to be able to record brain information from up to 45 people at once.

Among the questions they hope to answer: What are the optimal conditions for an audience to experience a performance or movie? Is there an ideal group size? Does having some joint interaction right before a performance improve the experience? How does the audience affect the performer, and vice versa?

Name: ____________________ Class: ____________________

Celebrating Cinco de Mayo

By Sanjana Chetia
2019

Cinco de Mayo, a well-known Mexican holiday, has become an important cultural celebration for Mexican Americans across the United States. As you read, take notes on why Cinco de Mayo is an important day for Mexicans Americans.

"twirling cinco de mayo dress" by Gail Williams is licensed under CC BY-ND 2.0

[1] Cinco de Mayo is one of the most well-known Mexican holidays in America, but not many Americans know what the day is about. Some people even confuse it with Mexico's Independence Day.

Cinco de Mayo is only a minor holiday in most of the country. It is celebrated mainly in the Mexican state of Puebla. But for many Mexican Americans, Cinco de Mayo has become an important celebration of cultural pride.

Remembering History: What Happened on May 5th?

In the late 1800s, Mexico was in big trouble. The treasury[1] was nearly bankrupt after fifteen years of civil war and two years fighting the United States. The country owed money to many European countries. The new President of Mexico — a Zapotec[2] man named Benito Juárez — had to halt the debt payments because there was no money to complete them.

Angry with Juárez's decision, Britain, Spain, and France sent troops to Veracruz, Mexico. They demanded the money owed to them. Luckily, President Juárez was able to reach an agreement with Britain and Spain. But Emperor Napoleon III of France refused to talk and settle the debts. He saw this as an opportunity to grow his empire. He soon sent troops to claim Mexican land for France. This forced President Juárez into a war that Mexico was not prepared for: the Franco-Mexican War.

[5] President Juárez quickly rounded up a ragtag army of 2,000 men. They were led by Texas-born General Ignacio Zaragoza. The army moved to the small town of Puebla de Los Angeles in the Mexican state of Puebla. The soldiers secured the town and waited for the French to arrive.

1. the money a government has to spend and the people in charge of looking after it
2. people who lived in the southern part of Mexico

From dawn until dusk on May 5, 1862, the battle raged. After three unsuccessful attacks, the French were surrounded by Mexican soldiers. They attacked after the French ran out of ammunition, or bullets. The Mexican army won, and the French retreated from the battlefield with almost 500 of their soldiers killed. On the other side, fewer than 100 of the Mexican soldiers had been lost.

The Battle of Puebla was seen as a great success. It boosted the spirits of the Mexican resistance movement. Despite the challenges they faced, the Mexican troops had achieved a small but inspiring victory against a strong European power. The Franco-Mexican War finally ended in 1867 when President Juárez's forces drove the French out of Mexico.

What Does Cinco de Mayo Represent?

The Battle of Puebla is still remembered today with Cinco de Mayo. For many Mexicans, May 5th is like any other day in the year. But in the state of Puebla, Cinco de Mayo is celebrated with military parades, speeches, battle reenactments, and festivals. In the United States, Cinco de Mayo acts as a more general celebration of Mexican heritage[3] and culture.

Cinco de Mayo became a major Mexican American holiday because of Chicano activists in the 1960s. They saw Cinco de Mayo as a way to encourage Mexican Americans to celebrate their heritage. They were inspired by how the Mexican soldiers overcame great odds in the Battle of Puebla. To show their pride, Chicano activists began holding small Cinco de Mayo celebrations. Over time, they grew into the large festivals held today.

How is Cinco de Mayo Celebrated Today?

[10] Many Mexican American communities throw parties, parades, and festivals to celebrate Cinco de Mayo. Mariachi and other Mexican folk bands play music, and baile folklórico[4] dancers often perform. These events highlight parts of Mexican culture that come from Puebla, like the colorful skirt-and-blouse style of clothing called China poblana or the spice-and-chocolate dish called mole poblano. Some of the largest Cinco de Mayo festivals are held in Los Angeles, Chicago, and Houston.

Over the past fifty years, Cinco de Mayo has spread from Mexican American communities across the United States. The holiday has introduced Mexican culture to a wider audience. Many students learn about the holiday in school and through public festivals. People with and without Mexican heritage look forward to Cinco de Mayo as a day to celebrate Mexican food, music, clothing, and other traditions.

The meaning of Cinco de Mayo has truly evolved over time. It started as a battle in Puebla and later became a holiday about Mexican culture. It has traveled from Puebla to the United States and beyond! No matter where you live, Cinco de Mayo stands as an important day for Mexican people around the world to connect with their communities and celebrate their heritage.

3. **Heritage** ***(noun):*** the background from which one comes
4. traditional Mexican dances that emphasize local culture

Text-Dependent Questions

Directions: For the following questions, choose the best answer or respond in complete sentences.

1. PART A: What is the central idea of the text?
    - A. The Battle of Puebla successfully ended the Franco-Mexican War.
    - B. Mexico's debt during the 1800s had a negative impact on the country and its culture.
    - C. President Juárez created Cinco de Mayo and is responsible for the holiday's traditions.
    - D. Cinco de Mayo has changed over time but continues to be an important celebration of Mexican culture.

2. PART B: Which detail from the text best supports the answer to Part A?
    - A. "The treasury was nearly bankrupt after fifteen years of civil war and two years fighting the United States." (Paragraph 3)
    - B. "Cinco de Mayo stands as an important day for Mexican people around the world." (Paragraph 8)
    - C. "Cinco de Mayo became a major Mexican American holiday because of Chicano activists in the 1960s." (Paragraph 9)
    - D. "Many students learn about the holiday in school and through public festivals." (Paragraph 10)

3. Which quotation best describes the relationship between the Battle of Puebla and modern-day celebration of Cinco de Mayo?
    - A. "The Battle of Puebla is still remembered today with Cinco de Mayo." (Paragraph 8)
    - B. "They were inspired by how the Mexican soldiers overcame great odds in the Battle of Puebla." (Paragraph 9)
    - C. "These events highlight parts of Mexican culture that come from Puebla." (Paragraph 10)
    - D. "It started as a battle in Puebla and later became a holiday about Mexican culture." (Paragraph 12)

4. How does the author support the idea that Cinco de Mayo is growing in popularity across the United States?
    - A. The author explains that Cinco de Mayo is now celebrated by people who are not from Mexican descent.
    - B. The author provides examples of how Mexican Americans currently celebrate the holiday.
    - C. The author shares a personal experience from a recent Cinco de Mayo celebration.
    - D. The author describes cultural traditions that are rooted in Puebla history.

5. What is the meaning of the word “ragtag” in paragraph 5?
   A. troubled
   B. prepared
   C. disorganized
   D. independent

6. What is the author’s purpose in paragraph 10?
   A. to persuade readers to celebrate cultural holidays
   B. to highlight the different ways Cinco De Mayo is celebrated
   C. to provide readers with an understanding of Cinco de Mayo
   D. to argue the importance of remembering the Battle of Puebla

7. How has the popularity of Cinco de Mayo impacted the celebration of the holiday?

Discussion Questions

Directions: Brainstorm your answers to the following questions in the space provided. Be prepared to share your original ideas in a class discussion.

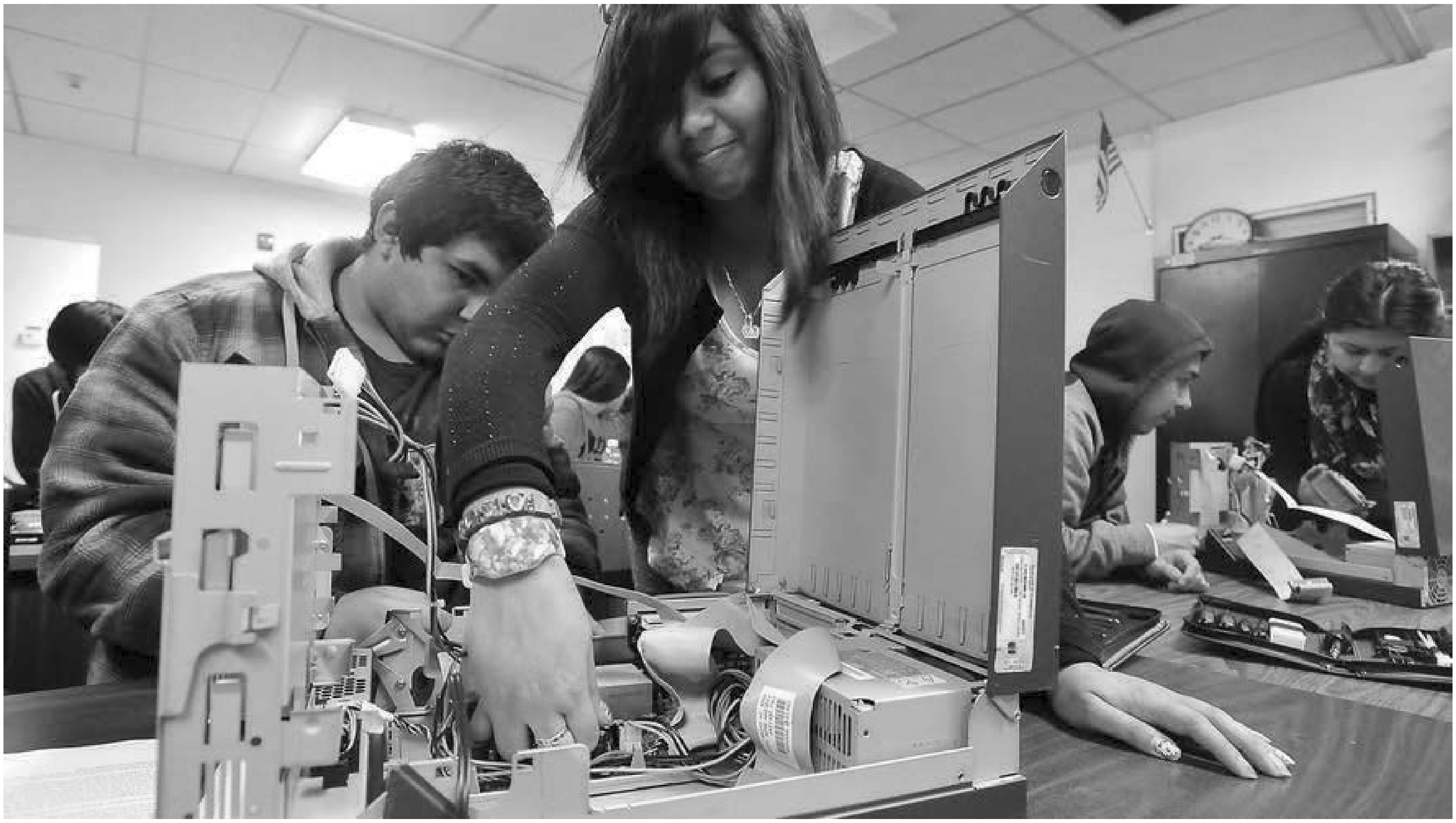
1. How do cultural celebrations such as Cinco de Mayo make America unique? What other cultural celebrations take place in America, and how do these celebrations teach us about other cultures and communities?

2. To celebrate Cinco de Mayo, many Mexican American communities participate in parties, parades, and festivals. How does a holiday like Cinco de Mayo impact a community? How are community celebrations like Cinco de Mayo important?

3. Have you participated in celebrations in your own community? Compare and contrast these celebrations with Cinco de Mayo celebrations.

Tech training program aims to help students climb out of poverty

By Fresno Bee, adapted by Newsela staff on 01.29.16
Word Count **850**
Level **1020L**



Xavier Raygoza, 17, (left) and Sara Rabadan, 17, take a computer apart in a Tech Connect class at Orosi High School in Orosi, California. Tech Connect gives students experience with computers and computer repair, and every student who has participated in the program since it started in 2009 has gone on to college. Silvia Flores/Fresno Bee/TNS

OROSI, Calif. — Emilio Isazaga says he hopes his education will get himself and his family "out of the struggle" to lead better lives.

The 17-year-old takes part in an after-school program called Tech Connect in Orosi. The yearlong program teaches students how to repair computers, prepare taxes and perform community service.

For many, the class is a chance at a brighter future. Every high school senior in Tech Connect has gone on to attend college. It's a great accomplishment, especially considering that 62 percent of adults in Orosi and nearby Cutler don't graduate from high school, compared to 32 percent throughout Tulare County, according to a 2013 survey.

Equal Opportunities For The Poor

After he was inspired by a similar program in San Francisco, Miguel Castañeda started Tech Connect in 2009. Castañeda grew up in an agricultural city called Delano, California. He thought students who were raised in poorer rural areas should receive the same opportunities as those raised in wealthier areas.

“It’s hard out here,” he says of Cutler-Orosi, adding that many people work as farm laborers for very little money and there are lots of gangs.

There are regularly more than 100 high school students in the Cutler-Orosi Joint Unified School District who apply for 30 slots in his Tech Connect class. Castañeda doesn’t choose participants based on grade-point average. He looks for students with a passion, and a need, for learning.

Emilio is one of those young people. “Honestly,” Emilio says, “I’ve been through some things, you know? I’m trying to learn some things.”

A Father Figure

Emilio’s mother was forced to leave the United States because she had come to the country illegally. After she was deported to Mexico, Emilio and his younger sister moved in with his grandmother. Emilio broke the law and is currently under tight supervision. Despite his troubles, Emilio managed to graduate from high school two years early at age 16.

One of the reasons Emilio loves Tech Connect is because Castañeda has become a father figure.

Emilio sat in his classroom last week. Outside sirens could be heard screaming in the distance, surely an omen of someone in trouble.

Emilio says Tech Connect enables him to channel his energy in positive ways. “Right now, it’s helping me stay out of those sirens, right? It will help me build some character, help out my people, you know? I feel like it’s a good choice, to help out.”

Doing What It Takes To Help Others

Tech Connect students are required to do community service. They clean up graffiti around town, feed the homeless and teach adults how to use computers. Starting again next month, students will volunteer doing taxes for low-income Orsi residents on Saturdays. Each year, all of Castaneda’s students have become certified in tax preparation.

Castaneda also takes students on field trips to colleges, offers tutoring and helps connect them with jobs in the community. One of his students is Adylene Saucedo, 15, who says Castañeda is a great leader and "will do whatever he can to help you out.”

Tech Connect is a California Services Employment Training (CSET) program that is also funded by the Cutler-Orosi Joint Unified School District and the Central Valley Community Foundation. Castañeda is also a senior program specialist for CSET.

“He’s just really good at what he does,” says Elizabeth Gonzalez. A grant writer who applies for government funds to help pay for the program, she watched Castañeda teach students about computer parts last week.

“This subject could be really boring, but as you can see, the kids are really engaged," Gonzales said. "He’s just very giving, very giving.”

Being A Role Model

Emilio agrees that Castañeda is a role model. “Mr. Miguel, he’s really nice to us, you know? So I think that’s good for a teacher.”

Emilio’s classmates have a similar perspective.

“My family is so unstable right now,” says Sara Rabadan, 17. “He doesn’t give up on people. He literally told us, a couple of times, he’s not going to give up – even if we put up the struggles. I think that’s nice 'cuz there are parents that give up on you, ya know.”

“He teaches us to help your community, help other people,” says Christian Salacup, 15, “and by doing that, now it gives us at least a little bit of a habit to help others.

“He said in one of our first meetings that he had a rough past, bad people around him," Salacup added. "Even though he went through all of that, he was still able to find a way to help others and himself succeed.”

Doing Some Good ... For A Change

Emilio says he will likely attend a community college before transferring to a four-year college “if they want me.” He’s still deciding what he’d like to study, but he's sure the skills he’s learned through Tech Connect will help him.

“Hopefully I get to get out of my struggle too, ya know, and will learn a little something along the way. And do some good for a change, right?”

Name: ______________________ Class: ______________________

What Is Earth?

By NASA
2015

This informational text explores what makes up the planet Earth, how it supports life, and its movement within the solar system. As you read, take notes on what Earth is made of and how scientists are able to study it.

"This picture of Earth is sometimes called the blue marble" by NASA is in the public domain.

[1] Earth is our home planet. Scientists believe Earth and its moon formed around the same time as the rest of the solar system. They think that was about 4.5 billion years ago. Earth is the fifth-largest planet in the solar system. Its diameter is about 8,000 miles. And Earth is the third-closest planet to the sun. Its average distance from the sun is about 93 million miles. Only Mercury and Venus are closer.

Earth has been called the "Goldilocks planet." In the story of "Goldilocks and the Three Bears," a little girl named Goldilocks liked everything just right. Her porridge couldn't be too hot or too cold. And her bed couldn't be too hard or too soft. On Earth, everything is just right for life to exist. It's warm, but not too warm. And it has water, but not too much water.

Earth is the only planet known to have large amounts of liquid water. Liquid water is essential for life. Earth is the only planet where life is known to exist.

What Does Earth Look Like?

From space, Earth looks like a blue marble with white swirls and areas of brown, yellow, green and white. The blue is water, which covers about 71 percent of Earth's surface. The white swirls are clouds. The areas of brown, yellow and green are land. And the areas of white are ice and snow.

[5] The equator is an imaginary circle that divides Earth into two halves. The northern half is called the Northern Hemisphere. The southern half is called the Southern Hemisphere. The northernmost point on Earth is called the North Pole. The southernmost point on Earth is called the South Pole.

How Does Earth Move?

Earth orbits the sun once every 365 days, or one year. The shape of its orbit is not quite a perfect circle. It's more like an oval, which causes Earth's distance from the sun to vary during the year. Earth is nearest the sun, or at "perihelion," in January when it's about 91 million miles away. Earth is farthest from the sun, or at "aphelion," in July when it's about 95 million miles away.

At the equator, Earth spins at just over 1,000 miles per hour. Earth makes a full spin around its axis once every 24 hours, or one day. The axis is an imaginary line through the center of the planet from the North Pole to the South Pole. Rather than straight up and down, Earth's axis is tilted at an angle of 23.5 degrees.

Why Do We Have Day and Night?

At all times, half of Earth is lighted by the sun and half is in darkness. Areas facing toward the sun experience daytime. Areas facing away from the sun experience nighttime. As the planet spins, most places on Earth cycle through day and night once every 24 hours. The North Pole and South Pole have continuous[1] daylight or darkness depending on the time of year.

Why Does Earth Have Seasons?

Earth has seasons because its axis[2] is tilted. Thus, the sun's rays hit different parts of the planet more directly depending on the time of year.

[10] From June to August, the sun's rays hit the Northern Hemisphere more directly than the Southern Hemisphere. The result is warm (summer) weather in the Northern Hemisphere and cold (winter) weather in the Southern Hemisphere.

From December to February, the sun's rays hit the Northern Hemisphere less directly than the Southern Hemisphere. The result is cold (winter) weather in the Northern Hemisphere and warm (summer) weather in the Southern Hemisphere.

From September to November, the sun shines equally on both hemispheres. The result is fall in the Northern Hemisphere and spring in the Southern Hemisphere.

The sun also shines equally on both hemispheres from March to May. The result is spring in the Northern Hemisphere and fall in the Southern Hemisphere.

What Are Earth's Different Parts?

Earth consists of land, air, water and life. The land contains mountains, valleys, and flat areas. The air is made up of different gases, mainly nitrogen and oxygen. The water includes oceans, lakes, rivers, streams, rain, snow and ice. Life consists of people, animals and plants. There are millions of species, or kinds of life, on Earth. Their sizes range from very tiny to very large.

1. **Continuous** ***(adjective):*** continuing without being stopped or interrupted
2. the imaginary straight line that something (such as the Earth) turns around

[15] Below Earth's surface are layers of rock and metal. Temperatures increase with depth, all the way to about 12,000 degrees Fahrenheit at Earth's inner core.

Earth's parts once were seen as largely separate from each other. But now they are viewed together as the "Earth system." Each part connects to and affects each of the other parts. For example:

- Clouds in the air drop rain and snow on land.
- Water gives life to plants and animals.
- Volcanoes on land send gas and dust into the air.
- People breathe air and drink water.

Earth system science is the study of interactions between and among Earth's different parts.

Why and How Does NASA Study Earth?

NASA studies Earth to learn about how the planet changes. Earth's parts — land, air, water and life — are always changing. Some of the changes are natural and some are caused by humans. Scientists want to understand how Earth has changed in the past and how it is changing now. This information helps them predict how Earth might change in the future.

NASA studies Earth using satellites.[3] Satellites look toward Earth from space. They take pictures of, and collect information about, all of Earth's parts. NASA satellites are especially good for observing clouds, oceans, land and ice. They also measure gases in the atmosphere, such as ozone and carbon dioxide. They measure how much energy enters and leaves Earth's atmosphere. And they monitor wildfires, volcanoes and their smoke.

[20] Information gathered by NASA satellites helps scientists predict weather and climate. It also helps public health officials track disease and famine[4]. It helps farmers decide when to plant crops and what kinds to plant. And it helps emergency workers respond to natural disasters.

The more people know about Earth and its current and predicted changes, the better decisions they can make.

3. an object placed in orbit around the Earth, moon, or other planet that collects information or is used for communication
4. extreme lack of food

Text-Dependent Questions

Directions: For the following questions, choose the best answer or respond in complete sentences.

1. PART A: Which statement best identifies one of the central ideas of the text?
    A. The Earth's natural elements and distance from the sun allow humans and animals to live successfully on Earth.
    B. Scientists' observations of Earth show that the planet may be habitable for humans in the future.
    C. The Earth's placement in the universe guarantees that humans will always be able to live comfortably there.
    D. Scientists' understanding of Earth's makeup and movements is still limited, but it is becoming more advanced through satellites.

2. PART B: Which detail from the text best supports the answer to Part A?
    A. "Earth is the only planet known to have large amounts of liquid water. Liquid water is essential for life. Earth is the only planet where life is known to exist." (Paragraph 3)
    B. "Earth has seasons because its axis is tilted. Thus, the sun's rays hit different parts of the planet more directly depending on the time of year." (Paragraph 9)
    C. "Earth's parts once were seen as largely separate from each other. But now they are viewed together as the 'Earth System.'" (Paragraph 16)
    D. "NASA studies Earth to learn about how the planet changes. Earth's parts — land, air, water and life — are always changing. Some of the changes are natural and some are caused by humans." (Paragraph 18)

3. Which of the following describes the author's purpose for referencing "Goldilocks and the Three Bears" in paragraph 2?
    A. to help students understand that Earth needs certain conditions to be "just right" for life to exist
    B. to teach students the origins of the fairytale and how it can be applied to real life
    C. to emphasize how impossible it is for a "Goldilocks planet" like Earth to exist
    D. to show students what humans need to live comfortably in their daily lives

4. How does the author introduce Earth's movements and how they affect time and seasons on Earth?

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Discussion Questions

Directions: Brainstorm your answers to the following questions in the space provided. Be prepared to share your original ideas in a class discussion.

1. How does the text explore the power of our planet? What impact does its makeup and movements have on us? How does this compare to the effect that humans have on the Earth? Cite examples from the text, your own experience, and other literature, art, or history in your answer.

2. Imagine a universe in which the Earth moved differently. What would the Earth look like? How would time be affected by this change in motion?

3. The article refers to Earth as a “Goldilocks planet.” How likely do you think it is that life exists on other planets? Is it very likely? Why or why not?

America is saving tons of food, thanks to a student volunteer's great idea

By Washington Post, adapted by Newsela staff on 01.11.16
Word Count **732**
Level **970L**

A worker removes leaves as nectarines get sorted for packaging at Eastern ProPak Farmers Cooperative in Glassboro, New Jersey, Aug. 27, 2013. Photo: AP Photo/Mel Evans BELOW: MEANS Database's Maria Rose Belding (right), co-founder and executive director, along with Grant Nelson, chief operating officer, with their homepage visible on the computer screen in their office. Ricky Carioti/ The Washington Post

It's an odd problem that is uniquely American. More than 45 million Americans don't have enough to eat, but the country wastes an estimated 40 percent of its food.

The reasons why are complicated. Grocery stores think they could get in legal trouble if they donate food to food pantries that makes people sick. Farmers allow fruit that is safe but ugly to rot because they don't think it will sell. Bananas turn black on all our shelves.

Something Had To Change

The reasons behind this waste, however, didn't feel so complicated to a teenage girl named Maria Rose Belding. On a chilly day five years ago, the whole thing just felt simple. It felt wrong. It felt like something had to change.

At the time, Belding was a volunteer at a food pantry in the town of Pella, Iowa. She had just thrown out hundreds of boxes of expired mac and cheese in front of numerous needy people lining up outside to collect free food.

"We were throwing away all of this food just because we couldn't communicate," Belding, then a freshman in high school, remembers. That frustration would ultimately lead her to develop a groundbreaking technology in the war on hunger.

Saving Tons Of Food

Belding, now 20 and a student at American University in Washington, D.C., conducted years of research. It led her to launch an online network that connects thousands of food pantries in 24 states, allowing them to quickly share extra food that might have otherwise gone to waste. Pantries simply post their leftover food to the program and someone else in the network picks it up and puts it to use. So far, the database has saved two tons of food.

Belding's program is called MEANS, which stands for Matches Excess and Need for Stability. Experts agree that its website can improve communication between food pantries. They also say it can help with the country's huge problem of constant waste.

Food waste "needs to be addressed on multiple levels," said Mathy Stanislaus, an official with the Environmental Protection Agency. The EPA is a branch of the U.S government that works to protect human health and the environment. Stanislaus works on ending food waste. He said part of the solution "is wider knowledge of the problem, but also tools [like this] to reduce waste."

Wait! No One Thought Of This Yet?

Even people who donate to their local pantries are contributing to the problem. Emergency food centers have long been the last stop for whatever's lurking in the back of America's cupboards. And so, people donate an endless supply of near-expired creamed corn, beans and Honeybuns. All of these products do one of two things. They expire on the shelf and get thrown out, or they simply fill up the pantry so the food center can't accept any more quality food.

When Belding started researching the idea behind the MEANS database while in high school, she was sure someone had beat her to it. She was wrong.

It took more than a year. It was a year of planning, researching and building program after program along with her co-founder, Grant Nelson. Then in February, the website launched.

Months passed. In May, Belding was sitting in class when she saw one of their early users had posted an item to the site. This was the moment, she realized, when the project would either succeed or fail. A sense of panic seized her when she saw someone was giving away assorted varieties of canned beans. She did not think anyone would want them. "So we were all anxiously sitting by our computers hitting refresh, and I said, 'Please, someone take this.' And then, it's gone. It just disappeared. . . . The beans had moved."

More Calls To Make

Things then happened very quickly for MEANS. The group now has several computer programmers who are paid through donated money. It even has a few young volunteers whom Belding admits are older than she. The number of members on the site has grown from around 50 larger food banks in June to more than 200.

However there's still a lot of work to do, Belding said. There are still 26 states that aren't yet using her program. There's still the world. Belding said she had more calls to make, and more connections to build.

Quiz

1 The introduction [paragraphs 1-2] mainly describes the problem of food waste by:

(A) listing a number of ways in which food is wasted

(B) indicating the number of people who use food pantries

(C) pointing out that many states are using the MEANS program

(D) suggesting that there is a communication problem

2 What is the MOST likely reason why the article includes the fact that some of the volunteers are older than Belding?

(A) to show that most volunteers in the program are elderly

(B) to emphasize Belding's youth

(C) to show that even young people can lead with great ideas

(D) to show that the MEANS program is diverse

3 Which answer choice is the BEST definition of the word "groundbreaking" as used in the sentence below?

That frustration would ultimately lead her to develop a groundbreaking technology in the war on hunger.

(A) innovative

(B) significant

(C) established

(D) complex

4 Which paragraph from the section "Something Had To Change" helps you understand the main reason why Maria Rose Belding believed the food pantries were wasting food?

East African runners one step ahead

By Scientific American, adapted by Newsela staff on 08.15.16
Word Count **840**
Level **1020L**

Kenya's Asbel Kiprop (center) heads for the finish line to win the men's 1500-meter final at the World Athletics Championships in the Luzhniki stadium in Moscow, Russia, August 18, 2013. AP Photo/Anja Niedringhaus

When the starting gun fires at the Olympic track in Rio de Janeiro, the leaders of the distance races might be no surprise.

In the men's 1,500 meters, Asbel Kiprop will be up front. In the women's 5,000 meters, also called a 5K, Almaz Ayana will run away. She may also take the 10,000 meters, or 10K race. In the marathon, Helah Kiprop will push the women whereas Eliud Kipchoge will be the one to watch among the men. In the men's 800 meters, David Rudisha will likely hold his title and maybe break his own world record.

In other words, most of these races will be dominated by runners from, or with roots in, eastern Africa— mainly Kenya and Ethiopia. Mo Farah, at the top of the ranking for 10,000 meters, was born in Somalia, which borders Ethiopia. Bernard Lagat, who just won the U.S. 5,000-meter Olympic qualifier — at age 41 — is Kenyan-American.

It's In Their Genes

East African runners have dominated since Kenyans started winning in the mid-1990s, followed by Ethiopians shortly thereafter. The reasons for that dominance are hotly debated. Science has offered little clear information about it.

The favorite theory in the West is that runners from east Africa have some genetic advantage over other runners. Many of the elite runners come from the Oromo ethnic group in Ethiopia and the Kalenjin tribes in Kenya. It is believed these groups must have traits or environments that make them faster. Maybe their ancestors gained endurance by hunting on foot. It could be their longer, thinner legs or their increased lung capacity from living at higher altitudes. In an attempt to find answers, researchers have collected DNA from across the region. Yannis Pitsiladis of the University of Brighton in England said, “We know genes are important. We just don’t know which ones they are.”

Another factor that has been overlooked, however, is the “running cultures” of places in Ethiopia and Kenya. One is the poor Ethiopian town of Bekoji. It has about 16,000 people and is a few hours outside the capital of Addis Ababa. In recent years, it has produced 10 Olympic gold medals, 15 world records and 34 World Championship gold medals, said British runner and writer Declan Murray. He is writing a book about Bekoji.

Coach Trains Athletes

This town's success rate is stunning. Many other towns in the region have similar ethnic backgrounds, genetic makeup and quality of life. However, they have not produced a single elite runner.

At the center of the town’s success is a coach named Sentayehu Eshetu, who has been training local running talent for over 30 years. One of his first stars was Derartu Tulu, who took the gold medal at the 1992 Olympics in Barcelona. Since then Sentayehu has drawn more runners to his program. Every day, the hills around Bekoji are filled with hundreds of young athletes who train and dream of winning. Sentayehu’s runners brought home five Olympic medals from Athens in 2004, four from Beijing in 2008 and four more from London in 2012.

Olympian Ran In His Bare Feet

Ethiopia’s running culture started with a trailblazer whose success seemed to inspire young people to follow in his footsteps. Adebe Bikila is still a folk hero today for winning the 1960 Olympic Marathon in bare feet. “When you ask people why they got involved in running, it’s because they see these people on TV or they heard it on the radio,” says Malcolm Anderson. He is an athletics agent and founder of Moyo Sports, an agency with runners from Kenya, Ethiopia and the U.K.

The small town of Iten has seen results similar to Bekoji's. Culturally, Iten is similar to Bekoji, attracting a huge pool of talent while fostering competition and training. Every day, young runners arrive in Iten from across the region. If they are lucky—and fast—they will be accepted into a training camp. If they are luckier still, they’ll be signed by an agent for training and racing abroad. Almost all of them will see some of their fellow athletes rise to the world stage.

It Helps To Speak The Right Language

For several generations, athletic knowledge has grown in Kalenjin training camps. Benoit Gaudin of the Department of Sport Sciences at Addis Ababa University in Ethiopia interviewed elite non-

Kalenjin runners. They report that joining a training camp is difficult if you are not Kalenjin.

Those who succeed do so by basically becoming Kalenjin. “Either they learn the language or they marry a Kalenjin girl or they have high-profile support inside the running community, and someone is helping them," Gaudin says. "Otherwise it’s very difficult, because they have their own specific language even within the Kalenjin group. For example, you can train with them today but you don’t know where the next training is tomorrow, because when it comes time to give this key information, they switch languages."

Gaudin says this is interesting because it has to do with ethnicity, but has nothing to do with genetics.

Quiz

1 Which section highlights the idea that no one is sure why East African runners are exceptionally great?

(A) Introduction [paragraphs 1-3]

(B) "It's In Their Genes"

(C) "Coach Trains Athletes"

(D) "Olympian Ran In His Bare Feet"

2 Which of these sentences from the article BEST supports the conclusion that culture has a role in developing great runners?

(A) It could be their longer, thinner legs or their increased lung capacity from living at higher altitudes.

(B) Many other towns in the region have similar ethnic backgrounds, genetic makeup and quality of life.

(C) “When you ask people why they got involved in running, it’s because they see these people on TV or they heard it on the radio,” says Malcolm Anderson.

(D) “Either they learn the language or they marry a Kalenjin girl or they have high-profile support inside the running community, and someone is helping them," Gaudin says.

3 Which statement would be most important to include in a summary of the article?

(A) It is a common belief that East African runners have good genes for running.

(B) David Rudisha might break world records at the Olympics.

(C) Bekoji is a poor town in Ethiopia outside of the capital, with about 16,000 people.

(D) Adebe Bikila won a marathon without wearing shoes.

4 Which two of the following sentences from the article include central ideas of the article?

1. *In other words, most of these races will be dominated by runners from, or with roots in, eastern Africa— mainly Kenya and Ethiopia.*
2. *The reasons for that dominance are hotly debated.*
3. *Many other towns in the region have similar ethnic backgrounds, genetic makeup and quality of life.*
4. *They report that joining a training camp is difficult if you are not Kalenjin.*

(A) 1 and 2

(B) 1 and 3

(C) 2 and 3

(D) 3 and 4

These middle schoolers explore the world on a plate

By Kitson Jazynka, Washington Post, adapted by Newsela staff on 05.31.18

Word Count **618**

Level **MAX**

Image 1. Sigita Clark (right), a volunteer with the nonprofit Common Threads, helps students Michelle Espinoza (left) and Naterrah Tyson (center) prepare a traditional Ethiopian meal at the Washington School for Girls on May 1, 2018. Photo for The Washington Post by Kitson Jazynka.

The smell of fresh-cut lemons fills the small cafeteria at the Washington School for Girls on a recent Tuesday. Soon the aroma of cinnamon takes over. It is followed by the sharp scent of onions and ginger as a bustling group of student chefs chops and slices with shiny 8-inch professional knives.

Some peel and dice sweet potatoes. Others measure chicken broth and spices. At the other end of the work table, girls rip the leaves off red-stemmed Swiss chard, organizing the greens into piles.

The sixth-graders work after school under the direction of chef instructor Patrick McDermott. He teaches, demonstrates and advises. He calls each of his students "Chef." He also checks the food, stirring a pot of steaming seasoned chicken and then moving on to oversee the greens, which are now ready to wilt in a pot of fragrant liquid bubbling on the stove. The result of the student chefs' work will be a traditional Ethiopian meal for them to share.

The class is a year-long program called Cooking Skills and World Cuisine. Once a week, students meet to learn about cultures across the globe and healthful food choices through cooking (and eating). On this day, students learned about Ethiopian cultures. They learned how extended families often share meals and that the person sitting next to you is supposed to refill your drink. This month, they also made food from Germany and Jamaica.

The student chefs also learn about nutrition. Topics cover "the importance of having fruits and vegetables and a variety of color on your plate and portion control," McDermott says.

He works as the D.C. program manager for the nonprofit organization Common Threads. It is a community program based in Chicago that promotes wellness through healthful cooking and eating. Common Threads offers the class, which also teaches kitchen safety and cleanliness, recipe reading, measuring ingredients and table manners.

McDermott teaches knife skills, too. For some, such as 11-year old Sa'Nai Lathern, it's the best part of the class. "Chopping makes me feel happy," she says.

For other students, it means more privileges at home.

"Before ... my mom was scared to give me a knife," says Sydney Stevens, who's also 11. "Now she trusts me with a knife."

In addition to the greens dish, called ye'abesha gomen, on that Tuesday the chefs also made doro wat, a traditional Ethiopian stew. As it simmers, the girls clean the kitchen and prepare dessert. A few chefs debate the cutting techniques required to turn a whole mango into cubes. Is it more like cutting a tomato or an avocado?

Actually, it's a bit of both, says McDermott. He shows the girls how to cut it lengthwise. Then he cuts it in half, off center, to avoid the core and leave a large slice to cut into a checkerboard pattern.

It's a recipe for fruit skewers that requires the juicy, orange cubes, plus sliced bananas. The girls repeat the directions from adult volunteer Sigita Clark as they pierce the fruit on thin wooden sticks, "a banana, a mango, a banana, a mango."

With the skewers assembled, set on a tray and sprinkled with ground cinnamon, ginger and cloves, it's time to eat.

"I love making food with my hands and then sharing it with my friends," says 12-year-old Za'Niyah Martin.

As for Sydney, she says the afternoon has been like taking a trip to Ethiopia. She tried zucchini for the first time and "it wasn't bad."

Quiz

1 Which statement is a CENTRAL idea of the article?

(A) Children are able to learn about other cultures through cooking.

(B) Children learn to use unusual ingredients when they take cooking classes.

(C) Children should be able to use a knife when cooking in class.

(D) Children always enjoy cooking because they can use their hands.

2 Which sentence from the article would be MOST important to include in a summary of the article?

(A) At the other end of the work table, girls rip the leaves off red-stemmed Swiss chard, organizing the greens into piles.

(B) The result of the student chefs' work will be a traditional Ethiopian meal for them to share.

(C) Once a week, students meet to learn about cultures across the globe and healthful food choices through cooking (and eating).

(D) He works as the D.C. program manager for the nonprofit organization Common Threads.

3 What is MOST likely the reason the author included the information about children using knives in the cooking classes?

(A) to persuade parents reading the article to allow their children to use knives

(B) to demonstrate that the children have learned about kitchen safety

(C) to explain some of the dangers that children encounter when cooking

(D) to highlight the best part of the cooking class for most children

4 Which sentence from the article BEST introduces a cultural tradition to the reader?

(A) It is followed by the sharp scent of onions and ginger as a bustling group of student chefs chops and slices with shiny 8-inch professional knives.

(B) At the other end of the work table, girls rip the leaves off red-stemmed Swiss chard, organizing the greens into piles.

(C) The result of the student chefs' work will be a traditional Ethiopian meal for them to share.

(D) They learned how extended families often share meals and that the person sitting next to you is supposed to refill your drink.

Name: ______________________ Class: ______________________

The Selfish Giant

By Oscar Wilde
1888

Oscar Wilde (1854-1900) was an Irish playwright, novelist, essayist, and poet. He remains well known for his literary talents, his sharp wit, and his memorable personality. His later years were characterized by failing health and deep depression. As you read, take notes on how the seasons and their elements are characterized.

[1] Every afternoon, as they were coming from school, the children used to go and play in the Giant's garden.

It was a large lovely garden, with soft green grass. Here and there over the grass stood beautiful flowers like stars, and there were twelve peach-trees that in the spring-time broke out into delicate blossoms of pink and pearl, and in the autumn bore[1] rich fruit. The birds sat on the trees and sang so sweetly that the children used to stop their games in order to listen to them. 'How happy we are here!' they cried to each other.

One day the Giant came back. He had been to visit his friend the Cornish[2] ogre, and had stayed with him for seven years. After the seven years were over he had said all that he had to say, for his conversation was limited, and he determined to return to his own castle. When he arrived he saw the children playing in the garden.

"What are you doing here?" he cried in a very gruff[3] voice, and the children ran away.

[5] "My own garden is my own garden," said the Giant; "any one can understand that, and I will allow nobody to play in it but myself." So he built a high wall all round it, and put up a notice-board.

TRESPASSERS
WILL BE
PROSECUTED

He was a very selfish Giant.

The poor children had now nowhere to play. They tried to play on the road, but the road was very dusty and full of hard stones, and they did not like it. They used to wander round the high wall when their lessons were over, and talk about the beautiful garden inside.

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1. produced
2. The term "Cornish" refers to inhabitants of Cornwall, a county on England's southwestern tip.
3. **Gruff** ***(adjective):*** rough and low in pitch

"How happy we were there," they said to each other.

Then the Spring came, and all over the country there were little blossoms and little birds. Only in the garden of the Selfish Giant it was still Winter. The birds did not care to sing in it as there were no children, and the trees forgot to blossom. Once a beautiful flower put its head out from the grass, but when it saw the notice-board it was so sorry for the children that it slipped back into the ground again, and went off to sleep. The only people who were pleased were the Snow and the Frost. "Spring has forgotten this garden," they cried, "so we will live here all the year round." The Snow covered up the grass with her great white cloak, and the Frost painted all the trees silver. Then they invited the North Wind to stay with them, and he came. He was wrapped in furs, and he roared all day about the garden, and blew the chimney-pots down. "This is a delightful spot," he said, "we must ask the Hail on a visit." So the Hail came. Every day for three hours he rattled on the roof of the castle till he broke most of the slates,[4] and then he ran round and round the garden as fast as he could go. He was dressed in grey, and his breath was like ice.

[10] "I cannot understand why the Spring is so late in coming," said the Selfish Giant, as he sat at the window and looked out at his cold white garden; "I hope there will be a change in the weather."

But the Spring never came, nor the Summer. The Autumn gave golden fruit to every garden, but to the Giant's garden she gave none. "He is too selfish," she said. So it was always Winter there, and the North Wind, and the Hail, and the Frost, and the Snow danced about through the trees.

One morning the Giant was lying awake in bed when he heard some lovely music. It sounded so sweet to his ears that he thought it must be the King's musicians passing by. It was really only a little linnet[5] singing outside his window, but it was so long since he had heard a bird sing in his garden that it seemed to him to be the most beautiful music in the world. Then the Hail stopped dancing over his head, and the North Wind ceased roaring, and a delicious perfume came to him through the open casement.[6] "I believe the Spring has come at last," said the Giant; and he jumped out of bed and looked out.

What did he see?

He saw a most wonderful sight. Through a little hole in the wall the children had crept in, and they were sitting in the branches of the trees. In every tree that he could see there was a little child. And the trees were so glad to have the children back again that they had covered themselves with blossoms, and were waving their arms gently above the children's heads. The birds were flying about and twittering[7] with delight, and the flowers were looking up through the green grass and laughing. It was a lovely scene, only in one corner it was still Winter. It was the farthest corner of the garden, and in it was standing a little boy. He was so small that he could not reach up to the branches of the tree, and he was wandering all round it, crying bitterly. The poor tree was still quite covered with frost and snow, and the North Wind was blowing and roaring above it. "Climb up! little boy," said the Tree, and it bent its branches down as low as it could; but the little boy was too tiny.

4. shingles on the roof
5. a small bird with a reddish breast and forehead
6. window
7. chirping

[15] And the Giant's heart melted as he looked out. "How selfish I have been!" he said; "now I know why the Spring would not come here. I will put that poor little boy on the top of the tree, and then I will knock down the wall, and my garden shall be the children's playground for ever and ever." He was really very sorry for what he had done.

So he crept downstairs and opened the front door quite softly, and went out into the garden. But when the children saw him they were so frightened that they all ran away, and the garden became Winter again. Only the little boy did not run, for his eyes were so full of tears that he did not see the Giant coming. And the Giant stole up behind him and took him gently in his hand, and put him up into the tree. And the tree broke at once into blossom, and the birds came and sang on it, and the little boy stretched out his two arms and flung them round the Giant's neck, and kissed him. And the other children, when they saw that the Giant was not wicked any longer, came running back, and with them came the Spring. "It is your garden now, little children," said the Giant, and he took a great axe and knocked down the wall. And when the people were going to market at twelve o'clock they found the Giant playing with the children in the most beautiful garden they had ever seen.

All day long they played, and in the evening they came to the Giant to bid him good-bye.

"But where is your little companion?" he said: "the boy I put into the tree." The Giant loved him the best because he had kissed him.

"We don't know," answered the children; "he has gone away."

[20] "You must tell him to be sure and come here to-morrow," said the Giant. But the children said that they did not know where he lived, and had never seen him before; and the Giant felt very sad.

Every afternoon, when school was over, the children came and played with the Giant. But the little boy whom the Giant loved was never seen again. The Giant was very kind to all the children, yet he longed for his first little friend, and often spoke of him. "How I would like to see him!" he used to say.

Years went over, and the Giant grew very old and feeble.[8] He could not play about any more, so he sat in a huge armchair, and watched the children at their games, and admired his garden. "I have many beautiful flowers," he said; "but the children are the most beautiful flowers of all."

One winter morning he looked out of his window as he was dressing. He did not hate the Winter now, for he knew that it was merely the Spring asleep, and that the flowers were resting.

Suddenly he rubbed his eyes in wonder, and looked and looked. It certainly was a marvelous sight. In the farthest corner of the garden was a tree quite covered with lovely white blossoms. Its branches were all golden, and silver fruit hung down from them, and underneath it stood the little boy he had loved.

[25] Downstairs ran the Giant in great joy, and out into the garden. He hastened[9] across the grass, and came near to the child. And when he came quite close his face grew red with anger, and he said, "Who hath dared to wound thee?" For on the palms of the child's hands were the prints of two nails, and the prints of two nails were on the little feet.[10]

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8. **Feeble** ***(adjective):*** lacking physical strength, especially due to age or illness
9. **Hasten** ***(verb):*** to hurry

“Who hath dared to wound thee?” cried the Giant; “tell me, that I may take my big sword and slay him.”

“Nay!” answered the child; “but these are the wounds of Love.”

“Who art thou?” said the Giant, and a strange awe fell on him, and he knelt before the little child.

And the child smiled on the Giant, and said to him, “You let me play once in your garden, to-day you shall come with me to my garden, which is Paradise.”

[30] And when the children ran in that afternoon, they found the Giant lying dead under the tree, all covered with white blossoms.

10. Holes in the hands and feet are called “stigmata” and are a reference to Jesus Christ, who was nailed to a cross by his hands and feet.

Text-Dependent Questions

Directions: For the following questions, choose the best answer or respond in complete sentences.

1. PART A: Which TWO of the following best identify the central themes of this story?
    A. Selfishness will be punished, while a gracious spirit will be rewarded.
    B. It is impossible to treat all people equally; we will always have preferences for some people over others.
    C. It is only in death that people's good deeds can truly be appreciated.
    D. People are dynamic beings who can learn, change, and redeem themselves.
    E. Living in agreement with a particular religion is the only way to live kindly.
    F. People may behave differently over time, but they can never really change who they are.

2. PART B: Which TWO phrases from the story best support the answers to Part A?
    A. "So it was always Winter there, and the North Wind, and the Hail, and the Frost, and the Snow danced about through the trees." (Paragraph 11)
    B. "'I will knock down the wall, and my garden shall be the children's playground for ever and ever.' He was really very sorry for what he had done." (Paragraph 15)
    C. "The Giant loved him the best because he had kissed him." (Paragraph 18)
    D. "'Nay!' answered the child; 'but these are the wounds of Love.'" (Paragraph 27)
    E. "'You let me play once in your garden, to-day you shall come with me to my garden, which is Paradise.'" (Paragraph 29)
    F. "they found the Giant lying dead under the tree, all covered with white blossoms." (Paragraph 30)

3. How does the giant's first interaction with the children shape their perspective of him?
    A. It makes them fearful of him.
    B. It encourages them to continue playing in his garden.
    C. It motivates them to befriend the little boy.
    D. It makes them feel bad for him.

4. How does the following phrase help develop the plot of the story: "He did not hate the Winter now, for he knew that it was merely the Spring asleep, and that the flowers were resting" (Paragraph 23)?
    A. It emphasizes how miserable the giant was during the period of time when it was constantly winter on his property.
    B. It shows that the giant became a more understanding and optimistic person after his interaction with the little boy.
    C. It demonstrates that the presence of the children has ensured that it will never again be winter in the giant's garden.
    D. It symbolizes the giant's mood: since he is unkind and insensitive to the children, he does not care whether it is spring or not.

5. Explain how the seasons and natural elements in the story help develop the major characters in the story.

Discussion Questions

Directions: Brainstorm your answers to the following questions in the space provided. Be prepared to share your original ideas in a class discussion.

1. Why do you think the giant is initially so unwelcoming to the children who wish to play in his garden? What might this suggest about his past experiences?

2. The text uses Christian symbols throughout (the holes from nailing hands and feet to the cross). What is the significance of these symbols on the little boy at the end of the story? What does this add to the story?

3. In the story, the seasons, the North Wind, Hail, Frost, and Snow are all personified (Paragraph 11). This means that they are given the attributes of human beings by being able to make conscious decisions. In the context of this story, who is in control: man or nature? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

4. In the context of this story, what is a friend? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

5. After forming a special bond with the boy he placed in the tree, the giant allows the children permanent access to his beautiful garden. In the context of this story, how are we changed by love? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

Timekeeping: Why We Need Clocks and Calendars

By David Christian, Big History Project, adapted by Newsela staff on 06.21.16
Word Count **1,956**
Level **990L**

TOP: Stonehenge at sunrise, Salisbury Plain, England. Images: Big History Project

All life forms are born with some way of keeping track of time, but humans do it in more ways and with greater precision than any other species.

Why bother to keep time?

Why do we need clocks and calendars? Looking at our lives today, some of the answers may seem obvious. To survive in this complex society, you need to track what others are doing and when they're doing it. You also need to know what's happening in the natural world (what season it is, for example). If you didn't know the time or date, you'd be seriously out of sync with your world. You'd miss a train or walk in late to your Big History class.

But it's not just modern humans who need to keep track of time. All living things must know the time to adjust to their environment as it changes. Bears know when to hibernate. When winter is over, they know when to wake up. Plants know when to blossom. Many birds know when it's time to head south for the winter.

In fact, keeping track of time is so important that evolution has given us internal clocks in our body. Some of them are especially in tune with the differences in daylight hours caused by the change in seasons. These are known as "circadian rhythms." Your body clock will tell you that it's not a good idea to get up at 2 am, when it's pitch dark, unless you have to.

Monarch butterflies use circadian clocks during migrations that span thousands of miles

What's different about human time?

We humans track time differently than other creatures. And, as human societies have become larger and more complex, we have gotten more precise at marking the time. We can mark time from the stopwatch precision of the Olympic games to our daily schedules of work. We can even date geological events that happened millions or billions of years ago. To do this, modern humans have had to devise increasingly sophisticated clocks, calendars, and timetables. It wasn't always this way.

Keeping time in the Paleolithic era

If you were a Paleolithic forager living 100,000 years ago, how would you have kept track of time? We have little direct evidence about Paleolithic time-tracking. However, we can study modern foraging societies for hints.

In a foraging society, the rhythms of the natural world are critical. You need a pretty good sense of the changing seasons and of the schedules that other species keep. Then you can decide when to move to a new campground, what plants to collect, and what animals to hunt. Modern foragers sense such changes with a precision no modern city dweller can match.

Keeping track of the time of day and the time of year was not difficult in early societies. Ancient people typically spent most of their time outdoors. They could find out all they needed to know by the positions of the Sun and the stars. And aligning your activities with those of your family and friends was much less complicated than it is today. Back then, people lived in small groups and met face to face.

Meetings with other communities often happened based on the season. There was no need for precise scheduling. If a group normally met with a neighboring tribe "when the reindeer returned," it didn't really matter if their schedules were a few days off. Foraging societies were much more forgiving about appointments than we are.

So no special instruments were required for timekeeping. But there are clues that even Paleolithic foragers didn't rely entirely on their memories and their senses to keep track of time. South Africa's Blombos Cave was lived in by humans perhaps as early as 100,000 years ago. Inside, archaeologists have found chunks of ochre with strange marks on them. Scientists date them to about 70,000 years ago. These are the oldest known "artworks." It's possible that the engravings were used to mark the passing of time. Perhaps they were lists of the cycles of the Moon or dates of important rituals.

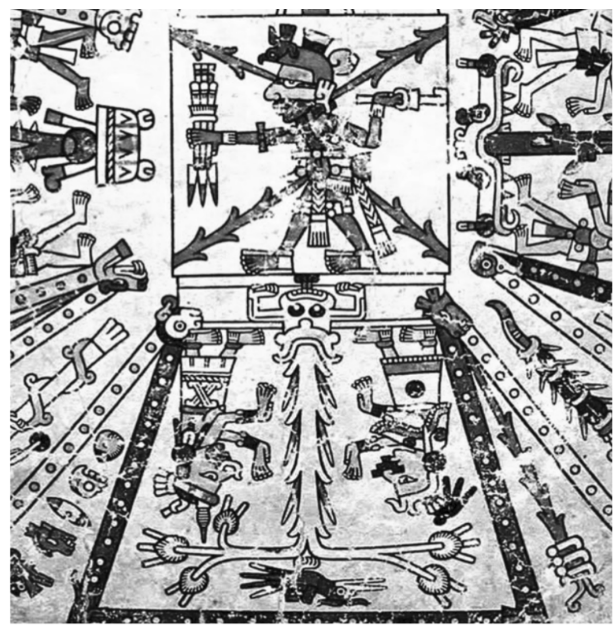
More serious evidence of calendars of some kind comes from about 40,000 years later. The American archaeologist Alexander Marshack (1918–2004) became fascinated by marks on Paleolithic objects. He was sure that some of them were simple calendars. Paleolithic people seemed to have been tracking the movements of the Moon. In a 1984 lecture, Marshack talked of his 1964 visit to Les Eyzies, a prehistoric site in France:

As [the Sun] was going down, the first crescent of the new Moon appeared in the sky as a thin silver arc, facing the sinking Sun. It was instantly apparent that the Les Eyzies horizon formed a perfect natural "calendar" and that the first crescent would appear over those hills at sunset every 29 or 30 days...that the Sun was sinking at its farthest point north on that horizon, its position at summer solstice, and that it would now begin to move south.... There was no way that generations of hunters living on that shelf over a period of 18,000 years or more could fail to notice these periodic changes and movements of the Sun and Moon....

Keeping time in agrarian societies

Agricultural societies began to appear about 11,000 years ago. As they expanded, they linked up with their neighbors. Now they needed more reliable methods of keeping time. If you wanted to sell some vegetables in a nearby town or worship at a nearby temple, you had to know exactly when the markets and religious rituals were held — and you needed to know in advance. Drifting in a week or two later no longer cut it. Now you needed calendars that everyone agreed on and shared. If your village depended on irrigation, everyone needed to know exactly when the irrigation gates would be opened.

Similarly, seeds were planted at particular times. The harvest was also collected according to seasonal calendars. These early calendars were based on Earth's orbit around the Sun and associated climate patterns.



Detail from an Aztec calendar codex illustrating the 260-day Mesoamerican augural cycle

This is why new devices began to appear that could track time more precisely. One method of timekeeping was to watch the Sun's shadow using sundials. A stick in the ground would often do the job — as long as the Sun was shining. But some sundials were extremely precise. Time was also measured by how long it took sand to move through a narrow hole in a glass container or by the rate at which water dripped from an urn.

More elaborate instruments were used to track the movements of the stars and planets. The famous Stonehenge rocks in England were constructed between 4,000 and 5,000 years ago. Stonehenge may have been designed partly to determine the exact dates of the summer and winter solstices. These events occur two times a year when the Sun reaches its highest and lowest points in the sky.

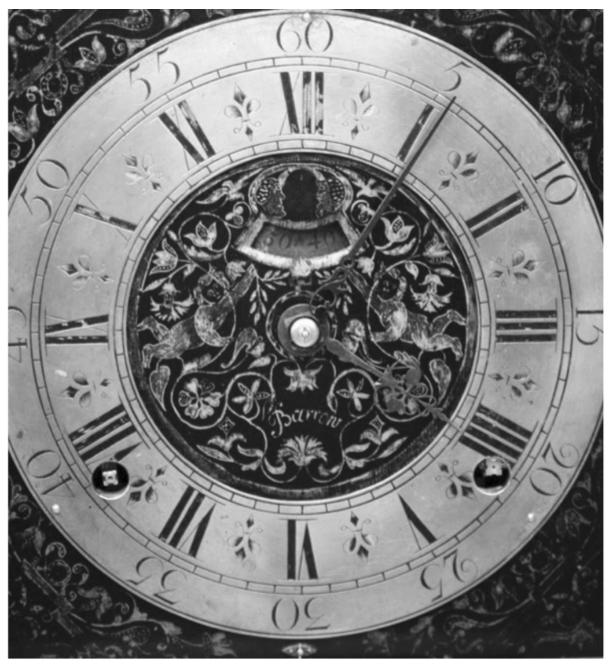
The most elaborate and precise of all agrarian-era calendars were probably those of Mesoamerica. This region hosted early civilizations appearing in Mexico and Central America in the first millennium BCE. The Mayan calendar included a 260-day cycle based on biweekly rituals. The

Maya also designed a 365-day version organized around the agricultural and solar phases. They even had a calendar measuring time from the beginning of their civilization. Meanwhile, the Romans developed a calendar with 10 months. The names they used should be mostly familiar. For example, Martius is our March. Eventually, the Romans refined their calendar. They added two more months and even included the concept of a leap day.

Toward the modern era

In his book *Time: An Essay*, the German scholar Norbert Elias argued that as societies became larger and more complex, people began to require more and more precise clocks and more accurate records. This was because individual schedules were getting linked together in networks of increasing complexity. As schedules began to interlace, people had to start thinking about time more carefully:

Just as the chains of interdependency in the case of pre-state societies are comparatively short, so their members' experience of past and future as distinct from the present is less developed. In people's experience, the immediate present — that which is here and now — stands out more sharply than either past or future. Human actions, too, tend to be more highly centered on present needs and impulses. In later societies, on the other hand, past, present and future are more sharply distinguished. The need and the capacity to foresee, and thus considerations of a relatively distant future, gain stronger and stronger influence on all activities to be undertaken here and now.


18th-century English clockmaker John Harrison made the most precise clocks of his time

Improved methods of keeping time evolved in many different contexts. Monks needed to know when to pray, so they developed various methods, including the ringing of bells. Travelers needed to schedule their departures and arrivals more carefully. Increasingly, elaborate clocks were built. Some used carefully controlled drips of water. Others used falling weights.

Precise clocks were particularly important for navigators. They needed them to calculate their longitude, or how far west or east they had traveled. Ships began to travel around the globe from the late fifteenth century. With that came recognition of the need for accurate timekeeping. In 1714, the British government offered a prize of £20,000 (nearly $5 million in today's money) for the first person to build a clock that could stay accurate to within two minutes during long ocean voyages. Clockmaker John Harrison spent most of his life on the task. He finally won the prize in 1773, three years before he died.

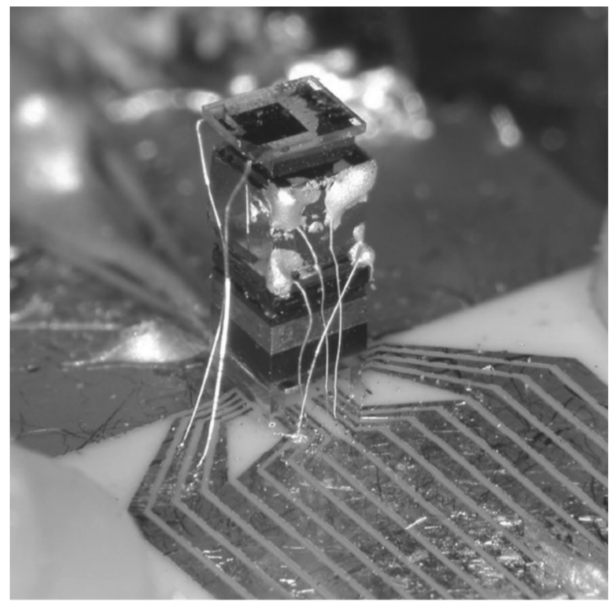
In the nineteenth century, the invention of railways and steamships required entirely new levels of precision. Now many more passengers and important cargo could travel. On-time departures and arrivals were critical to the whole network. The first English train schedule was published in 1839. For the first time, different British cities needed to coordinate their clocks to the same national clock, that of Greenwich Mean Time (GMT). But not until 1880 was Greenwich Mean Time adopted officially throughout Britain. In the United States, regional time zones were not systematized until 1918. At about the same time, the idea of daylight saving was introduced in numerous countries around the world.

International steamships required equally precise coordination across the entire globe. Not until 1929 did most countries begin to link their local time to Greenwich Mean Time. The nation of Nepal waited until the 1980s to do so.

In today's world of international plane schedules and electronic bank transfers, we need even greater precision. So, timekeeping today relies more on complex devices such as atomic clocks. These clocks measure time using signals emitted by electrons as they change energy levels.

One final breakthrough in timekeeping was particularly important for Big History. That was the invention of "radiometric" dating. This technique can date past events by measuring the breakdown of radioactive materials.

Before about 1950, the only way to be sure of the date of a past event was to use written records. Of course these don't exist for any date more than a few thousand years ago. The first workable method of radiometric dating was devised by American chemist Willard Libby in the early 1950s. It used the breakdown of an isotope of carbon, C14, to date materials containing carbon. Since then, a whole range of new dating techniques have been developed. They can now give us reasonably accurate dates for events reaching back to the Big Bang, 13.8 billion years ago.



The most accurate atomic clocks will lose only one second every 1.4 million years

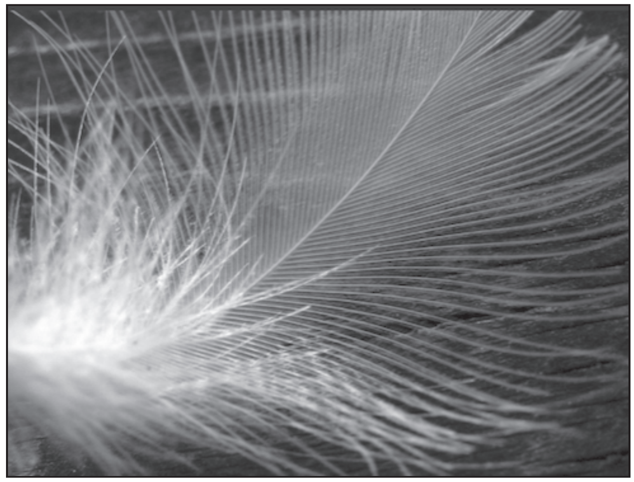
Accurate timekeeping and recordkeeping are the foundation for histories of all kinds, including Big History. Next time you fly or take a bus, be grateful that your pilot or driver is not planning to arrive at your destination any old time in the next week or two!

Name: ______________________ Class: ______________________

Feathers

By Anonymous

In this short story by an anonymous writer, a woman spreads a rumor, unaware of the consequences of her actions. As you read, take notes on how the woman's understanding of rumors changes throughout the story.



"feather" by Jo Andre Johansen is licensed under CC BY-SA 2.0.

[1] A sharp-tongued woman was accused of starting a rumor. When she was brought before the village rabbi,[1] she said, "I was only joking. My words were spread by others, and so I am not to blame."

But the victim demanded justice, saying, "Your words soiled[2] my good name!"

"I'll take back what I said," replied the sharp-tongued woman, "and that will take away my guilt." When the rabbi heard this, he knew that this woman truly did not understand her crime.

And so he said to the women, "Your words will not be excused until you have done the following. Bring my feather pillow to the market square. Cut it and let the feathers fly through the air. Then collect every one of the feathers from the pillow and bring them all back to me. When you have done this, you will be absolved[3] of your crime."

[5] The woman agreed, but thought to herself, The old rabbi has finally gone mad!

She did as he asked, and cut the pillow. Feathers blew far and wide over the square and beyond. The wind carried them here and there, up into trees and under merchants' carts. She tried to catch them, but after much effort it was clear to her that she would never find them all.

She returned to the rabbi with only a few feathers in her hand. Facing the rabbi, she said, "I could not take back the feathers any more than I could take back my words. From now on I will be careful not to say anything that would harm another, for there is no way to control the flight of words, any more than I could control the flight of these feathers." From that day, the woman spoke kindly of all she had met.

1. a Jewish scholar or teacher
2. **Soil** ***(verb):*** to make dirty
3. **Absolve** ***(verb):*** to free from guilt or blame

Text-Dependent Questions

Directions: For the following questions, choose the best answer or respond in complete sentences.

1. PART A: What is the meaning of “soiled” as it is used in paragraph 2?
   - A. involved
   - B. damaged
   - C. emphasized
   - D. identified

2. PART B: Which TWO phrases help the reader understand the meaning of “soiled”?
   - A. “starting a rumor.” (Paragraph 1)
   - B. “‘I was only joking.’” (Paragraph 1)
   - C. “‘my good name!’” (Paragraph 2)
   - D. “‘I’ll take back’” (Paragraph 3)
   - E. “‘take away my guilt.’” (Paragraph 3)
   - F. “understand her crime.” (Paragraph 3)

3. PART A: Based on the story, which statement explains how starting a rumor and cutting a feather pillow are alike?
   - A. Both events helped the woman make up for things that she failed to do.
   - B. Both events caused the rabbi to forgive the woman for her crime.
   - C. Both events scattered things that could no longer be retrieved.
   - D. Both events allowed the woman to make changes in her life.

4. PART B: Which quotation provides evidence for the answer to Part A?
   - A. “‘My words were spread by others, and so I am not to blame.’” (Paragraph 1)
   - B. “‘and that will take away my guilt.’” (Paragraph 3)
   - C. “The wind carried them here and there” (Paragraph 6)
   - D. “She returned to the rabbi with only a few feathers in her hand.” (Paragraph 7)

5. PART A: Which statement contrasts the attitude of the woman with the attitude of the rabbi at the beginning of the story?
   - A. The woman accepted no blame, while the rabbi realized the significance of her crime.
   - B. The woman trusted the rabbi, but he thought she was playing a trick.
   - C. The woman wanted to correct her behavior, while the rabbi was pleased with his own behavior.
   - D. The woman thought the rabbi was wise, but the rabbi thought the woman was careless.

6. PART B: Select TWO sentences from the story that show how the woman changes to agree with the rabbi.
   A. "'My words were spread by others'" (Paragraph 1)
   B. "The woman agreed, but thought to herself, The old rabbi has finally gone mad!" (Paragraph 5)
   C. "'there is no way to control the flight of words, any more than I could control the flight of these feathers'" (Paragraph 7)
   D. "From that day, the woman spoke kindly of all she had met." (Paragraph 7)

7. PART A: What is the purpose of the dialogue between the woman and the victim in the beginning of the story?
   A. to introduce the causes for the woman's negative actions
   B. to introduce the conflict that will be resolved later in the story
   C. to connect the woman's thoughts and actions to important events
   D. to develop background information for events later in the story

8. PART B: Which sentence from the story makes a connection to the answer to Part A?
   A. "When she was brought before the village rabbi, she said, 'I was only joking.'" (Paragraph 1)
   B. "The wind carried them here and there, up into trees and under merchants' carts." (Paragraph 6)
   C. "She tried to catch them, but after much effort it was clear to her that she would never find them all." (Paragraph 6)
   D. "From that day, the woman spoke kindly of all she had met." (Paragraph 7)

9. PART A: Which statement expresses a theme of the story?
   A. Stand up for those less fortunate.
   B. Peer pressure can be a powerful inspiration.
   C. Speak with courage.
   D. Think before you speak.

10. PART B: Which quotation demonstrates the theme identified in Part A?
   A. "A sharp-tongued woman was accused of starting a rumor." (Paragraph 1)
   B. "The woman agreed, but thought to herself, The old rabbi has finally gone mad!" (Paragraph 5)
   C. "She returned to the rabbi with only a few feathers in her hand." (Paragraph 7)
   D. "Facing the rabbi, she said, 'I could not take back the feathers any more than I could take back my words.'" (Paragraph 7)

Discussion Questions

Directions: Brainstorm your answers to the following questions in the space provided. Be prepared to share your original ideas in a class discussion.

1. Have you ever had a rumor spread about you? How did it make you feel?

2. In the context of the text, why do people do bad things? Why does the woman think it's ok to spread rumors? Cite examples from the text, your own experience, and other literature, art, or history in your answer.

3. In the context of the text, how do we find redemption? How does the woman come to realize the consequences of her actions? Cite examples from the text, your own experience, and other literature, art, or history in your answer.

Curiosity changes the brain to boost memory and learning

By The Conversation, adapted by Newsela staff on 08.07.19

Word Count **756**

Level **1040L**

Image 1. A curious child in Vietnam in 2010. Being curious means wanting to know more. People who are curious are also better at remembering things. Photo by: Wagner T. Cassimiro/Flickr

What happens inside our brains when our curiosity is sparked? A study published in 2014 gives us some ideas about what takes place.

Participants in the study were asked to rate how curious they were to find out the answer to a specific trivia question. One question they were asked was, "What does the term 'dinosaur' actually mean?"

The participants were then placed in a magnetic resonance imaging (MRI) machine. An MRI machine measures brain activity. They were shown the trivia question again, followed by the image of a person's face. They were asked to make a specific decision about the person. Then, participants were shown the answer to the trivia question, which in the case of the dinosaur was "terrible lizard."

After the MRI scan, the participants completed a surprise test on the answers to the trivia questions. They were also tested on their ability recognize the faces shown during the scan.

The Curious Mind Is A Vortex For Information

The research had three major findings.

The first was that when people are curious to learn the answer to a question they are better at learning that information. Most surprising though was that participants had greater recall of the completely unrelated information — such as the face — shown at the same time. It seems that, in the curious mind, more information is taken in no matter the subject.

Amy Reichelt is a psychology expert at the University of New South Wales. She shared her thoughts about this first key finding: "This shows that when the brain is engaged more, by making a task relevant and interesting, people learn more."

The second finding is that activity increases in the hippocampus when curiosity is stimulated. The hippocampus is the region of the brain associated with memory. The third finding is that there is increased activity in the regions of the brain associated with reward when curiosity is stimulated.

Fiona Kumfor is a researcher who studies how the emotions you experience during an event determine how likely you are to remember it. Kumfor said that the work in this study agrees with her findings. She also said that other motivational states, such as curiosity, also influence whether information is likely to be remembered.

Motivations Matter

Behavioral neuroscience is the science of how a person's brain influences their behavior. Jee Hyun Kim is a behavioral neuroscientist. She said more could be done to see whether the different levels of curiosity and different motivations have an impact on memory and learning.

Extrinsic motivation describes behavior that is driven by goals that come from outside a person, like when a person is motivated by the promise of a reward or the threat of being punished. Intrinsic motivation describes behavior that is driven by rewards that come from inside a person. Intrinsic motivation is when a person does something because it is naturally satisfying to them. Curiosity is one example of intrinsic motivation.

Kim said scientists should be trying to figure out if people with low curiosity respond better to extrinsic motivation. They should also work more to see if people with high intrinsic motivation are better left to their own devices, she said.

"Finding such relationships, and how such intrinsic vs. extrinsic motivations may change due to neurological disorders, will have more important practical implications," Kim said. Neurological disorders are diseases suffered by the brain, spinal cord and nerves that connect them. Alzheimer's and dementia are examples of neurological disorders. The diseases make it hard for people to remember things and think. Most people with the diseases are elderly.

Kumfor adds that research into extrinsic rewards on memory is an important research area. She said that other research has found that "the [benefits] of intrinsic reward and extrinsic reward are not additive." In other words, she said: "Providing additional external rewards, when an individual is already self-motivated is unlikely to have any extra benefit on memory." But external rewards could be useful to people who are trying to learn something that isn't interesting or if they don't have enough self-motivation.

Stimulating Curiosity

Reichelt said that "stimulating curiosity is really important across all ages, from schools to the workplace and to elderly care." She said that stimulating curiosity can help children who struggle to learn. It can increase their motivation. She noted that the new research is particularly interesting when it comes to people with Alzheimer's or dementia. "Carrying out engaging tasks can help people remember things that are important, and also encourage new learning," she said.

Name: ______________________ Class: ______________________

The Story of The Lazy Boy: A Kachari Folktale

By Compiled by Rev. Sidney Endle
1911

In the early 1900s, a missionary named Reverend Sidney Endle wrote about the Kachari people, who live in the Assam region of India. In his book, he translated several of their spoken folktales, including the following story about a boy who tries to plant seeds after everyone else has finished. As you read, take notes on how the moral, or lesson, develops throughout the story.

[1] There was once a very lazy boy. And when everybody else had planted out his paddy,[1] he was only setting forth to plough. But the old man of the season, seeing him, said "The season has gone; what are you ploughing for now? The paddy is all planted out, and it is late."

"Cultivation" by Dignata Talukdar is licensed under CC BY 2.0.

But the boy would not listen to him, and ploughed sturdily ahead, beating his cattle soundly as he went. And when the old man again and again questioned him, he cried "What sort of old man is this? Can he not see that I am busy? I know very well what I am about."

But the old man said gently, "Nay, my son: but it is for your good that I would speak to you."

And the boy said "Speak quickly then, and have done with it."

[5] And the old man said, "My son, the season is gone; what avails[2] it to plough now?"

And then the boy cried "Where has it gone? And when has it gone? And why has it gone? And how shall I find it?"

But the old man of the season said, "You should have ploughed when others did. The season has gone, and no man can bring it back."

But the boy said, "I must bring it back; else, how shall I eat, and how shall I live? Do tell me where it is gone."

And as he would not let the god go, finally, losing patience, he said "You go over there, and you will find an old man with a snow-white head ploughing in a field. You get hold of him and do as he tells you." So saying, he made his escape. Then the lad hastened home to his mother and bade her cook supper quickly, and tie him up some rice to take with him on the morrow, for he was going to bring back the departed season for ploughing.

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1. wet land in which rice is grown
2. **Avail** ***(verb):*** to help or benefit

[10] “For,” said he, “when I was ploughing to-day, an old man told me that the season was gone, and that if I went after him and pursued him I would find him, and that I must do as he would tell me.” So she rose very early in the morning, and, giving him to eat and drink, sent him on his way.

And as he went, he asked all he met “Can you tell me where the old man of the season has gone?”

But they said, “Everyone knows that the season is gone, but where it is gone, or why it is gone, who can say?”

At last, when he was nearly in despair, he saw an old man ploughing afar off, and shouted to him “Stay a moment, father, stay; I want to ask you a question.”

But the old man was busy, and went his way. Then the lad pursued him and never ceased calling after him till at last the old man losing patience, turned upon him, and said, “What pertinacious[3] noisy lad is this, who won't leave me alone?”

[15] But the lad said, “Be not angry, my father; I am fallen into great trouble, and it behooves[4] you to help me.”

“Speak quickly, then,” said the old man.

And the boy said, “I take you to be the old man of the season, and I pray you not to slay me. All the others have planted out their paddy, and I have fallen behind, and have planted ”

But the old man said, “It is too late for me to return. Go you back, and plant your paddy as best you can.” And so the lad hastened back and planted out his seedlings in such heedless haste as became him. And that's all.

3. **Pertinacious** ***(adjective):*** stubborn or insistent
4. **Behoove** ***(verb):*** to be necessary or proper for

Text-Dependent Questions

Directions: For the following questions, choose the best answer or respond in complete sentences.

1. PART A: Which of the following statements best describes a theme of the text?
   - A. No matter how hard someone works, there's no way to get back lost time.
   - B. One should never give up, even if there is little chance of success.
   - C. Working hard once is more rewarding than working often at a steady pace.
   - D. Young people should respect their elders by offering to do their work for them.

2. PART B: Which of the following quotes best supports the answer to Part A?
   - A. "But the boy would not listen to him, and ploughed sturdily ahead, beating his cattle soundly as he went." (Paragraph 2)
   - B. "'What sort of old man is this? Can he not see that I am busy? I know very well what I am about.'" (Paragraph 2)
   - C. "'You should have ploughed when others did. The season has gone, and no man can bring it back.'" (Paragraph 7)
   - D. "And so the lad hastened back and planted out his seedlings in such heedless haste as became him." (Paragraph 18)

3. How does the boy compare to the other characters in the story?
   - A. The boy represent the beginning of the season, and the old men represent the end of the season.
   - B. The other characters are seen working, while the boy continues to avoid work by chasing after the season.
   - C. The other characters stick to their traditions, but the boy questions them and tries to create a new solution to his problem.
   - D. The boy actually believes that the old men are the seasons, but the adults know that they are just men.

4. How does the conversation between the boy and the old man in paragraphs 13-18 contribute to the story?
   - A. The old man convinces the boy that there is still hope for a good harvest and encourages him to stop worrying.
   - B. The old man yells at the boy for interrupting him and the boy learns to be more respectful of his elders.
   - C. The old man refuses to go back and this helps the boy change from a lazy boy to a more hard-working one.
   - D. The old man refuses to go back, and this helps the boy realize that he cannot fight time or undo his mistakes.

5. In the story, the old men represent the seasons. How do their characters contribute to the theme of the story?

Discussion Questions

Directions: Brainstorm your answers to the following questions in the space provided. Be prepared to share your original ideas in a class discussion.

1. Why do you think people sometimes put off or neglect their responsibilities? What are the benefits of this? What are the negative consequences of this?

2. In the context of this story, what does it mean to be grown up? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

3. Who's in control: man or nature? How does time control or dictate our lives? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

The difference between empathy and sympathy

By ThoughtCo., adapted by Newsela staff on 12.20.17
Word Count **829**
Level **1010L**

Image 1. A woman gives food to a homeless man in New York City. Photo by: Ed Yourdon/WIkimedia.

Is that "empathy" or "sympathy" you're showing? These two words are often used interchangeably, but that is incorrect. Their difference is important. Sympathy is a simple expression of concern for another person's misfortune. Empathy, however, goes beyond sympathy. Empathy is the ability to actually feel what another person is feeling, like the saying "to walk a mile in their shoes." Taken to extremes, deep or extended feelings of empathy can actually be harmful to one's emotional health.

Sympathy

Sympathy is a feeling and expression of concern for someone, often accompanied by a wish for them to be happier or better off. An example of sympathy is feeling concerned after finding out someone has cancer and hoping the treatment goes well for him or her.

In general, sympathy implies a deeper, more personal level of concern than pity. Pity is really just a simple expression of sorrow.

However, sympathy does not imply that someone's feelings for another person are based on shared experiences or emotions. That is empathy.

Empathy

Empathy is the ability to recognize and share another person's emotions.

Empathy requires the ability to recognize the suffering of another person from his or her point of view. It also means openly sharing another person's emotions, including painful distress.

Empathy is often confused with sympathy, pity and compassion. These feeling are just a recognition of another person's distress.

Pity typically implies that the person who is suffering does not deserve what has happened to him or her. Pity also implies the person suffering is powerless to do anything about it.

Pity shows a lower degree of understanding and engagement with the suffering person's situation.

Compassion is a deeper level of empathy, demonstrating an actual desire to help the suffering person.

Empathy requires shared experiences. So, people generally feel empathy only for other people, not for animals. While people may be able to sympathize with a horse, for example, they cannot truly empathize with it.

The Three Types Of Empathy

Paul Ekman is a psychologist who specializes in emotions. He has identified three types of empathy.

• Cognitive empathy: Also called "perspective taking," cognitive empathy is the ability to understand and predict the feelings and thoughts of others by imagining one's self in their situation.

• Emotional empathy: This is the ability to actually feel what people feel or at least feel emotions similar to theirs. In emotional empathy, there is always some level of shared feelings. Emotional empathy can be a trait among persons diagnosed with Asperger syndrome.

• Compassionate empathy: Driven by their deep understanding of the other people's feelings based on shared experiences, compassionately empathic people make actual efforts to help.

Having empathy can give meaning to our lives. However, Ekman warns that empathy can also go terribly wrong.

Empathy Can Lead To Misplaced Anger

Empathy can make people angry — perhaps dangerously so — if they mistakenly perceive that another person is threatening a person they care for.

Danish family therapist Jesper Juul believes empathy and aggression are related.

Empathy Can Drain Your Wallet

Psychologists report cases of overly empathetic patients endangering their own well-being. One example is an overly empathetic person giving away his or her life savings to random, needy individuals. Such overly empathetic people who feel they are somehow responsible for the distress of others have developed an empathy-based guilt.

There is a better-known condition called "survivor guilt." This is a form of empathy-based guilt in which an empathic person incorrectly feels that his or her own happiness has come at the cost of someone else's.

Psychologist Lynn O'Connor believes people who regularly have empathy-based guilt may develop mild depression later.

Empathy Can Harm Relationships

Psychologists warn that empathy should never be confused with love. While love can make any relationship — good or bad — better, empathy cannot do this. Empathy can even cause a strained relationship to end quicker. Essentially, love can cure, but empathy cannot.

A scene from the animated comedy TV series "The Simpsons" is an example of how empathy can damage a relationship. In the scene, Bart is bemoaning the failing grades on his report card. He says, "This is the worst semester of my life." His dad, Homer, based on his own school experience, tries to comfort his son by telling him, it is "your worst semester so far."

Empathy Can Lead To Fatigue

Counselor Mark Stebnicki coined the term "empathy fatigue." This refers to a state of physical exhaustion resulting from repeated or prolonged personal involvement in the illness, disability, pain, grief and loss of others.

Any overly empathetic person can experience empathy fatigue. This is common among mental health counselors, doctors, nurses, lawyers and teachers. This can cause the person to have health problems.

Paul Bloom is a professor of psychology and cognitive science at Yale University. He goes so far as to suggest that due to its inherent dangers, people need to have less empathy, rather than more.

Quiz

1 Which sentence from the article supports the idea that empathy can sometimes be a bad thing?

(A) Empathy, however, goes beyond sympathy.

(B) Having empathy can give meaning to our lives.

(C) However, Ekman warns that empathy can also go terribly wrong.

(D) For example, a parent may notice a stranger staring at his or her child.

2 Read the section "Sympathy."

Which sentence from the section hints that there are differences between sympathy and empathy?

(A) Sympathy is a feeling and expression of concern for someone, often accompanied by a wish for them to be happier or better off.

(B) An example of sympathy is feeling concerned after finding out someone has cancer and hoping the treatment goes well for him or her.

(C) In general, sympathy implies a deeper, more personal level of concern than pity.

(D) However, sympathy does not imply that someone’s feelings for another person are based on shared experiences or emotions.

3 Which of the following are two MAIN ideas from the article?

(A) Many people confuse empathy with sympathy. Empathy can be positive but also has some negative effects.

(B) There are three types of empathy. Emotional empathy is the ability to feel what people feel.

(C) Sympathy and empathy are important emotions. Sympathy is concern for someone who is sick.

(D) Sympathy is very similar to pity. Compassion is a deeper level of empathy.

4 The CENTRAL idea of the article is developed by _______.

(A) comparing compassion and pity

(B) defining sympathy and empathy

(C) explaining how pity causes anger

(D) explaining how psychologists work

All that jazz: Kids in dance classes don't get enough exercise, study says

By Los Angeles Times, adapted by Newsela staff on 09.21.15

Word Count **674**

Level **1060L**

Steven Jackson of the Atlanta Falcons dances with students at Shiloh Point Elementary School as part of the NFL's Play 60 Campaign to encourage kids to get 60 minutes of exercise a day, Dec. 3, 2013, in Cumming, Georgia. AP Photo/David Goldman

Dance classes might be big on fun, but a new study says they are surprisingly light on exercise.

A medical magazine called Pediatrics reports that only 8 percent of kids in after-school dance programs are getting enough exercise to meet government guidelines for physical activity. For teens, that number is only 6 percent.

Researchers from San Diego State University and the University of California, San Diego studied 264 dance students. Girls wore tracking devices around their waists while they took classes like ballet, tap, jazz and hip-hop. The devices recorded how much time the girls spent in motion and how brisk that motion was.

Failing The 30-Minute Exercise Goal

The Centers for Disease Control and Prevention (CDC) recommend 30 minutes of exercise for students during each school day. They also encourage another 30 minutes of physical activity after school. Seven dance classes were tested in the study. None would have been challenging enough to meet the after-school portion of that goal.

Some dance classes missed the half-hour goal by more than others. For instance, kids ages 5 to 10 did only about six minutes of fast-paced movement during a 50-minute Spanish dance class. In ballet, students recorded 14 minutes of challenging physical activity per class. Jazz and partnered dance classes (like ballroom and swing dancing) kept students moving for about 22 minutes per class.

Hip-Hop Classes Get Best Score

Hip-hop classes came closest to meeting the CDC guidelines. They provided 27 minutes of significant physical activity per session.

Next, researchers broke down which classes provided the most activity in the same amount of time. They were not surprised to find that hip hop came out on top again. About 57 percent of each hip-hop class counted as meaningful exercise. Girls who spent the same amount of time practicing a Spanish dance called flamenco were only dancing full speed for about 14 percent of each class.

For dancers ages 11 to 18, results were not much different. Ballet scored highest with almost 17 minutes of challenging activity during a 55-minute class. Hip-hop was a close second with almost 16 minutes of hard work in each session. Flamenco came in last again with just four minutes of real exercise per class.

Teen Dancers Work Out Less Than Kids

Still, the teen dance classes all failed to meet the 30-minute goal. None of them required students to push themselves more than 31 percent of the time.

Researchers even found that the teenage group got less exercise than the 5- to 10-year-olds did. That was especially surprising since the older students were going to longer, more advanced classes.

The scientists tried to find an explanation for why older dancers would be dancing less than the kids group. They thought maybe teens were spending more time standing around in class while they learn more complicated routines. It’s also possible that younger students moved around more while they were waiting for their turn to dance.

Team Sports Outdo Dance As A Healthy Workout

Overall, the study determined that dance classes delivered much less exercise than team sports. Researchers pointed out that there is a lot of standing around in both types of activities. However, sports require more intense activity in general.

For example, dancers wind up standing around for about 30 percent of each class. Soccer players do just as much standing around, but they also spend about 28 percent of each practice working up a sweat and giving it their all. Doctors say that is the type of exercise that is most effective at preventing children from becoming overweight. Dancers push it that hard only about 7 percent of the time.

Similar studies have found that between 50 percent and 100 percent of kids in sports programs meet the CDC's 30-minute exercise goal. Fewer than 10 percent of dancers in this study hit the same mark.

As the study's authors noted, that's a shame. Dance classes often attract girls who are not interested in sports, but they simply do not offer the same health benefits.

Quiz

1 Which answer choice BEST explains the significance of the research on dance conducted by San Diego State University?

(A) Classes in hip-hop dancing offered more intense exercise than other dance classes.

(B) Younger kids actually got more exercise than teens even though their classes were shorter.

(C) Kids will not meet CDC exercise standards by participating in after-school dance classes.

(D) Girls are often more interested in dance classes than in sports activities.

2 Read the section "Teen Dancers Work Out Less Than Kids."

Select the paragraph that shows researchers' possible reasons for differences between younger kids and teens in classes.

3 Read the following sentence from the article.

The devices recorded how much time the girls spent in motion and how brisk that motion was.

What is the BEST meaning of the word "brisk" as it is used above?

(A) sharp

(B) agile

(C) graceful

(D) energetic

4 Read the section "Team Sports Outdo Dance As A Healthy Workout."

Choose the phrase below that BEST defines the word "outdo" as it is used in the section title.

(A) to do better

(B) to work harder

(C) to be more difficult

(D) to do more

17th century self-portraits exhibited as the original "selfies"

By Associated Press, adapted by Newsela staff on 10.23.15
Word Count **609**
Level **1040L**

A woman admires paintings during a press preview of an exhibition called "Dutch Self-Portraits — Selfies of the Golden Age" at the Mauritshuis museum in The Hague, Netherlands, Oct. 7, 2015. AP/Mike Corder

THE HAGUE, Netherlands — A new museum exhibit features "selfies" from the 17th century Dutch Golden Age of art.

These days, anybody with a smartphone can snap a selfie in a second and post it on the Internet. Four hundred years ago, the Dutch Golden Age was a highpoint for trade, science, military and art in the Netherlands. Back then, the selfies were called self-portraits. They were painted by highly trained artists who thought long and hard about every detail.

A First Of Its Kind

The Mauritshuis museum is staging an exhibition focused solely on these 17th century self-portraits. The exhibit highlights the similarities and the differences between modern-day snapshots and historic works of art.

The museum's director, Emilie Gordenker, said that this is the first time a museum has exhibited Dutch Golden Age self-portraits like this. The Mauritshuis was eager to tie the paintings to the modern-day selfie phenomenon, she said.

The exhibition opened October 8 and runs through January 3. It features 27 self-portraits by artists ranging from Rembrandt van Rijn, who painted dozens of self-portraits, to his student Carel Fabritius and Judith Leyster. Her self-portrait is on loan from the National Gallery of Art in Washington, D.C.

The Original Selfie-Portraits

A less well-known artist, Huygh Pietersz Voskuyl, is the poster boy for the exhibition. His striking 1638 self-portrait features a classic selfie pose. He is staring over his right shoulder out of the frame and into the distance. It does not take much imagination to picture him gazing into the lens of a smartphone rather than a mirror, which Golden Age artists used to capture their images for self-portraits. Giant mirrors are spread through the exhibition space. They create reflections within reflections of paintings, which are mirror images of the artists.

The similarities between selfies and self-portraits are obvious, since the subject of the painting is the painter. Yet, there are also big differences. A selfie is often shot quickly with little concern for how people are posed. By comparison, these self-portraits are carefully thought out works of art. A video made for the exhibition shows the thought that went into the paintings and what today's selfie makers can learn from them to improve their snapshots.

And, yes, you are allowed to take selfies in the museum.

Early Attention To Detail

The painting by Voskuyl is a good example of the rich details that can be found in a picture that looks so simple.

"He brings out all these little details, like his beard or the little embroidery on his shirt, even a kind of fake wood-paneled wall behind him," Gordenker said. "So he's thought very hard about the textures and the things that make him who he is. At the same time, you can see the skill with which he painted this. And this will have definitely been a very good advertisement for what he could do."

That kind of attention to detail made the self-portraits almost a Golden Age advertisement for the painter. They showed off the artist and his or her talents to potential clients, who might pay to have their own portraits done.

"A lot of artists in the 17th century painted self-portraits, not only as portraits of themselves but also as an example of the beautiful art that they could make," said curator Ariane van Suchtelen. She organized the exhibit.

Rembrandt, for instance, was very famous for his sketchy way of painting, van Suchtelen said. "If you would buy a self-portrait by Rembrandt, you would not only have a portrait of this famous artist but also an example of what he could do, what he was famous for."

Quiz

1. Read the section "A First Of Its Kind." The museum's director, Emilie Gordenker, would most likely AGREE with which of the following statements?

   (A) Self-portraits are much more important than modern selfies taken with smartphones.

   (B) Museum visitors can learn new things by comparing old self-portraits and modern selfies.

   (C) Museum visitors should simply enjoy art from previous eras without trying to see modern connections.

   (D) Self-portraits are outdated and not relevant to modern people interested in art.

2. Read the section "Early Attention To Detail." According to this section, why did artists put great detail into their self-portraits?

   (A) The artists wanted to sell them for the highest price possible.

   (B) The artists wanted to demonstrate their particular skills.

   (C) The artists wanted to present themselves as attractively as possible.

   (D) The artists wanted to include details that showed off their wealth or status.

3. Read the sentence from the article.

   The Mauritshuis museum is staging an exhibition focused solely on these 17th century self-portraits. The exhibit highlights the similarities and the differences between modern-day snapshots and historic works of art.

   Which answer choice is the BEST definition of the word "staging" as used in the sentence?

   (A) lighting

   (B) presenting

   (C) finding

   (D) comparing

4. Read the excerpt below.

   A less well-known artist, Huygh Pietersz Voskuyl, is the poster boy for the exhibition. His striking 1638 self-portrait features a classic selfie pose. He is staring over his right shoulder out of the frame and into the distance.

   The sentence above calls Voskuyl's portrait "striking." What does this mean?

   (A) The portrait is unremarkable.

   (B) The portrait is memorable.

   (C) The portrait is perplexing.

   (D) The portrait is odd.

Math

1

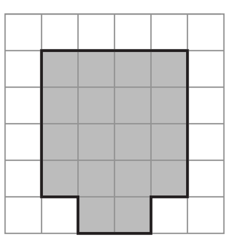
Thinking Rationally

Identifying and Ordering Rational Numbers

WARM UP

Determine the fraction represented by the shaded part of each grid. If necessary, rewrite in lowest terms.

1.



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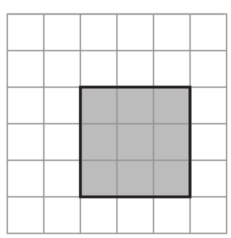
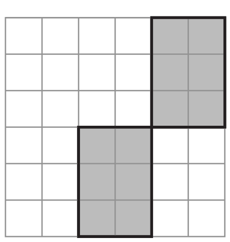


3.



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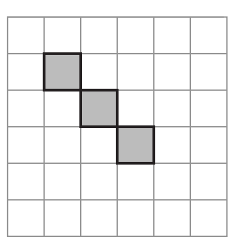


LEARNING GOALS

- Understand that counting numbers, fractions, and decimals are rational numbers.
- Identify properties of rational numbers.
- Identify models for rational numbers.
- Fluently compare and order rational numbers.

KEY TERMS

- positive rational number
- benchmark fraction

You have learned about whole numbers, fractions, and decimals. How can you compare these types of numbers?

Getting Started

How Many Can You Name?

You have learned about many different types of numbers. List as many types of numbers as you can. Give an example of each number type.

ACTIVITY 1.1

Identifying Positive Rational Numbers

You can group numbers in many different ways.

Keep these cards when you're finished. You'll need them in a future lesson.

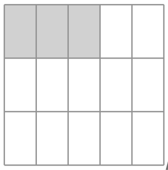
1. **Cut out the cards at the end of this lesson. Sort the cards into different groups. You may sort the cards in any way you think is appropriate, but you must sort them into more than 1 group. Give each group of cards a title.**

   Explain how you sorted the numbers and diagrams on the cards, including why you gave each group its title.

2. **Compare your groupings with your classmates' groupings. Create a list of some of the different ways to group the numbers.**

NOTES

3. Vivianne grouped these cards together. What reason could she give for why she put these cards into the same group?

, $\frac{1}{5}$, 0.2

4. Danika and Josh explained how they sorted the numbers.

Danika

I grouped these numbers together because they all represent whole numbers.

$\frac{8}{8}, \frac{5}{5}, \frac{10}{5}, 1, 0\ \frac{0}{1}$

a. Show why Danika's reasoning is correct.

b. Identify other numbers or diagrams that belong in Danika's group.

Josh

I grouped these numbers together because they are all equal.

$\frac{3}{5}, \frac{3}{4}, \frac{3}{8}$

c. Explain why Josh's reasoning is not correct.

d. Identify pairs of cards which show equal values. How many pairs can you find?

ACTIVITY 1.2

Writing Positive Rational Numbers

A **positive rational number** is a number that can be written in the form $\frac{a}{b}$, where a and b are both whole numbers greater than 0.

WORKED EXAMPLE

Is 0.75 a rational number?

To write a decimal like 0.75 in the form $\frac{a}{b}$, where a and b are both whole numbers and b is not equal to 0:

- Read the decimal using place value.

  0.75 ⟶ seventy-five hundredths

- Write the decimal as a fraction.

  $0.75 \longrightarrow \frac{75}{100}$

The fraction $\frac{75}{100}$ is written in the form $\frac{a}{b}$, where a is equal to 75 and b is equal to 100. The numbers 75 and 100 are both whole numbers greater than 0.

So, 0.75 is a rational number.

Any decimal greater than 0 that has a limited number of nonzero digits after the decimal point (like 0.5) or whose digits repeat in a pattern (like 0.3333 . . .) is a positive rational number.

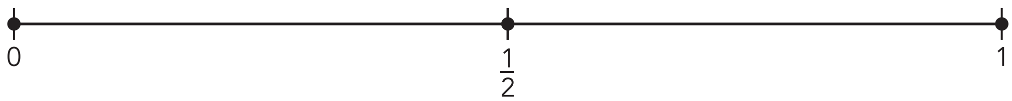
1. Show that the decimals 0.6, 0.1, 0.2, and 0.325 are positive rational numbers.

2. Which numbers, if any, that you sorted are not positive rational numbers? Explain your answer.

ACTIVITY
1.3
Benchmark Fractions

Benchmark fractions are common fractions you can use to estimate the value of fractions.

Three common benchmark fractions are $\frac{0}{1}$, $\frac{1}{2}$, and $\frac{1}{1}$.



A fraction is close to 0 when the numerator is very small compared to the denominator.

A fraction is close to $\frac{1}{2}$ when the numerator is about half the size of the denominator.

A fraction is close to 1 when the numerator is very close in size to the denominator.

1. Name the closest benchmark fraction for each fraction given.

a. $\frac{4}{9}$ b. $\frac{8}{9}$ c. $\frac{6}{9}$

d. $\frac{5}{67}$ e. $\frac{7}{15}$ f. $\frac{7}{12}$

g. $\frac{5}{6}$ h. $\frac{14}{27}$ i. $\frac{12}{13}$

j. $\frac{1}{17}$ k. $\frac{5}{11}$ l. $\frac{3}{7}$

2. Write the unknown numerator or denominator so that each fraction is close to but greater than 0.

a. $\frac{(\quad)}{12}$ b. $\frac{(\quad)}{27}$

c. $\frac{8}{(\quad)}$ d. $\frac{7}{(\quad)}$

3. Write the unknown numerator or denominator so that each fraction is close to but less than $\frac{1}{2}$.

   a. $\frac{(\quad)}{12}$ b. $\frac{(\quad)}{27}$

   c. $\frac{8}{(\quad)}$ d. $\frac{7}{(\quad)}$

4. Write the unknown numerator or denominator so that each fraction is close to but less than 1.

   a. $\frac{(\quad)}{12}$ b. $\frac{(\quad)}{27}$

   c. $\frac{8}{(\quad)}$ d. $\frac{7}{(\quad)}$

5. Describe the relationship between a and b when the fraction $\frac{a}{b}$ is:

   a. close to 0. b. close to $\frac{1}{2}$. c. close to 1.

An inequality is a statement that one number is less than or greater than another number.

6. Compare each pair of fractions using benchmark fractions. Insert a $>$ or $<$ symbol to make the inequality true. Explain your reasoning.

   a. $\frac{11}{12}$ ____ $\frac{5}{9}$ b. $\frac{5}{9}$ ____ $\frac{5}{7}$

   c. $\frac{7}{13}$ ____ $\frac{5}{11}$ d. $\frac{5}{10}$ ____ $\frac{7}{10}$

7. Compare the fractions in each pair. Think about how close the fractions are to 0, $\frac{1}{2}$, or 1.

   a. $\frac{5}{8}$ and $\frac{7}{12}$ b. $\frac{14}{15}$ and $\frac{7}{8}$ c. $\frac{1}{9}$ and $\frac{1}{23}$

ACTIVITY
1.4 Ordering Rational Numbers

Felipe and Corinne ordered the rational numbers 0.8, 0.06, and $\frac{3}{5}$ from least to greatest using different strategies. Felipe used benchmark numbers, and Corinne used equivalent fractions.

1. Use Felipe's strategy of benchmark numbers to order the rational numbers from least to greatest.

2. Use Corinne's strategy of equivalent fractions to order the rational numbers from least to greatest.

3. Use any strategy to order the rational numbers 0.6, $\frac{3}{4}$, and $\frac{5}{8}$ from least to greatest.

4. List the fractions in each set in ascending order.

a. $\frac{1}{8}, \frac{1}{11}, \frac{1}{9}, \frac{1}{4}, \frac{1}{7}, \frac{1}{5}$

b. $\frac{4}{5}, \frac{4}{10}, \frac{4}{12}, \frac{4}{7}$

c. $\frac{3}{8}, \frac{3}{11}, \frac{3}{9}, \frac{3}{4}, \frac{3}{7}, \frac{3}{5}$

5. What do the fractions in each part of Question 4 have in common? Explain how you determined the order of the fractions in each.

NOTES

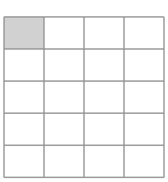
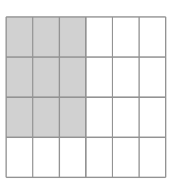
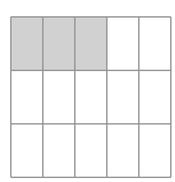
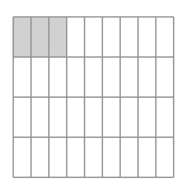
TALK the TALK

Close to Half

Consider the fractions shown.

$$\frac{5}{9}, \frac{7}{13}, \frac{2}{7}, \frac{10}{11}$$

1. **Write the fractions in ascending order. Use what you know about benchmark fractions to determine the order. Explain your reasoning.**

$\frac{1}{12}$	$\frac{3}{5}$	$\frac{5}{6}$	$\frac{3}{4}$	$\frac{1}{5}$
$\frac{1}{3}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{2}{3}$	$\frac{4}{5}$
$\frac{5}{8}$	$\frac{8}{8}$	$\frac{8}{4}$	$\frac{5}{5}$	$\frac{10}{5}$
0.4	0.6	0.1	0.2	0.06
0.75	0.5	1	0	$\frac{0}{1}$
				

Assignment

Write

Describe a way to compare two positive rational numbers that are not written in the same form.

Remember

A positive rational number is a number that can be written in the form $\frac{a}{b}$, where a and b are both whole numbers, and b is not equal to 0.

An inequality is a statement that one number is less than or greater than another number.

Practice

Order the rational numbers in each group from least to greatest.

1. $0.09, 0.1, \frac{2}{25}$
2. $\frac{5}{6}, \frac{5}{8}, \frac{3}{2}$
3. $0.55, \frac{3}{5}, \frac{2}{3}$
4. $4.2, 3.10, 4\frac{1}{8}, 3.01, 2.3, 2\frac{4}{5}, 3.017$
5. $6.84, 8\frac{5}{7}, 6.34, 6\frac{1}{4}, 8\frac{3}{10}, 8.15$
6. $1.98, 0.23, 0, 1.89, 1\frac{3}{5}, 1.02, \frac{3}{2}$
7. $2.35, 2.54, 2.01$
8. $9.3, 5\frac{3}{5}, 9.90, 9\frac{8}{11}, 3.78, 3.9, 5\frac{1}{6}$
9. $0.02, 0, 6.98, 2\frac{1}{16}, 2.2, 6.89, 2.01$

Stretch

Use reasoning to compare the fractions. Do not use common denominators.
Explain your reasoning.

1. $\frac{13}{3}$ ______ $\frac{17}{4}$
2. $\frac{3}{16}$ ______ $\frac{6}{31}$
3. $\frac{7}{11}$ ______ $\frac{9}{13}$

Review

1. In a video game, a character needs to shine a light through two spinning wheels that have holes in them. The first wheel makes a complete rotation in 7 seconds. The second wheel makes a complete rotation in 9 seconds. The holes are lined up at 0 seconds. How many seconds will pass before they are lined up again?
2. Your aunt's club is planning to sell small bags of different types of beads to people who want to make their own bead jewelry. The table below lists the different types of beads and how many they have.

Type of Bead	Quantity
Oval bead	24
Metal bead	18

   The club wants to divide these beads into bags so that each bag has exactly the same number of oval beads and metal beads. What is the greatest number of bags that they can make so that all of the beads are used and there is the same number of each bead in each bag?
3. Determine each sum or difference.
   a. $\frac{1}{8} + \frac{2}{3}$
   b. $\frac{7}{6} - \frac{6}{7}$

Did You Get the Part?

2

Multiplying and Dividing with Fractions

WARM UP

Write the least common multiple (LCM) of the numbers in each pair.

1. 3, 4
2. 2, 4
3. 8, 3
4. 15, 6
5. 14, 7

LEARNING GOALS

- Model and interpret the multiplication of fractions.
- Model, interpret, and compute the quotient of a whole number divided by a fraction or mixed number.
- Interpret the remainder when dividing a whole number by a fraction or mixed number.

You have used area models to represent the products and quotients of whole numbers. How can you use area models and a variety of other models to represent products and quotients that involve positive rational numbers?

Getting Started

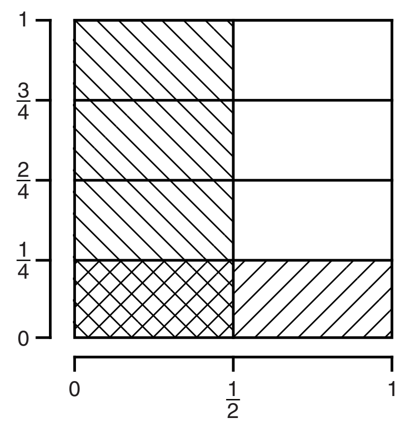
Return of the Area Model

Previously, you used an area model to represent products, to determine factors, and to list multiples of given numbers. In the same way that area models represent whole number multiplication, area models can represent fraction multiplication.

WORKED EXAMPLE

The expression $\frac{1}{4} \times \frac{1}{2}$ means to multiply $\frac{1}{4}$ and $\frac{1}{2}$. When you multiply a fraction by a fraction, you are calculating a part of a part. You can represent the product of two fractions using an area model.
Let's consider an area model for $\frac{1}{4} \times \frac{1}{2}$ and what it represents.

To represent $\frac{1}{4}$ along one side of the model, divide the model into four equal parts along the vertical line. Then shade $\frac{1}{4}$.



To represent $\frac{1}{2}$ along the other side, divide the model along the horizontal line into two equal parts. Then shade $\frac{1}{2}$.

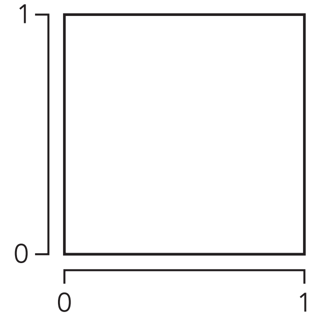
$\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$

The area of the overlapping region is the product of the fractions.

Show how the algorithm for fraction multiplication gives the same product as the model.

1. Estimate the product $\frac{2}{3} \times \frac{3}{4}$.

2. Represent the product using the area model.



ACTIVITY
2.1 Multiplying with Mixed Numbers

Let's look at two methods for multiplying mixed numbers.

Dawson is thinking about how to determine $3\frac{2}{3} \times 2\frac{1}{4}$. He is trying to remember a model he used when he learned how to multiply whole numbers.

He multiplied 25×34 first to remember the method, and then applied the same strategy to multiply the mixed numbers.

Dawson

25×34

	30	4
20	600	80
5	150	20

$$\begin{array}{r} 600 \\ 150 \\ 80 \\ +\ 20 \\ \hline 850 \end{array}$$

$3\frac{2}{3} \times 2\frac{1}{4}$

	2	$\frac{1}{4}$
3	6	$\frac{3}{4}$
$\frac{2}{3}$	$\frac{4}{3}$	$\frac{2}{12}$

$$\begin{array}{r} 6 \\ \frac{3}{4} = \frac{9}{12} \\ \frac{4}{3} = \frac{16}{12} \\ +\ \frac{2}{12} = \frac{2}{12} \\ \hline = 6 + \frac{27}{12} = 6 + 2\frac{3}{12} \\ = 6 + 2\frac{1}{4} = 8\frac{1}{4} \end{array}$$

1. **Describe the model Dawson used to calculated the product of two mixed numbers.**

NOTES

2. **Lezlee's correct method is shown. Describe how she calculated the product of two mixed numbers.**

Lezlee

$3\frac{2}{3} \times 2\frac{1}{4}$

$\frac{11}{3} \times \frac{9}{4} = \frac{99}{12}$

$= \frac{33}{4}$

$= 8\frac{1}{4}$

3. **Which method do you prefer, Lezlee's or Dawson's? Why?**

The teachers at Riverside Middle School decide to make trail mix for an upcoming field trip. Ms. Hadley shares her new tropical trail mix recipe with the other teachers. She named it Hawaiian Trail Mix Extravaganza. The recipe for 1 batch is shown.

Hawaiian Trail Mix Extravaganza

$3\frac{3}{8}$ cups of macadamia nuts	$2\frac{1}{3}$ cups of almonds
$2\frac{1}{4}$ cups of pumpkin seeds	$1\frac{1}{3}$ cups of sunflower seeds
$3\frac{3}{8}$ cups of dried cherries	$2\frac{5}{6}$ cups of honey
$4\frac{5}{8}$ cups of popped popcorn	$4\frac{1}{2}$ cups of raisins
$1\frac{2}{3}$ cups of corn syrup	$2\frac{3}{4}$ cups of granola

Feeds 12 People

4. The sixth grade teachers are each going to make 3 batches of Hawaiian Trail Mix Extravaganza. For each ingredient, first use benchmark fractions to estimate how many cups of each are needed. Then calculate the exact answer. Show your work.

   a. almonds Estimate: ___________

   b. popped popcorn Estimate: ___________

   c. macadamia nuts Estimate: ___________

5. There are more seventh grade students than sixth grade students. The seventh grade teachers determine that they are each going to make $4\frac{1}{2}$ batches. For each ingredient, first estimate how many cups of each are needed. Then calculate the exact answer. Show your work.

   a. raisins Estimate: ___________

   b. sunflower seeds Estimate: ___________

   c. pumpkin seeds Estimate: ___________

ACTIVITY 2.2

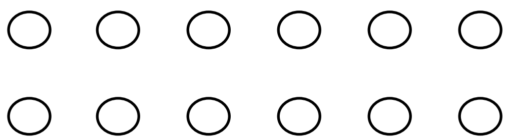
Whole Number ÷ Fraction

Division often means to ask how many groups of a certain size are contained in a number.

WORKED EXAMPLE

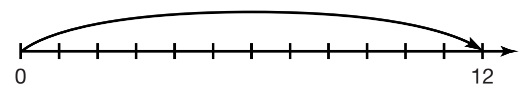
The expression 12 ÷ 3 means you are trying to determine how many groups of 3 are in 12. A physical model and number line model are shown.

Physical Model

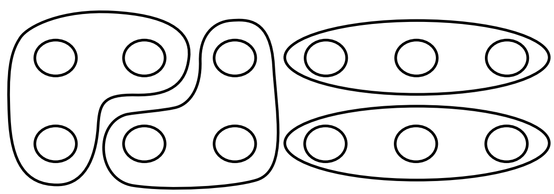


1 group of 12

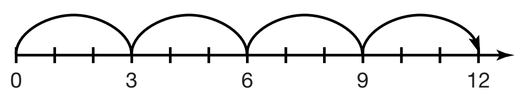
Number Line Model



1 group of 12



4 groups of 3



4 groups of 3

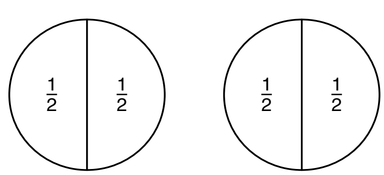
$$12 \div 3 = 4$$

There are 4 groups of 3 in 12.

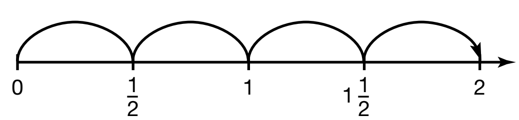
WORKED EXAMPLE

When you divide with fractions, you are asking the same question. The expression $2 \div \frac{1}{2}$ is asking how many halves are in 2.

Physical Model



Number Line Model



There are four $\frac{1}{2}$ parts in 2, so $2 \div \frac{1}{2} = 4$.

1. For each problem situation, first estimate the answer. Then draw a diagram and write the appropriate number sentence.

   a. How many students can be served with 4 cups of trail mix if each student gets $\frac{1}{2}$ of a cup of trail mix?

   b. How many $\frac{1}{4}$-cup servings of trail mix can you make with 4 cups?

   c. How many $\frac{1}{3}$-cup trail mix servings can you make with 4 cups?

   d. Do you notice a pattern? Explain your reasoning.

2. You have 4 cups of trail mix. If each student receives:

   a. $\frac{2}{3}$ cup, how many students are there?

   b. $\frac{2}{5}$ cup, how many students are there?

   c. $\frac{4}{5}$ cup, how many students are there?

   d. $\frac{4}{7}$ cup, how many students are there?

   e. What patterns do you notice? Explain your reasoning.

3. Jamilla is throwing a small party. She has 4 pizzas and decides that everyone at her party should receive a serving size that is $\frac{3}{5}$ of a pizza. Jamilla says she has $6\frac{2}{3}$ servings, but Devon says she has $6\frac{2}{5}$ servings. Draw a diagram of the situation, and solve for the quotient to determine who is correct. Then explain why one person is not correct.

NOTES

TALK the TALK

Reasoning with Division

1. How is the quotient of $12 \div \frac{1}{3}$ related to the quotient of $12 \div \frac{2}{3}$? Explain your reasoning.

2. Determine the quotient for each. Then, describe any patterns that you notice.

$6 \div \frac{1}{2}$ $\quad$ $6 \div \frac{1}{4}$ $\quad$ $6 \div \frac{1}{8}$ $\quad$ $6 \div \frac{1}{16}$

Assignment

Write

Describe a way to estimate the quotient of two fractions or mixed numbers. Provide an example.

Remember

Division often means to ask how many groups of a certain size are contained in a number. So, $6 \div \frac{4}{5}$ can mean, "How many groups of $\frac{4}{5}$ are in 6?"

Practice

Calculate each product or quotient.

1. $2\frac{2}{5} \times 3\frac{1}{3}$
2. $8 \div \frac{3}{4}$
3. $10 \div \frac{2}{5}$
4. $3\frac{4}{5} \times 2\frac{1}{2}$
5. $1\frac{3}{8} \times 6\frac{1}{4}$
6. $5\frac{2}{3} \times 4\frac{1}{6}$
7. $2\frac{1}{3} \times 7\frac{1}{4}$
8. $5 \div \frac{2}{5}$
9. $4 \div \frac{3}{8}$

Stretch

Jennifer is buying school supplies for her 3 children, and they each have their own list.

Mia: 15 pencils, 2 erasers, 4 colored markers

Cooper: 16 pencils, 12 pens, 10 colored markers, and 2 erasers

Tyler: 20 pencils, 10 erasers, and 10 sleeves of stickers

	Single	Pack
Assorted Colored Markers	\$0.73 per marker	\$4.56 for 8 markers
Erasers	\$0.18 per eraser	\$0.75 for 6 erasers
Pencils	\$0.93 per pencil	\$10.45 for 12 pencils
Assorted Stickers	\$1.07 per sleeve	\$5.27 for 5 sleeves
Assorted Pens	\$0.72 per pen	\$6.85 for 10 pens

Jennifer has budgeted \$75 to spend on supplies. Is this an appropriate amount based on the cost list? Explain your reasoning.

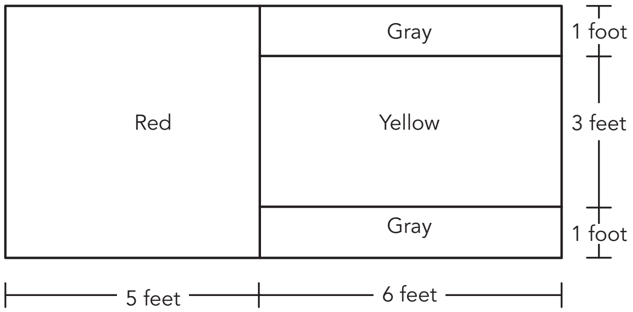
Review

1. A school participates in a reading contest. The table shows each sixth grade class's portion of the grade's total reading minutes. Order the classes from the greatest number of reading minutes to the least. Explain your reasoning.

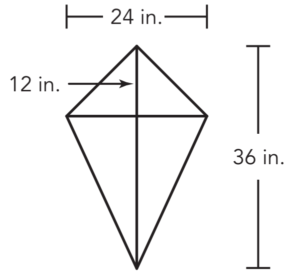
Class	Portion of Reading Minutes
Mr. Karlie	$\frac{5}{12}$
Ms. Jacobs	$\frac{1}{18}$
Ms. Suarez	$\frac{4}{9}$
Mr. Mitchell	$\frac{1}{12}$

2. Order the fractions $\frac{3}{7}$, $\frac{4}{5}$, $\frac{5}{9}$ and $\frac{1}{8}$ from least to greatest. Explain your method.

3. An artist is weaving a rectangular rug to match the pattern shown in the figure. Calculate the area of the entire rug.



4. You are making a kite out of nylon fabric. Study the diagram. How much nylon fabric will you need to make the kite?



5. Estimate and then calculate each product.

a. 625×34 b. 1014×59

Yours IS to Reason Why!

3

Fraction by Fraction Division

WARM UP

Use benchmark fractions to estimate each product.

1. $2\frac{5}{6} \times 3\frac{1}{8}$
2. $3\frac{8}{9} \times 2\frac{7}{15}$
3. $9\frac{6}{7} \times 4\frac{1}{5}$
4. $6\frac{4}{7} \times 2\frac{1}{9}$

LEARNING GOALS

- Model the division of fractions using area models and on a number line.
- Compute and interpret quotients of fractions and interpret remainders.
- Divide with mixed numbers.

KEY TERMS

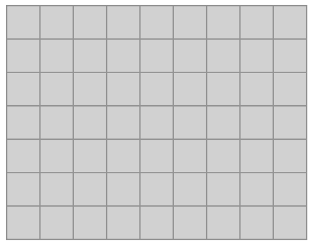
- complex fraction
- reciprocal
- multiplicative inverse
- Multiplicative Inverse Property

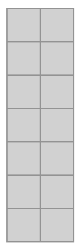
You have learned how to multiply and divide with whole numbers and positive rational numbers. How can you apply what you know about operating with these numbers to understand how to divide two fractions or mixed numbers?

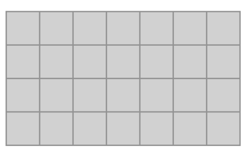
Getting Started

All in the Fact Family

Write the multiplication-division fact family for each rectangular array.

1. 

2. 

3. 

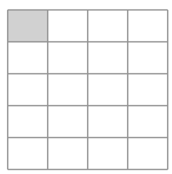
4. **For each fact family, which numbers represent the side lengths of the area model? Which numbers represent the area?**

ACTIVITY 3.1

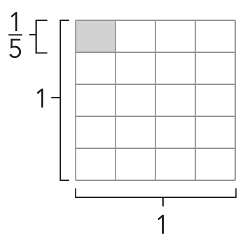
Fractional Fact Families

Collect all the diagrams you sorted in the lesson *Thinking Rationally*. Just like fact families for whole-number area models, you can also write multiplication-division fact families for models involving fractions.

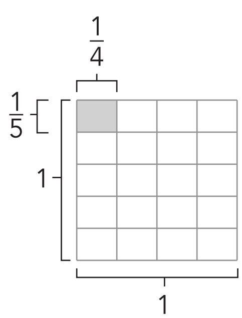
Consider the model shown.



The shaded area represents the fraction $\frac{1}{20}$, because 1 rectangle is shaded of the 20 total unit rectangles.



The height of the shaded rectangle is $\frac{1}{5}$ of the height of the model.



The width of the shaded rectangle is $\frac{1}{4}$ of the width of the model.

So, the shaded area of the rectangle represents the product $\frac{1}{5} \times \frac{1}{4} = \frac{1}{20}$.

1. **Write a multiplication-division fact family for the model.**

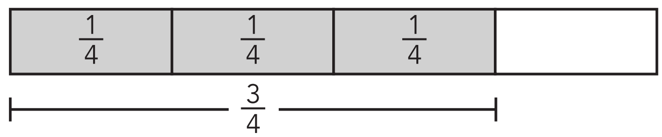
2. **Describe how the model shows the division of fractions.**

3. **Write multiplication-division fact families with fractions for the remaining diagrams that you sorted. Show your work.**

NOTES

ACTIVITY 3.2 Fraction Strip Models

You can also use fraction strip models to represent fraction division. For example, this model shows $\frac{3}{4} \div \frac{1}{4}$. The division expression asks, how many $\frac{1}{4}$s are in $\frac{3}{4}$?



1. What is the quotient: $\frac{3}{4} \div \frac{1}{4} = ?$

2. Write a sentence to describe the answer.

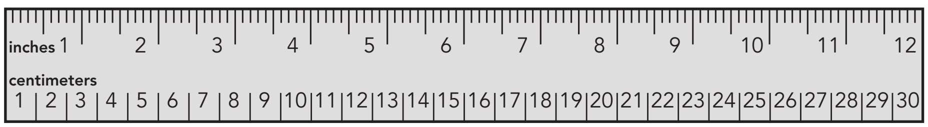
3. Write a sentence to describe what each division expression is asking. Then, draw a fraction-strip diagram to represent the division problem. Finally, calculate the quotient and write a sentence to describe your answer.

a. $\frac{3}{2} \div \frac{1}{4}$ **b.** $\frac{1}{2} \div \frac{1}{8}$ **c.** $\frac{3}{4} \div \frac{1}{8}$

NOTES

4. **How can you check each of your answers in Question 3 to make sure you were correct? Explain your reasoning.**

5. **Mason has $\frac{2}{3}$ of a foot of ribbon. He needs to divide the ribbon into $\frac{1}{6}$-foot pieces. How many pieces can he cut from the ribbon? Write a division problem to represent this situation. Use the ruler to answer the question and show your work.**



ACTIVITY
3.3 Dividing Across

In the same way that you can "multiply across," or multiply the numerators and multiply the denominators, to determine the product of two fractions, you can also "divide across" to determine the quotient of two fractions.

WORKED EXAMPLE

Determine the quotient: $\frac{7}{8} \div \frac{1}{2} = ?$

Divide the numerators. Then divide the denominators.

$$\frac{7}{8} \div \frac{1}{2} = \frac{7 \div 1}{8 \div 2}$$

$$= \frac{7}{4}$$

NOTES

Amy and Sandy used different ways to calculate the quotient $\frac{3}{4} \div \frac{1}{3}$.

Amy

$\frac{3}{4} \div \frac{1}{3}$

$\frac{3}{4} = \frac{9}{12} \qquad \frac{1}{3} = \frac{4}{12}$

$$\frac{9}{12} \div \frac{4}{12} = \frac{9 \div 4}{12 \div 12}$$
$$= \frac{9 \div 4}{1}$$
$$= \frac{9}{4}$$

I can determine equivalent fractions and then divide across.

Sandy

$\frac{3}{4} \div \frac{1}{3}$

$$\frac{3}{4} \div \frac{1}{3} = \frac{\frac{3}{4}}{\frac{1}{3}}$$
$$= \frac{\frac{3}{1} \times \frac{3}{4}}{\frac{4}{3} \times \frac{3}{4}}$$
$$= \frac{\frac{9}{4}}{1}$$
$$= \frac{9}{4}$$

I just divide across. If I get a fraction over a fraction, I can make the resulting denominator a 1.

A **complex fraction** is a fraction that has a fraction in either the numerator, the denominator, or both the numerator and denominator.

1. **Study Sandy's and Amy's methods.**

   a. **Which student wrote complex fractions?**

   b. **How are the methods different? How are they alike?**

2. **Calculate each quotient by dividing across. Rewrite any improper fractions as mixed numbers.**

   a. $\frac{3}{4} \div \frac{1}{3}$ b. $\frac{3}{8} \div \frac{1}{4}$ c. $\frac{5}{6} \div \frac{2}{3}$ d. $\frac{7}{8} \div \frac{3}{4}$

ACTIVITY 3.4 Multiply by the Reciprocal

When you reverse the numbers in the numerator and denominator of a fraction, you form a new fraction called the *reciprocal* of the original fraction.

1. **Which number is its own reciprocal?**

2. **Which number has no reciprocal? Explain your reasoning.**

The **reciprocal** of a number is also known as the multiplicative inverse of the number. The **multiplicative inverse** of a number $\frac{a}{b}$ is the number $\frac{b}{a}$, where a and b are nonzero numbers. The product of any nonzero number and its multiplicative inverse is 1.

The **Multiplicative Inverse Property** states: $\frac{a}{b} \cdot \frac{b}{a} = 1$, where a and b are nonzero numbers.

3. **Alexa wrote the reciprocal of the mixed number incorrectly. Explain why she is incorrect and provide the correct reciprocal.**

> Alexa
>
> Given $3\frac{8}{5}$
>
> The reciprocal is $3\frac{5}{8}$.

Karen said, "I wish everything could be as easy as dividing by 1." She tried her "dividing by 1" method to determine the quotient $\frac{5}{8} \div \frac{3}{4}$.

"If I can turn the divisor of $\frac{3}{4}$ into 1, then the problem can be solved. I can multiply both fractions by the reciprocal of $\frac{3}{4}$, which is $\frac{4}{3}$, to create 1."

4. **Analyze Karen's method for dividing fractions. Describe the steps in the dashed circles.**

$$\frac{5}{8} \div \frac{3}{4} = \frac{\frac{5}{8}}{\frac{3}{4}}$$

Division is rewritten as a fraction.

$$= \frac{\frac{5}{8}}{\frac{3}{4}} \cdot \frac{\frac{4}{3}}{\frac{4}{3}}$$

____

$$= \frac{\frac{5}{8} \cdot \frac{4}{3}}{\frac{3}{4} \cdot \frac{4}{3}} = \frac{\frac{5}{8} \cdot \frac{4}{3}}{1}$$

____

$$= \frac{5}{8} \cdot \frac{4}{3} = \frac{20}{24} = \frac{5}{6}$$

5. **Write a rule based on Karen's method that you can use to calculate the quotient in a fraction division problem.**

6. **Calculate each quotient.**

a. $\frac{5}{6} \div \frac{1}{4}$ b. $\frac{4}{5} \div \frac{1}{3}$ c. $\frac{1}{8} \div \frac{1}{2}$ d. $\frac{3}{10} \div \frac{1}{3}$

ACTIVITY
3.5

Dividing with Mixed Numbers

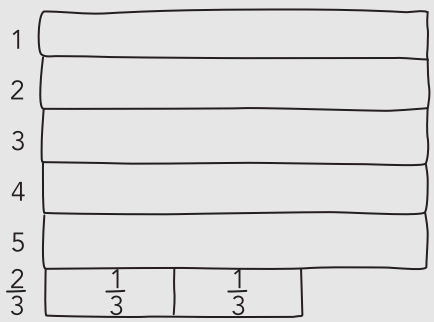
Let's consider how to make a bag of trail mix that has a weight greater than 1 pound.

If you have $5\frac{2}{3}$ pounds of trail mix, how many bags can you make so that each bag contains $1\frac{5}{6}$ pounds?

Analyze each student's method.

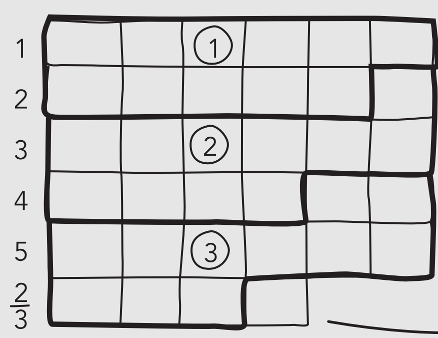
Carla

I drew a model for $5\frac{2}{3}$.



I knew that I needed $1\frac{5}{6}$ groups, so I divided my model to show $\frac{1}{6}$'s. Because $1\frac{5}{6} = \frac{11}{6}$,

I then marked off groups of $\frac{11}{6}$.

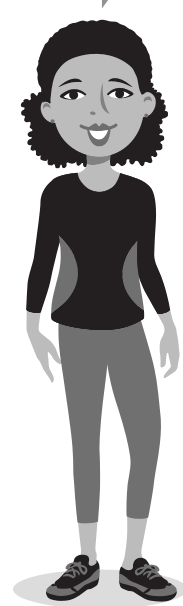


3 groups of $\frac{11}{6}$ and one $\frac{1}{6}$ part left over.

The remaining $\frac{1}{6}$ part is actually $\frac{1}{11}$ of a group.

So, I can make $3\frac{1}{11}$ bags of trail mix.

How did Carla know she needed to divide her model into $\frac{1}{6}$'s?



Karen

I wrote a division sentence, and then converted both mixed numbers to improper fractions.

$$5\frac{2}{3} \div 1\frac{5}{6} = \frac{17}{3} \div \frac{11}{6}$$

$$= \frac{17}{\cancel{3}} \cdot \frac{\cancel{6}^{2}}{11} = \frac{34}{11}$$

$$= 3\frac{1}{11}$$

So, I can make $3\frac{1}{11}$ bags of trail mix.

1. Karen converted the mixed numbers to improper fractions. How did Carla represent this same step?

2. Describe how Karen changed from division to multiplication.

Solve each problem. Show your work and be sure to label your answer.

3. The cook in the school cafeteria made $47\frac{1}{2}$ cups of mashed potatoes. If there are $1\frac{1}{4}$ cups of mashed potatoes in a serving, how many servings did she make?

4. One of the most beautiful hiking trails in the United States is Glacier Gorge in Rocky Mountains National Park. The hiking trail through Glacier Gorge is $9\frac{3}{5}$ miles round trip. If you hike $1\frac{3}{5}$ miles an hour, how many hours will the round trip take?

NOTES

TALK the TALK

Going (Almost) Numberless

1. Complete each statement with *greater than, less than,* or *the same as.*

   a. If a quantity greater than 1 is divided by a value between 0 and 1, the quotient will be ______________ the original quantity.

   b. If a quantity between 0 and 1 is divided by a value greater than 1, the quotient will be ______________ the original quantity.

   c. If a quantity between 0 and 1 is divided by a value between 0 and 1, the quotient will be ______________ the original quantity.

2. Complete each statement with *always, sometimes,* or *never.*

   a. If a mixed number is divided by another mixed number, the quotient will ______________ be greater than 1.

   b. If a fraction between 0 and 1 is multiplied by another fraction between 0 and 1, the product will ______________ be less than 1.

   c. If a whole number is divided by a fraction between 0 and 1, the quotient will ______________ be less than 1.

   d. If a fraction between 0 and 1 is multiplied by a mixed number, the product will ______________ be greater than 1.

NOTES

3. Consider the quotients $\frac{5}{6} \div \frac{1}{2}$ and $\frac{5}{6} \div 2$.

   a. Describe how these quotients are different.

   b. Write a real-world problem that can be solved using each division.

Assignment

Write

Explain how an area model can represent the division of two fractions.

Remember

One way to divide two fractions is to divide across:

$$\frac{3}{4} \div \frac{1}{4} = \frac{3 \div 1}{4 \div 4} = \frac{3}{1}$$

Another way is to rewrite the division problem as multiplication by the reciprocal of the divisor:

$$\frac{3}{4} \div \frac{1}{4} = \frac{3}{4} \times \frac{4}{1} = \frac{12}{4} = 3$$

Practice

Calculate each quotient.

1. $\frac{2}{5} \div \frac{1}{3}$
2. $\frac{7}{8} \div \frac{1}{4}$
3. $\frac{3}{4} \div \frac{1}{6}$
4. $\frac{15}{16} \div \frac{3}{4}$
5. $\frac{7}{12} \div \frac{1}{3}$
6. $1\frac{1}{8} \div \frac{5}{6}$
7. $5\frac{3}{8} \div \frac{1}{4}$
8. $7\frac{1}{3} \div 1\frac{2}{3}$

Stretch

Write a word problem that could be modeled by the quotient $2\frac{1}{2} \div \frac{3}{4}$.

Review

1. A triathlon competition consists of swimming, cycling, and running. Not all races cover the same distances. According to USA Triathlon, the international distance triathlon consists of $\frac{9}{10}$ mile swimming, $24\frac{4}{5}$ miles cycling, and $6\frac{1}{5}$ miles running. One of the most famous triathlons is an Ironman competition. Competitors in an Ironman competition must swim $2\frac{2}{3}$ times farther than competitors in an international distance triathlon.
   a. Use benchmark fractions to estimate how far competitors must swim in an Ironman triathlon. Show your work.
   b. Calculate the exact distance competitors in an Ironman triathlon must swim. Show your work.

2. Ling is a camp counselor at a local summer camp. She is in charge of the weekly craft activity for 40 campers. She plans to make fabric-covered frames that each require $\frac{1}{6}$ yard of fabric. The camp director gave her $6\frac{2}{3}$ yards of fabric remnants for this project. Does Ling have enough fabric for her craft activity? Show your work.

3. Write the prime factorization for each number. Then, determine the greatest common factor.
   a. 28, 32
   b. 40, 100

4. Draw a model to determine each quotient.
   a. $4 \div \frac{5}{4}$
   b. $2 \div \frac{4}{3}$

Topic 2

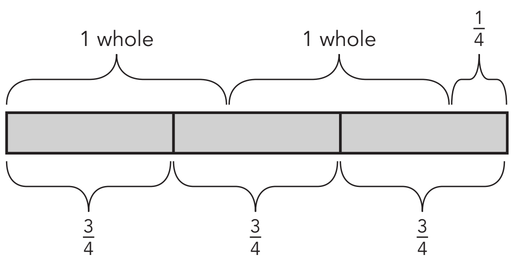
Positive Rational Numbers

Name ____ Date ____________________

I. Representing Fraction Division

A. Write a number sentence that describes each model using multiplication.

1.



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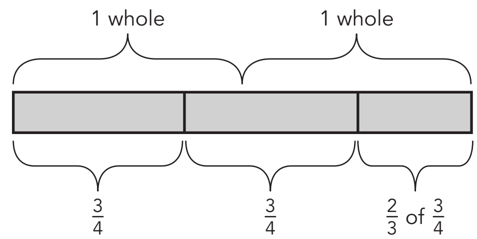

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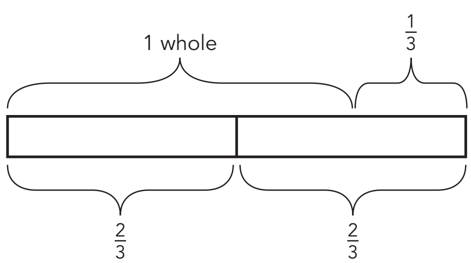

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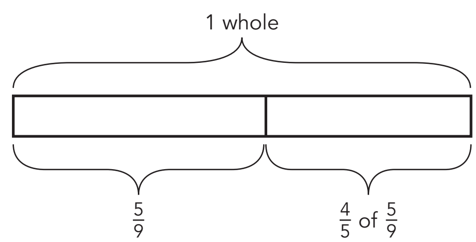

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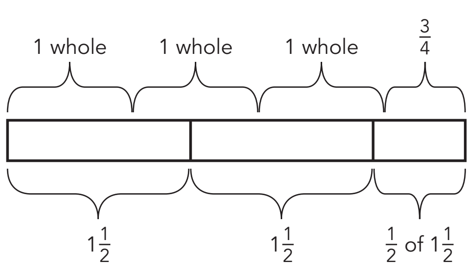

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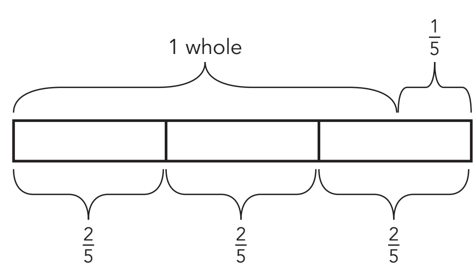
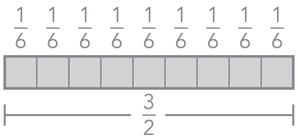
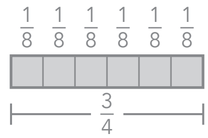
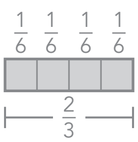


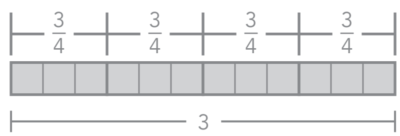
Name ______________________________ Date ______________

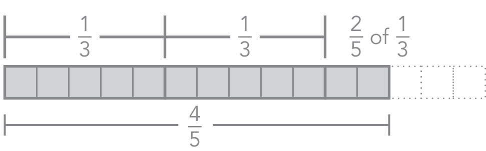
B. Write a number sentence that describes each model using division.

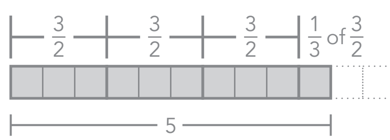
1. 

2. 

3. 

4. 

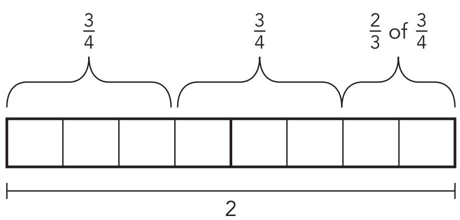
5. 

6. 

II. Interpreting Remainders Using Models

A. Solve each problem. Draw a model to help you.

1. Tara buys clay in a tube that is 2 feet long. She is making clay flowers and each flower requires $\frac{3}{4}$ foot of clay. How many whole flowers can Tara make from the tube of clay? Tara used the following model to help her solve the problem.



2. Cheyenne is making friendship bracelets for all of her friends. Each bracelet requires $\frac{2}{3}$ meter of thread. If Cheyenne has $2\frac{1}{3}$ meters of thread, how many complete friendship bracelets can she make?

3. Kayla works at a bookstore. One of her jobs is to take books that arrive and place them on bookshelves in the store. She has four shelves for a shipment of $1\frac{4}{5}$ boxes of the latest novel by one of Kayla's favorite authors. Will Kayla be able to stock all the books if each shelf can hold $\frac{2}{5}$ box of books? Use a model to explain your reasoning.

4. Mary has a pet ferret. She bought a bag of ferret food that contains $1\frac{1}{4}$ cups of food. The maker of the ferret food suggests feeding a ferret only $\frac{3}{8}$ cup of food a day. If Mary follows the suggestion, for how many days can she feed her ferret from the bag of food before she needs to open a new bag?

5. Derek is making puppets to sell at his town's annual craft fair. He is using yarn to make the hair for the puppets. He has a total of 3 yards of yarn, and each puppet requires $\frac{4}{5}$ yard of yarn to make the hair. How many puppets can Derek make?

6. Kelly is making sandwiches to sell at the football game's concession stand. She has $4\frac{3}{8}$ ounces of roast beef. Each sandwich has $\frac{3}{4}$ ounce of roast beef. How many sandwiches can Kelly make?

Name ____ Date ________________

III. Developing the Fraction Division Algorithm

A. Determine the fraction that makes each product 1.

1. _____ $\times \frac{3}{1} = 1$

2. $\frac{2}{3} \times$ _____ $= 1$

3. _____ $\times \frac{5}{4} = 1$

4. $\frac{1}{11} \times$ _____ $= 1$

5. $\frac{3}{5} \times$ _____ $= 1$

6. _____ $\times \frac{9}{4} = 1$

7. $\frac{1}{7} \times$ _____ $= 1$

8. _____ $\times \frac{1}{23} = 1$

9. _____ $\times \frac{8}{9} = 1$

10. $\frac{3}{7} \times$ _____ $= 1$

B. Calculate each quotient by rewriting it as a multiplication problem.

1. $\frac{7}{4} \div \frac{11}{7} = ?$

2. $\frac{24}{5} \div \frac{7}{2} = ?$

3. $\frac{8}{3} \div \frac{2}{5} = ?$

4. $\frac{1}{2} \div 4 = ?$

5. $9 \div \frac{3}{5} = ?$

6. $\frac{15}{8} \div \frac{4}{3} = ?$

7. $\frac{10}{3} \div \frac{1}{6} = ?$

8. $5 \div \frac{7}{9} = ?$

9. $\frac{2}{11} \div 3 = ?$

10. $\frac{6}{5} \div \frac{8}{7} = ?$

Name ______________________________ Date ______________

IV. Multiplying and Dividing Rational Numbers

A. Calculate each quotient. Simplify your answer.

1. $\frac{5}{6} \div \frac{1}{2}$

2. $\frac{8}{9} \div \frac{2}{3}$

3. $\frac{7}{8} \div \frac{1}{4}$

4. $\frac{3}{4} \div \frac{1}{6}$

5. $\frac{15}{16} \div \frac{3}{4}$

6. $\frac{7}{12} \div \frac{1}{3}$

7. $9\frac{1}{3} \div 2\frac{1}{3}$

8. $10\frac{1}{5} \div 3\frac{2}{5}$

9. $19 \div 6\frac{1}{4}$

10. $12\frac{1}{2} \div 2\frac{1}{3}$

11. $7\frac{3}{4} \div 1\frac{1}{4}$

12. $15\frac{2}{3} \div 4\frac{5}{6}$

13. $5\frac{1}{2} \div 1\frac{1}{4}$

14. $6\frac{1}{2} \div 2\frac{1}{2}$

15. $7\frac{1}{3} \div 1\frac{2}{3}$

16. $5\frac{3}{4} \div 1\frac{1}{8}$

17. $6 \div 2\frac{1}{3}$

18. $7\frac{3}{4} \div 3\frac{1}{4}$

Oh, Yes, I Am the Muffin Man

3

Determining Equivalent Ratios

WARM UP

Choose the correct statement to complete each sentence and explain your reasoning.

1. When the manager at Sweets-a-Plenty Bakery decides how many bakers are needed to bake muffins for a given day, she needs to consider the total number of muffins needed for the day.

   a. Making fewer muffins with more bakers will take:
      - less time.
      - an equal amount of time.
      - more time.

   b. Making more muffins in a shorter amount of time requires:
      - fewer workers.
      - an equal amount of workers.
      - more workers.

LEARNING GOALS

- Use drawings to model and determine equivalent ratios.
- Reason about tape diagrams to model and determine equivalent ratios.
- Define and use rates and rate reasoning to solve ratio problems.
- Use scaling up and scaling down to determine equivalent ratios.
- Use double number lines to solve real-world problems involving ratios.

KEY TERMS

- equivalent ratios
- tape diagram
- rate
- proportion
- scaling up
- scaling down
- double number line

Informally comparing ratios, or qualitatively comparing ratios, is important. However, there are many instances when you need to make more specific comparisons. How can you use equivalent ratios in order to compare ratios more precisely?

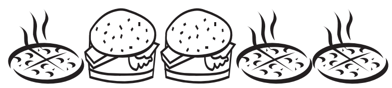
Getting Started

Which Has More?

Consider the given representations to answer each question. Explain your reasoning.

1. Which dinner order has more pizza?

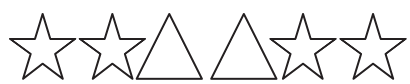
Order 1



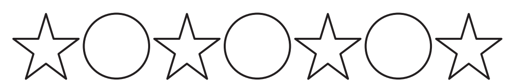
Order 2

2. Which pattern has more stars?

Pattern 1

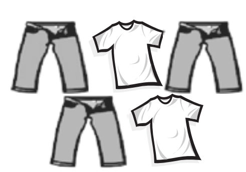


Pattern 2

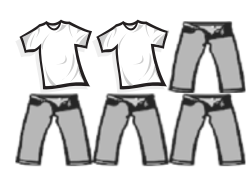


3. Which pile of laundry has more shirts?

Pile 1



Pile 2



4. Which type of reasoning did you use for each question—additive or multiplicative? Explain why.

ACTIVITY 3.1 Using Drawings to Model Equivalent Ratios

Kerri and her friends are going hiking. Kerri invites her friends to meet at her house for a quick breakfast before heading out on their hike. Kerri wants to offer muffins to her friends.

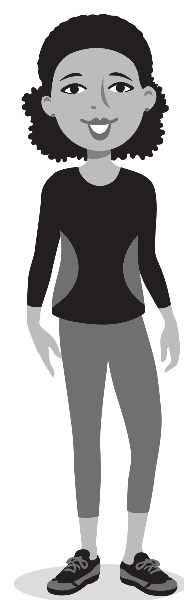
1. **She knows that one muffin combo has four muffins that can feed four people.**

   a. **Draw a model showing the relationship between the muffin combo and the number of people it will feed.**

   b. **If Kerri invites 6 friends, how many muffin combos will she need? Draw a model to show how many muffin combo(s) she will need, and explain your answer.**

   c. **If Kerri has $2\frac{3}{4}$ muffin combos, how many friends can she feed? Draw a model to show how many friends she can feed, and explain your answer.**

How do your models show a relationship between two quantities?



Let's consider a different variety pack.

In one muffin variety pack, two out of every five muffins are blueberry.

2. Draw a model to answer each question. Explain your reasoning.

a. How many muffins are blueberry muffins if there are a total of 25 muffins?

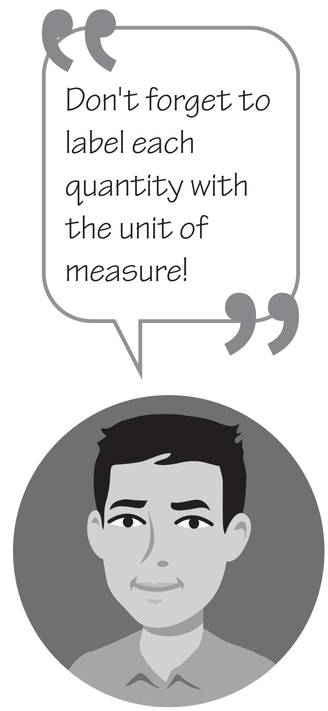
b. How many muffins are blueberry muffins if there are a total of 35 muffins?

c. How many total muffins are there if 8 muffins are blueberry?

As you solved these problems, you determined *equivalent ratios.* **Equivalent ratios** are ratios that represent the same part-to-part or part-to-whole relationship.

ACTIVITY
3.2 Tape Diagrams

The local bakery sells muffins in variety packs of blueberry, pumpkin, and bran muffins. They always sell the muffins in the ratio of 3 blueberry muffins : 2 pumpkin muffins : 1 bran muffin.



1. Write the ratio that expresses each relationship. Identify each as a part-to-part or a part-to-whole ratio.

a. blueberry muffins to total muffins

b. pumpkin muffins to total muffins

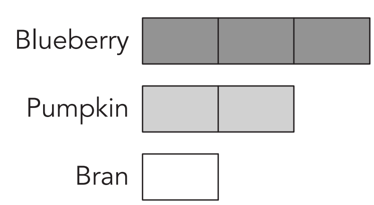
c. bran muffins to total muffins

d. blueberry muffins to pumpkin muffins

e. bran muffins to pumpkin muffins

f. blueberry muffins to bran muffins

A ratio can be represented by drawing the objects themselves, but they also can be represented using a *tape diagram*. A **tape diagram** illustrates number relationships by using rectangles to represent ratio parts. A tape diagram representing the ratio of each type of muffin is shown.



2. What does each small rectangle represent in the given tape diagram?

Remember, in this scenario the ratio of muffins in each variety pack is always 3 blueberry muffins : 2 pumpkin muffins : 1 bran muffin.

Tape diagrams provide a visual representation of ratios, but they also can be used to solve problems.

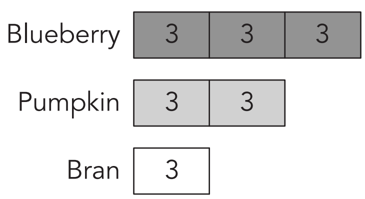
WORKED EXAMPLE

Suppose you purchase an 18-pack of muffins. How many blueberry, pumpkin, and bran muffins will you purchase?

There are 6 muffins represented in the tape diagram, and you want 18 total muffins that are in the same ratio.

Therefore, to determine how many muffins you need to maintain the same ratio, you can divide 18 by 6.
$18 \div 6 = 3$

Therefore, each rectangle will represent 3 muffins.

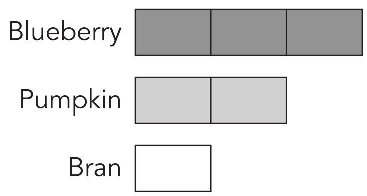


From the tape diagram, you can see that there are
9 blueberry muffins, 6 pumpkin muffins, and 3 bran muffins.

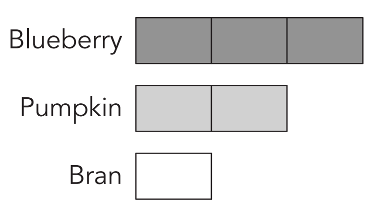
3. Is the ratio 9 : 6 : 3 equivalent to 3 : 2 : 1? Explain how you know.

NOTES

4. **Suppose you purchase a 36-pack of muffins. Use the tape diagram to illustrate how many blueberry, pumpkin, and bran muffins you will receive.**



5. **Suppose you wanted 20 pumpkin muffins in your variety pack. How many total muffins will be in your variety pack? Complete the tape diagram to determine the answer.**



6. The table shows the number of muffins in specific sized variety packs. Complete just the missing cells in the columns for the 6-pack and 36-pack of muffins.

Total Number of Muffins	6	12	18	24	36
Number of Blueberry Muffins			9		
Number of Pumpkin Muffins			6		
Number of Bran Muffins			3		

7. Analyze the completed columns in the table.

   a. What do you notice about the numbers?

   b. How could you have determined the number of each type of muffin in the 18-pack without using the tape diagram?

   c. How could you have determined the number of each type of muffin in the 36-pack without using the tape diagram?

   d. Use what you noticed about the numbers in the table to complete the remaining columns for the number of each type of muffin in a 12-pack and in a 24-pack of muffins. Explain your strategy.

ACTIVITY 3.3

Rates and Proportions

One of the rounds at the Math Quiz Bowl tournament is a speed round. A team of four students will represent Stewart Middle School in the speed round of the Math Quiz Bowl. One student of the team will be chosen to solve as many problems as possible in 20 minutes. The results from this week's practice are recorded in the table.

Student	Number of Correctly Solved Problems in a Specified Time
Kaye	4 problems correct in 5 minutes
Susan	7 problems correct in 10 minutes
Doug	1 problem correct in 2 minutes
Mako	3 problems correct in 4 minutes

1. **Explain how Tia's reasoning and Lisa's reasoning about who should compete in the speed round are incorrect.**

Tia

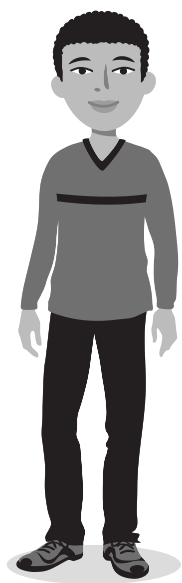
Susan should definitely compete in the speed round because she correctly solved the most problems.

Lisa

It took Susan the longest time to complete her problems. She should not compete in the speed round.

Each quantity in the table is a *rate*. A **rate** is a ratio that compares two quantities that are measured in different units. The rate for each student in this situation is the number of problems solved per amount of time.

It's important to line up the units when writing equal ratios.



WORKED EXAMPLE

Kaye's rate is 4 problems correct per 5 minutes. This rate can be written as:

$$\frac{4 \text{ problems correct}}{5 \text{ minutes}}.$$

2. Write the rates for the other three team members.

a. Susan

b. Doug

c. Mako

When two ratios or rates are equivalent to each other, you can write them as a *proportion*. A **proportion** is an equation that states that two ratios are equal. In a proportion, the quantities composing each part of the ratio have the same multiplicative relationship between them.

WORKED EXAMPLE

For example, you know that Kaye got four problems correct per 5 minutes. So, you can predict how many problems she could answer correctly in 20 minutes.

$$\frac{\text{problems correct}}{\text{minutes}} \rightarrow \frac{4}{5} \underset{\times 4}{\overset{\times 4}{=}} \frac{\boxed{16}}{20}$$

Kaye can probably answer 16 problems correctly in 20 minutes.

When you change one ratio to an equivalent ratio with larger numbers, you are *scaling up* the ratio. **Scaling up** means you multiply both parts of the ratio by the same factor greater than 1.

3. Use the definition of a ratio to verify that $\frac{4}{5}$ is equivalent to $\frac{16}{20}$.

Remember, one way to represent a ratio is in fractional form. It doesn't matter which quantity is in the numerator or denominator; it matters that the unit of measure is consistent among the ratios.

WORKED EXAMPLE

You can write the proportion in a different way.

$$\frac{\text{minutes}}{\text{problems correct}} \quad \begin{matrix} \longrightarrow \\ \longrightarrow \end{matrix} \quad \frac{5}{4} \overset{\times 4}{\underset{\times 4}{=}} \frac{20}{\boxed{16}}$$

4. Determine the number of problems each student can probably solve in 20 minutes. Explain the scaling up you used to determine the equivalent ratio.

Susan **Doug** **Mako**

5. Which team member is the fastest? Who would you pick to compete? Explain your reasoning.

ACTIVITY 3.4

Scaling Up and Scaling Down

The muffin variety packs baked by the Healthy for U Bakery come in a ratio of 2 blueberry muffins to 5 total muffins.

1. Scale up each muffin ratio to determine the unknown quantity.

a. $\dfrac{\text{2 blueberry muffins}}{\text{5 total muffins}} = \dfrac{\text{20 blueberry muffins}}{\text{? total muffins}}$

b. $\dfrac{\text{2 blueberry muffins}}{\text{5 total muffins}} = \dfrac{\text{30 blueberry muffins}}{\text{? total muffins}}$

c. $\dfrac{\text{2 blueberry muffins}}{\text{5 total muffins}} = \dfrac{\text{? blueberry muffins}}{\text{100 total muffins}}$

d. $\dfrac{\text{2 blueberry muffins}}{\text{5 total muffins}} = \dfrac{\text{50 blueberry muffins}}{\text{? total muffins}}$

e. $\dfrac{\text{2 blueberry muffins}}{\text{5 total muffins}} = \dfrac{\text{? blueberry muffins}}{\text{15 total muffins}}$

f. $\dfrac{\text{2 blueberry muffins}}{\text{5 total muffins}} = \dfrac{\text{28 blueberry muffins}}{\text{? total muffins}}$

When you change a ratio to an equivalent ratio with smaller numbers, you are *scaling down* the ratio. **Scaling down** means you divide both parts of the ratio by the same factor greater than 1, or multiply both parts of the ratio by same factor less than 1. Scaling down a ratio often makes it easier to understand.

Remember the definition of division, $a \div b = a \cdot \frac{1}{b}$.

2. Scale down each ratio to determine the unknown quantity.

a. $\frac{\text{3 people}}{\text{9 pizzas}} = \frac{?}{\text{3 pizzas}}$

b. $\frac{\text{2 hoagies}}{\text{6 people}} = \frac{\text{1 hoagie}}{?}$

c. $\frac{\text{100 track shirts}}{\text{25 people}} = \frac{?}{\text{1 person}}$

d. $\frac{\text{60 tracks}}{\text{5 CDs}} = \frac{?}{\text{1 CD}}$

e. $\frac{\text{3 tickets}}{\$26.25} = \frac{\text{1 ticket}}{?}$

f. $\frac{\text{12 hours}}{\text{720 miles}} = \frac{\text{4 hours}}{?}$

g. $\frac{\text{20 hours of work}}{\$240} = \frac{\text{1 hour of work}}{?}$

h. $\frac{\text{3 gallons of red paint}}{\text{2 gallons of yellow paint}} = \frac{?}{\text{1 gallon of yellow paint}}$

ACTIVITY
3.5 Double Number Lines

An interval is the amount of space between two tick marks on a number line.

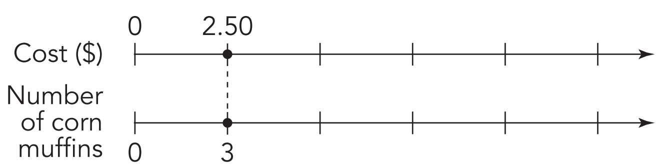
You know several strategies to determine the relationship between two quantities: drawing models, building tape diagrams, and scaling up or down. You can also use a *double number line* to visualize these relationships. A **double number line** is a model that is made up of two number lines used together to represent the ratio between two quantities. The intervals on each number line maintain the same ratio.

The Muffin Man Bakery offers two types of muffins—corn or cinnamon raisin. It costs the bakery $2.50 to make 3 corn muffins.

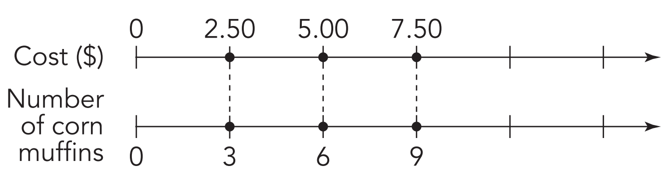
The scale for each number line is different, but the interval is the same for both lines.

WORKED EXAMPLE

The ratio $2.50 : 3 corn muffins is shown on the double number line.



You can see other equivalent ratios of *cost : number of corn muffins* by continuing to label each interval.

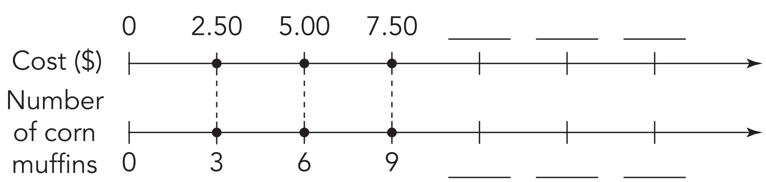


1. **State the two new ratios of cost : number of corn muffins shown on the second double number line.**

2. Describe the interval represented on each number line.

3. Use the double number line to determine equivalent ratios.

a. Plot the new ratios. Explain your calculations.



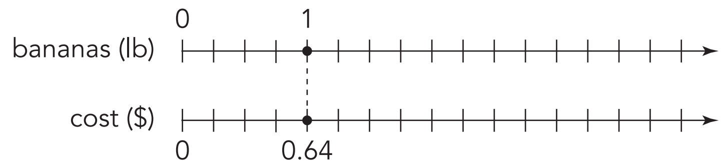
b. What is the cost of making 12 corn muffins?

c. What is the cost of making 15 corn muffins?

d. What is the cost of making 18 corn muffins?

e. Describe any patterns you notice between the cost and the number of corn muffins made.

4. One pound of bananas costs $0.64. Use the double number lines to determine the cost for each quantity of bananas.

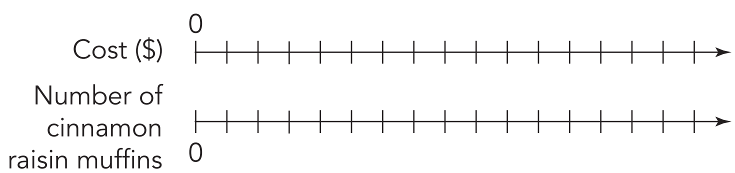


a. $2\frac{1}{2}$ pounds

b. $\frac{1}{2}$ pound

c. 2 pounds

5. The cost for The Muffin Man Bakery to make 4 cinnamon raisin muffins is $3.20. Use the double number line to determine equivalent ratios and answer each question. Explain your calculations.

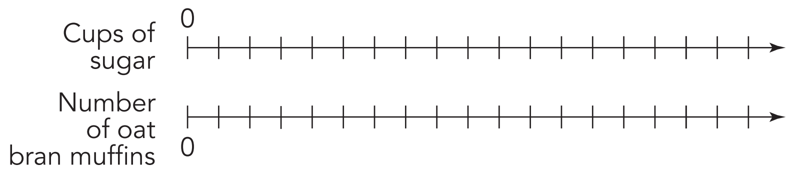


a. What is the cost to make 8 cinnamon raisin muffins?

b. How many cinnamon raisin muffins are made for $12.80?

c. What is the cost of making 12 cinnamon raisin muffins?

6. It takes 1 cup of sugar to make 12 oat bran muffins. Use the double number line to determine equivalent ratios and answer each question. Explain your calculations.



a. Plot the given ratio on the double number line.

b. How many oat bran muffins can be made using $\frac{1}{2}$ cup of sugar? $\frac{2}{3}$ cup of sugar? $1\frac{1}{2}$ cups of sugar?

c. How many cups of sugar are needed to make 3 muffins? 15 muffins? 9 muffins?

NOTES

TALK the TALK

Make a Choice

Answer each question by using pictures, a tape diagram, or a double number line. Show all of your work and explain why you chose your strategy.

1. **A T-shirt store keeps 7 white T-shirts on the shelves for every 3 purple T-shirts on the shelves.**

   a. **How many white T-shirts are on the shelves if there are 15 purple T-shirts on the shelves?**

   b. **How many purple T-shirts are on the shelves if there are 49 white T-shirts on the shelves?**

   c. **How many white shirts are on the shelves if there are 40 total shirts (purple and white) on the shelves?**

2. **A grocery store advertises 4 pounds of apples for $6.00.**

   a. **What is the cost for 3 pounds of apples?**

   b. **What is the cost for 1 pound of apples?**

   c. **How many pounds of apples can you purchase with $40.00?**

Circle the question that your teacher has asked you to present to the class. Write at least 3 sentences to tell your classmates how you completed the work.

Assignment

Write

Compare and contrast tape diagrams and double number line models for representing ratio relationships. Use an example in your description.

Remember

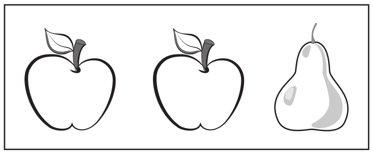
Equivalent ratios are ratios that represent the same part-to-part or part-to-whole relationship.

A proportion is an equation that states that two ratios are equal. In a proportion, the quantities composing each part of the ratio have the same multiplicative relationship between them.

Scaling up means you multiply both parts of the ratio by the same factor greater than 1.

Scaling down means you divide both parts of the ratio by the same factor greater than one, or multiply both parts of the ratio by the same factor less than 1.

Practice



1. Ms. Yoto is putting together bags of fruit that contain 1 pear for every 2 apples. For each ratio given, create a picture module. Then, calculate the answer from your model, and explain your reasoning.
   a. How many apples are in the bag if there are a total of 9 pieces of fruit?
   b. How many apples are in the bag if there are a total of 15 pieces of fruit?
   c. How many pieces of fruit are there if there are 8 apples in the bag?
2. When creating playlists for dances, DJ Lew likes to maintain a ratio of 4 hip hop songs : 3 country songs : 1 slow song.
   a. Create a tape diagram to represent this ratio.
   b. Suppose DJ Lew has 40 songs on his playlist. Use the tape diagram to illustrate how many hip hop, country, and slow songs are on the playlist.
   c. Suppose DJ Lew wants to put 36 hip hop songs on the playlist. How many total songs will be on the playlist? Use a tape diagram to determine the answer.
3. Scale up or scale down each ratio to complete the proportion.

   a. $\frac{\text{2 teachers}}{\text{26 students}} = \frac{\text{8 teachers}}{?}$

   b. $\frac{\text{12 inches}}{\text{1 foot}} = \frac{?}{\text{18 feet}}$

   c. $\frac{\$39{,}000}{\text{1 year}} = \frac{?}{\text{3 years}}$

   d. $\frac{\text{18 pencils}}{\text{1 box}} = \frac{\text{108 pencils}}{?}$

   e. $\frac{\$40}{\text{15 gallons}} = \frac{?}{\text{3 gallons}}$

   f. $\frac{\text{1200 boxes}}{\text{9 truckloads}} = \frac{?}{\text{3 truckloads}}$

   g. $\frac{\text{280 beats}}{\text{4 seconds}} = \frac{\text{70 beats}}{?}$

   h. $\frac{\text{520 cm}}{\text{5.2 m}} = \frac{\text{260 cm}}{?}$

4. A mason is a person who builds structures with bricks, stone, cement block, or tile. A mason usually uses mortar to hold the bricks together. A general rule of thumb in masonry is that $2\frac{1}{2}$ bags of mortar are needed for every 100 cement blocks.
   a. Complete a double number line to determine the amount of mortar needed for each quantity of blocks.
   b. How many bags of mortar will a mason need for 350 blocks?
   c. How many bags of mortar will a mason need for 50 blocks?
   d. With $12\frac{1}{2}$ bags of mortar, how many blocks can the mason lay?

Stretch

Scale up or scale down each ratio to complete the proportion.

1. $\dfrac{\text{7 cups of red dye}}{\text{10 cups of yellow dye}} = \dfrac{?}{\text{25 cups of yellow dye}}$

2. $\dfrac{?}{\text{175 in.}} = \dfrac{\$42}{\text{50 in.}}$

3. $\dfrac{\text{47 feet}}{\text{60 seconds}} = \dfrac{?}{\text{45 seconds}}$

Review

1. In planning for the upcoming regional girls' tennis tournament, Coach McCarter looked at her players' statistics from the previous 2 months.

   Sarah: 7 matches won, 3 matches lost
   Sophie: 6 matches won, 4 matches lost
   Grace: 7 matches won, 4 matches lost

   Based on their records, which player should Coach McCarter choose to attend the regional tournament? Explain your reasoning.

2. Hydrate sports drink calls for 7 scoops for every gallon of water. Sarah thinks the drink is too weak, and she wants to change it. Describe how she can change either the number of scoops or the amount of water to make the drink stronger.

3. Decide whether each amount is more closely related to volume or surface area.
   a. the amount of air in a room
   b. the amount of wood in a dog house.

4. Determine each product.
   a. $\frac{2}{5} \times \frac{7}{3}$
   b. $4\frac{1}{6} \times 3\frac{4}{5}$

A Trip to the Moon

4

Using Tables to Represent Equivalent Ratios

WARM UP

It takes 1 cup of milk to make a batch of 8 pancakes.

1. How many cups of milk does it take to make 16 pancakes?

2. How many cups of milk does it take to make 4 pancakes?

3. How many pancakes can be made with 4 cups of milk?

LEARNING GOALS

- Create and reason about tables of equivalent ratios.
- Use known values in a table to determine equivalent ratios.
- Solve problems by reasoning about graphs, diagrams, and tables of equivalent ratios.

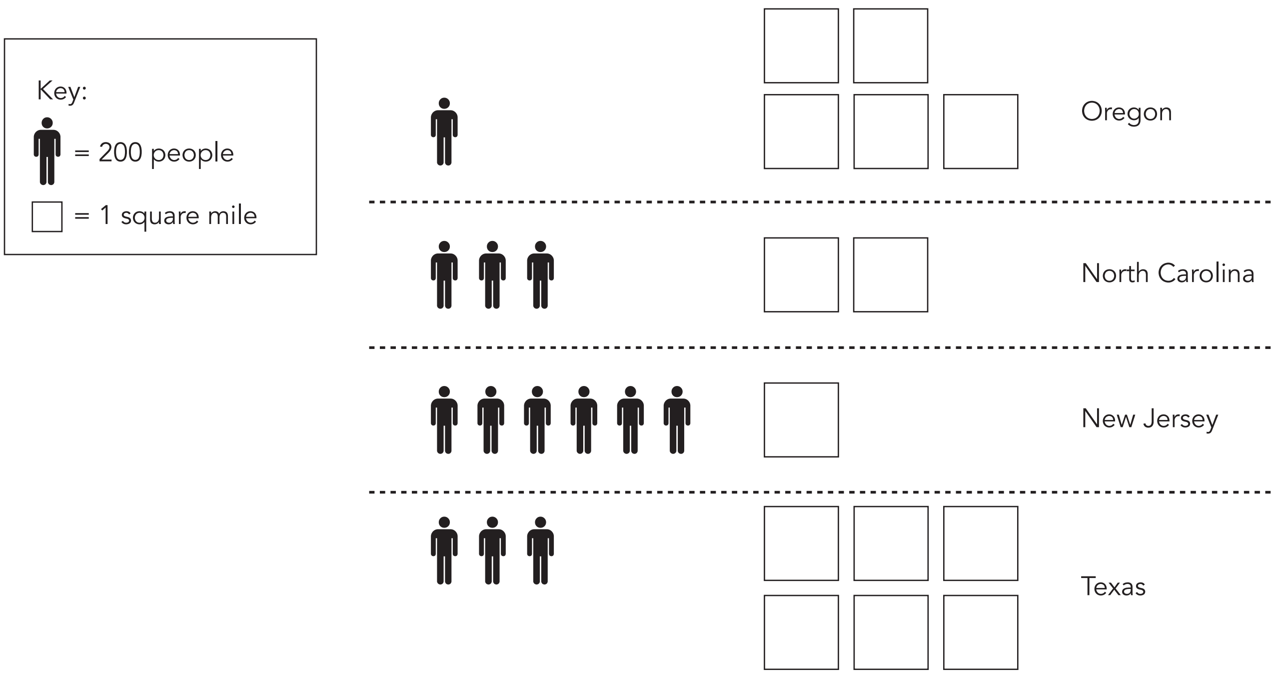
You have created equivalent ratios using pictures, tape diagrams, double number lines, and scaling up or scaling down. Are there other strategies you can use to determine equivalent ratios?

Getting Started

I'm Your Density

Population density is a ratio that compares people to square miles. The graph shown gives the approximate population density of four U.S. states in 2015.

1. Which of the states shown has the greatest population density? Which state has the least population density? Explain what this means in your own words.



2. What is the population density of your state or your city? How does this compare with other states or cities?

ACTIVITY
4.1 Introduction to Ratio Tables

Gravity is a natural force that attracts objects to each other. Gravity is the pull toward the center of an object like the Earth, a planet, or the Moon. Your weight on the Earth is the measure of the amount of gravitational attraction exerted on you by the Earth. The Moon has a weaker gravitational force than the Earth.

The ratio of *weight on Earth* : *weight on the Moon* is approximately 60 lb : 10 lb.

You can use ratio tables to show how two quantities are related. Ratio tables are another way to organize information.

WORKED EXAMPLE

The table represents three equivalent ratios of *weight on Earth (lb)* : *weight on the Moon (lb).*

The ratio of 60 lb on Earth : 10 lb on the Moon is given.

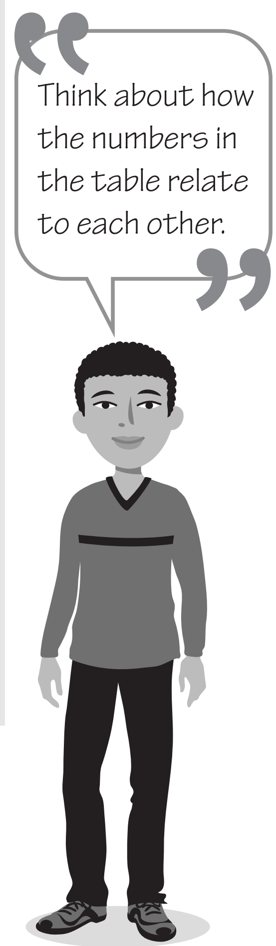
add

÷2

Weight on Earth (lb)	60	30	90
Weight on the Moon (lb)	10	5	15

÷2

add



1. Verify that adding the two existing equivalent ratios 60 lb on Earth : 10 lb on the Moon and 30 lb on Earth : 5 lb on the Moon produces the equivalent ratio 90 lb on Earth : 15 lb on the Moon by analyzing the quotient of each ratio.
What do you notice?

2. Can you show a different strategy to determine the ratio of 90 lb on Earth : 15 lb on the Moon?

3. Howard, Carla, Mitsu, and Ralph each determined the weight of a 120-lb person on the Moon.

   a. Compare Howard's and Carla's strategies.

Howard

I can scale 60 up to 120 by multiplying by 2, so then I must also multiply 10 by 2 to get 20.

×2

Weight on Earth (lb)	60	30	90	120
Weight on the Moon (lb)	10	5	15	20

×2

Carla

I also got the ratio of 120 lb on Earth : 20 lb on the Moon.

$$\text{30 lb on Earth : 5 lb on the Moon} \xrightarrow{\times 4} \text{120 lb on Earth : 20 lb on the Moon}$$

b. **Explain Mitsu's reasoning. Then verify the ratio 120 lb on Earth : 20 lb on the Moon is a correct equivalent ratio.**

Mitsu

I used the weights for a 30-lb person and a 90-lb person to obtain the weight of a 120-lb person.

Weight on Earth (lb)	60	30	90	120
Weight on the Moon (lb)	10	5	15	20

So that means 120 lb on Earth : 20 lb on the Moon.

c. **Explain why Ralph's reasoning is not correct.**

Ralph

The difference between 90 and 120 is 30, so I just added 30 to 15 and got 45.

+30

Weight on Earth (lb)	90	120
Weight on the Moon (lb)	15	45

+30

I got the ratio of 120 lb on Earth : 45 lb on the Moon.

4. Mitsu said, "I see another equivalent ratio when I look at the way Carla showed her work."

   30 lb on Earth : 5 lb on the Moon
   120 lb on Earth : 20 lb on the Moon
   150 lb on Earth : 25 lb on the Moon

Is Mitsu correct? Explain her reasoning.

5. Use the table to show a different calculation for the ratio of 150 lb on Earth : 25 lb on the Moon. Explain your reasoning.

Weight on Earth (lb)	60	30	90	120	150
Weight on the Moon (lb)	10	5	15	20	25

ACTIVITY 4.2 Using Equivalent Ratio Tables

The 6th-grade pizza party is planned for tomorrow. Tracy is in charge of ordering the pizza for 450 students. The pizza parlor said two pizzas will serve 9 students. Tracy made a ratio table to help her determine how many pizzas to order for 450 students.

Pizzas	2	10	
Students	9	45	450

1. Explain Tracy's strategy and determine the number of pizzas needed.

2. Complete the table to show the number of pizzas to order given the number of students. Explain your calculations.

Pizzas	2	10						
Students	9	45	450	135	270	225	900	1350

3. Use your table of values to answer each question. Explain your calculations.

   a. How many students will 12 pizzas feed?

   b. How many students will 20 pizzas feed?

   c. How many students will 90 pizzas feed?

ACTIVITY
4.3 Parts and Wholes in Ratio Tables

Remember, the school colors at Riverview Middle School are a shade of bluish green and white. The art teacher, Mr. Raith, needs to mix different quantities of the green paint for several school projects. It takes 3 parts blue paint to 2 parts yellow paint to create the bluish green color. Carla needs 5 total pints of the bluish green paint, so she used 3 pints of blue paint and 2 pints of yellow paint.

Mr. Raith thought that the art students needed a table to help determine the correct amount of each color of paint for different projects—both large and small.

1. **Complete the table with the correct amounts. Explain your reasoning.**

Amount of Bluish Green Paint Needed	5 pints	15 pints			
Yellow Paint	2 pints		8 pints		
Blue Paint	3 pints		12 pints	18 pints	1.5 pints

2. **Examine Sally's answer. Explain what is wrong with her thinking.**

Sally

If I want 15 pints of bluish green paint, then I will need to add 10 to the original 5 total parts of bluish green to get 15. So, I should add 10 to each of the other numbers too to get 12 pints of yellow and 13 pints of blue.

Charlie said, "The table is helpful, but it cannot list every amount we might need for every painting project. I think if we multiply $\frac{2}{5}$ times the total amount of bluish green paint we need, we can determine the amount of yellow paint needed. If we multiply $\frac{3}{5}$ times the total amount of bluish green paint we need, we can determine the amount of blue paint needed."

3. What do you think about Charlie's method? Is he correct or incorrect? Explain your reasoning.

Charlene said, "I am thinking about this in a different way. The amount of blue paint is always $1\frac{1}{2}$ times as much as the amount of yellow paint."

4. Is she correct in her thinking? Explain your reasoning.

Clifford said, "My thinking is related to Charlene's. The yellow paint is $\frac{2}{3}$ of the blue paint."

5. Is Clifford correct? Explain your reasoning.

6. How does Clifford's thinking relate to Charlene's thinking?

NOTES

TALK the TALK

Lollipop Recipe

Consider the recipe for making one batch of lollipops.

2 cups granulated sugar
$\frac{2}{3}$ cup light corn syrup
$\frac{3}{4}$ cup water
$\frac{1}{4}$ teaspoon flavoring oil

1. The table represents the ratio of ingredients used to make lollipops. Complete the ratio table. Explain your calculations.

Number of Batches	1	2	5	10
Sugar (c)				
Corn syrup (c)				
Water (c)				
Flavoring Oil (tsp)				

2. For each number of batches, describe how you can use addition to determine the amount of each ingredient needed.

a. 3 batches

b. 7 batches

3. For each number of batches, describe how you can use subtraction to determine the amount of each ingredient needed.

a. 3 batches

b. 7 batches

Assignment

Write

Describe how addition can be used with ratio tables to create equivalent ratios. Use examples in your explanation.

Remember

You can use a table to represent, organize, and determine equivalent ratios. You can use addition and multiplication to create equivalent ratios.

Practice

Each table represents the ratio of yellow daffodils to white daffodils for different garden displays. Complete each ratio table. Explain your calculations.

1.

Yellow daffodils	9	36	45	
White daffodils	15			90

2.

Yellow daffodils	7		28	
White daffodils	6	12		42

3.

Yellow daffodils	32			16
White daffodils		48	6	12

4.

Yellow daffodils	5	1		9
White daffodils		3	30	

5.

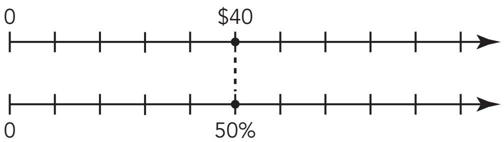
Yellow daffodils		105	84	21
White daffodils	20	60		

6.

Yellow daffodils	55	22	77	
White daffodils	25	10		5

Stretch

Complete each double number line.

1.


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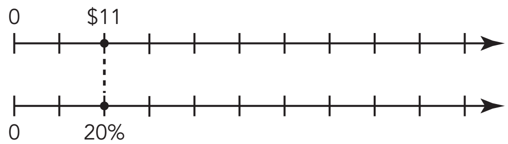

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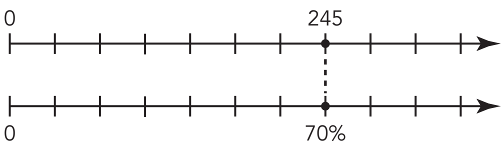

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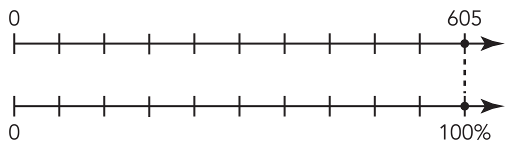


Review

1. In tennis, an ace is a legal serve that cannot be returned and is not even touched by the opponent's racket. Cecelia has an excellent serve. Last week, Cecelia hit 7 aces in 2 matches.
   a. If she plays 6 matches in the regional tournament, how many aces should she expect? Show your work.
   b. If she plays 10 matches in the regional tournament, how many aces should she expect? Show your work.

2. The winning time for the middle school 4-person 100-meter relay was 62.59 seconds. Suppose that each runner ran exactly the same amount of time. What would the time be for each runner?

3. Spring Hill Park is on a rectangular piece of land that measures 0.75 mile by 1.25 miles. Draw and label a rectangle to represent the park. Then determine the area of the park.

4. Determine each product.
   a. 25×0.31
   b. 7.05×3.72

They're Growing!

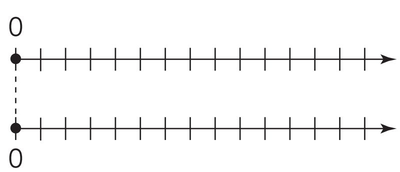
Graphs of Ratios

5

WARM UP

A tree grows at a constant rate of 3 feet per year.

1. Write a ratio to represent the amount of growth in feet : the number of months.
2. Create a double number line that describes the growth of the tree every 12 months over a 48-month period.



LEARNING GOALS

- Plot ratios and equivalent ratios on a coordinate plane.
- Read equivalent ratios from graphs.
- Use ratio reasoning to determine equivalent ratios from graphs.
- Recognize the graphical representation of equivalent ratios.

Key Term

- linear relationship

So far, you have used scaling up or scaling down, tables, tape diagrams, pictures, and double number lines to determine equivalent ratios. How can you plot pairs of values on a coordinate plane and determine equivalent ratios?

Getting Started

Growing Rectangles

Consider a rectangle with a short side of length 2 units and a long side of length 3 units.

- In the first table, add the indicated number of units to both the long and short sides of the original rectangle.
- In the second table, multiply each original side length by the given value.
- For each rectangle, determine the ratio of the long side length : short side length.

	Original	+2 units	+3 units	+4 units
Long side	3			
Short side	2			
Ratio	3 : 2			

	Original	×2 units	×3 units	×4 units
Long side	3			
Short side	2			
Ratio	3 : 2			

1. What do you notice about the ratios for rectangles formed by adding to the sides of the rectangle?

2. What do you notice about the ratios for rectangles formed by multiplying the sides of the rectangle by a given value?

ACTIVITY 5.1

Analyzing Rectangle Ratios

You have 2 copies of Rectangle A. You need both for Question 6.

Analyze the rectangles at the end of the lesson.

1. **Cut out each rectangle and sort into at least two piles. Share your sorts and your criteria.**

2. **Determine the side lengths of each rectangle. Label each rectangle with the length of its short side and the length of its long side.**

3. **Ava grouped together Rectangles A, C, E, F, G, and J. What do you think was her reasoning?**

4. **Gabriel's sort was similar to Ava's but he included Rectangle A with Rectangles B, D, H, I, and K. What do you think was his reasoning?**

5. **Complete the table for Ava's Group and Gabriel's Group. Write the ratios in fractional form, comparing the length of the short side to the length of the long side. Compare the ratios in each table. What do you notice?**

Ava's Group

	Short	Long	Ratio
A			
C			
E			
F			
G			
J			

Gabriel's Group

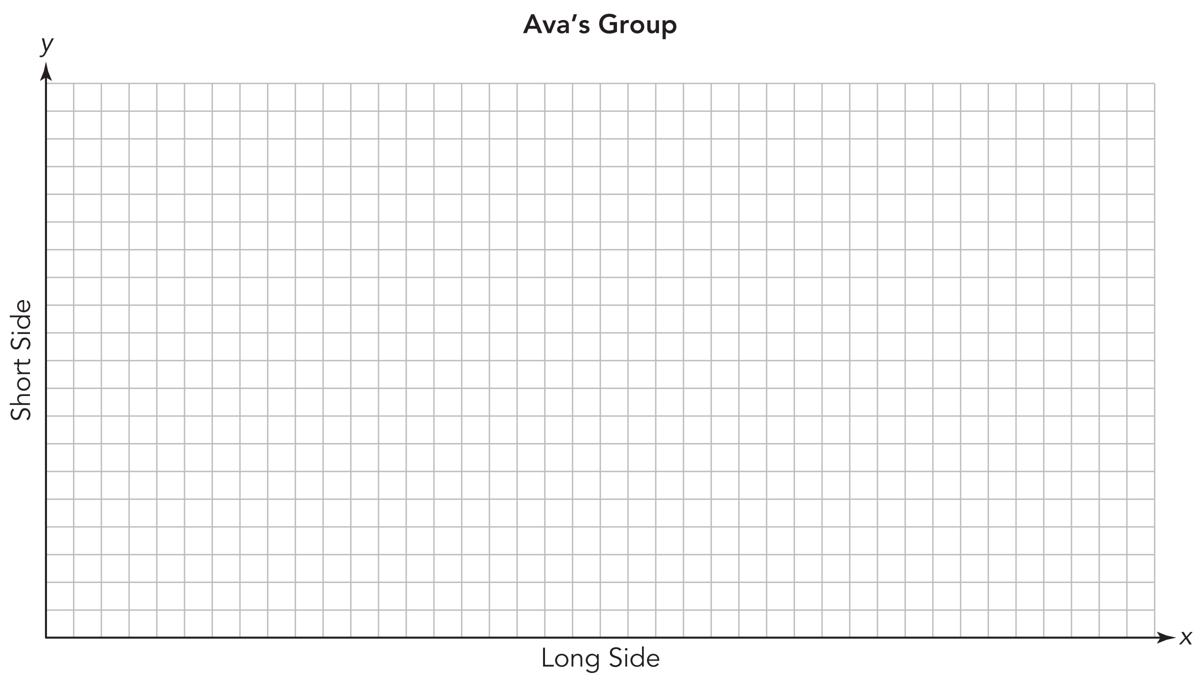
	Short	Long	Ratio
A			
B			
D			
H			
I			
K			

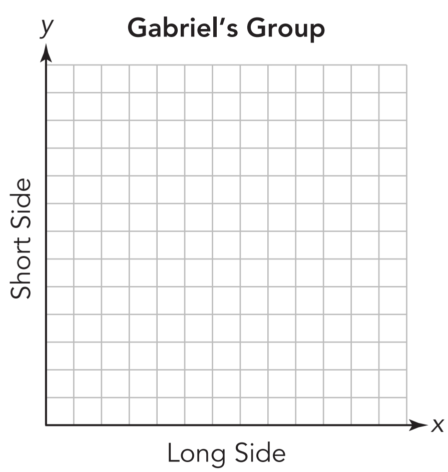
6. Stack each group of rectangles with the smallest rectangle on top so that their longer sides are horizontal and their lower left corners align. What do you notice?

   a. Ava's Group

   b. Gabriel's Group

7. Attach each set of stacked rectangles to the appropriate coordinate grid, with the lower left corner of the rectangles at the origin of the grid.





8. **Label the coordinates of the upper right corner of each rectangle. What do you notice about the coordinates in relation to your ratio?**

9. **Draw a line through the labeled points on each graph. What do you notice about which ordered pairs each line passes through?**

When a set of points graphed on a coordinate plane forms a straight line, a **linear relationship** exists.

Just as equivalent ratios can be represented using tables and double number lines, they can also be represented on the coordinate plane. The ratio $\frac{y}{x}$ is plotted as the ordered pair (x, y). When you connect the points that represent the equivalent ratios, you form a straight line that passes through the origin, such as with Ava's Group. In contrast, non-equivalent ratios are those represented by points that do not create a straight line through the origin, like Gabriel's Group.

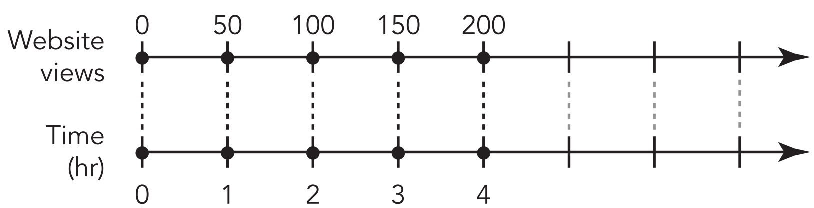
ACTIVITY 5.2 Graphing Equivalent Ratios

Let's investigate how you can use a graph to determine other equivalent ratios, and see how all the representations are connected.

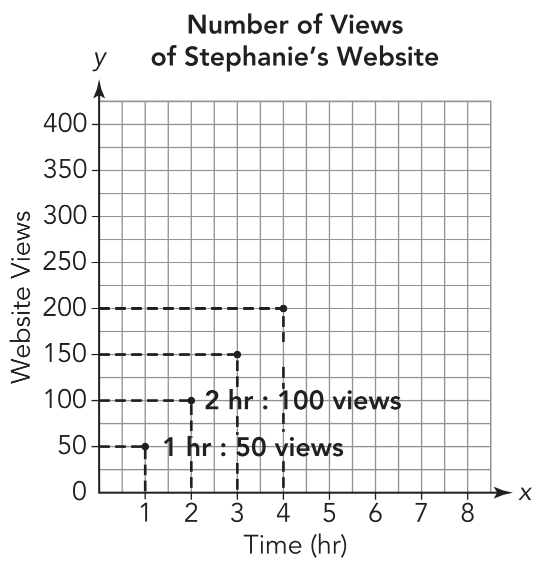
Stephanie runs a website for a local sports team that gets 50 views every hour. The table shows the ratio *time* : *website views.*

Website Views	50	100	150	200
Time (hr)	1	2	3	4

The double number line shown represents the same data.



You can also represent equivalent ratios on a coordinate plane.



1. Label the remaining ratios on the graph.

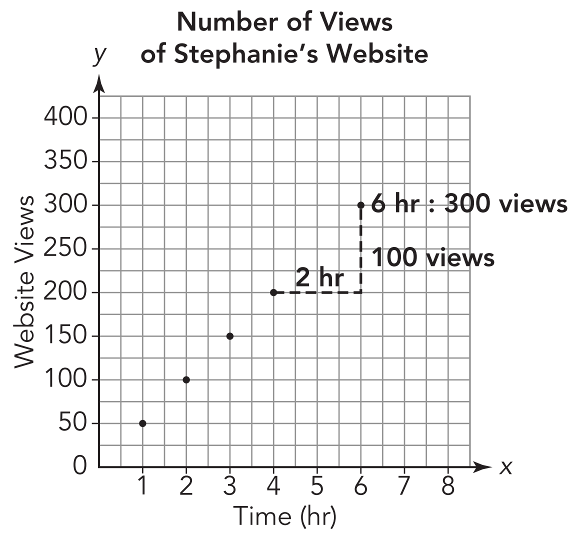
You have used various strategies to determine equivalent ratios:

- drawing pictures
- tape diagrams
- scaling up or down
- ratio tables, and
- double number lines.

WORKED EXAMPLE

Consider the question: How many views will Stephanie's website have in 6 hours?

You know 4 different equivalent ratios from the original graph. The graph shows how to use the two ratios 2 hr : 100 views and 4 hr : 200 views to determine the equivalent ratio 6 hr : 300 views.



Stephanie's website will have 300 views in 6 hours.

2. Describe how to determine how many views Stephanie's website will have in 7 hours given each representation.

a. using the graph

b. using the table

c. using the double number lines

One way to analyze the relationship between equivalent ratios displayed on a graph is to draw a line to connect the points. You can also extend the line to make predictions of other equivalent ratios. Sometimes, all of the points on the line make sense. Other times when you draw a line, not all the points on the line make sense.

So, you are comparing time and views of a website. Do fractional values make sense?

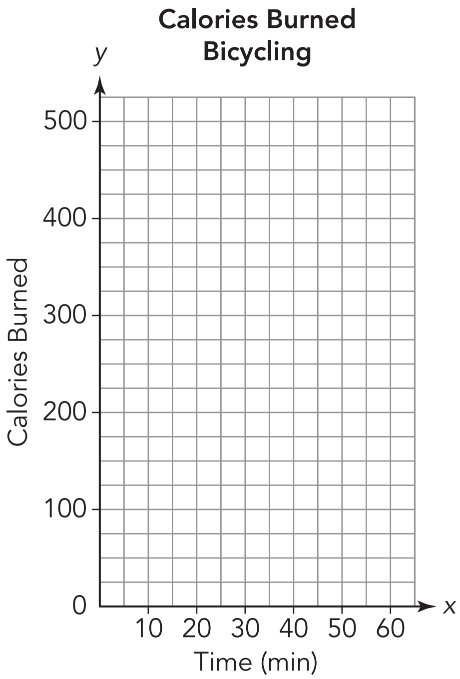
3. **Draw a line through all the points you plotted on your graph. Do all the points on the line you drew make sense in this problem situation? Why or why not?**

4. **How do all the representations—tables, double number lines and graphs—show equivalent ratios? How are they similar? Describe some of the advantages of each representation.**

ACTIVITY
5.3

Using Ratio Graphs to Solve Problems

Augie burns 225 calories for every 30 minutes he rides his bike.

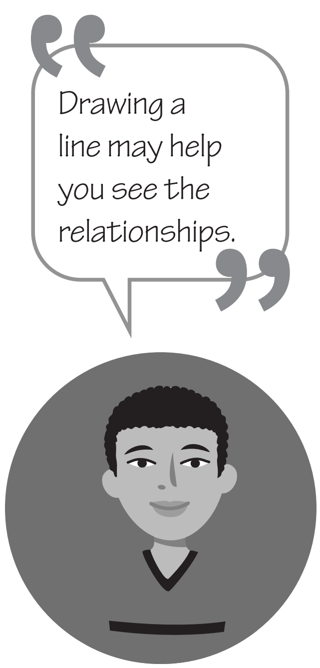


1. Complete the table to chart the number of calories burned for different amounts of time. Then plot the table of values on the graph.

Calories Burned				
Time (min)	30	10	60	50

2. Use your graph to answer each question.

a. How many minutes would Augie have to bike to burn 150 calories?



b. How many calories can he burn if he bikes for 25 minutes?

3. How was the graph helpful? Were there any limitations when using the graph to determine values?

NOTES

TALK the TALK

To Graph or Not to Graph

Go back and examine all the graphs in this lesson.

1. **What is similar about all of the graphs?**

2. **What is different about all the graphs?**

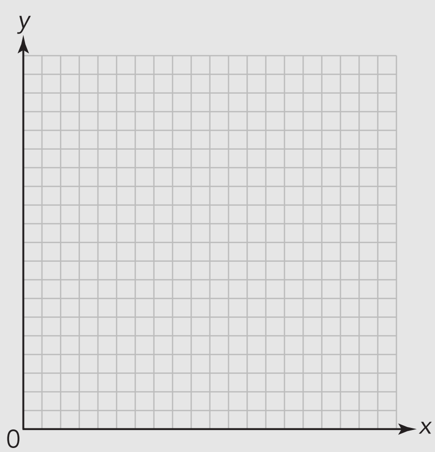
3. **Describe how you can use a line to analyze equivalent ratios. What are the benefits and limitations of using a graph to display and interpret ratios?**

4. **Complete the graphic organizer to demonstrate your understanding of ratios.**

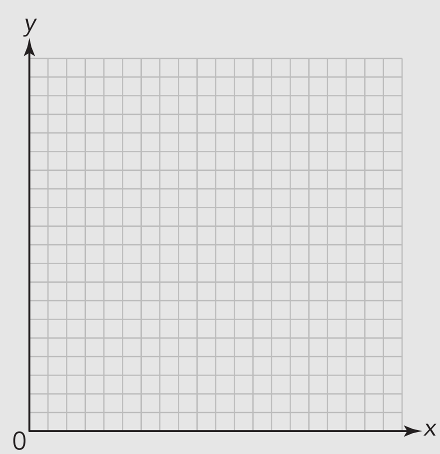
DEFINITION

CHARACTERISTICS

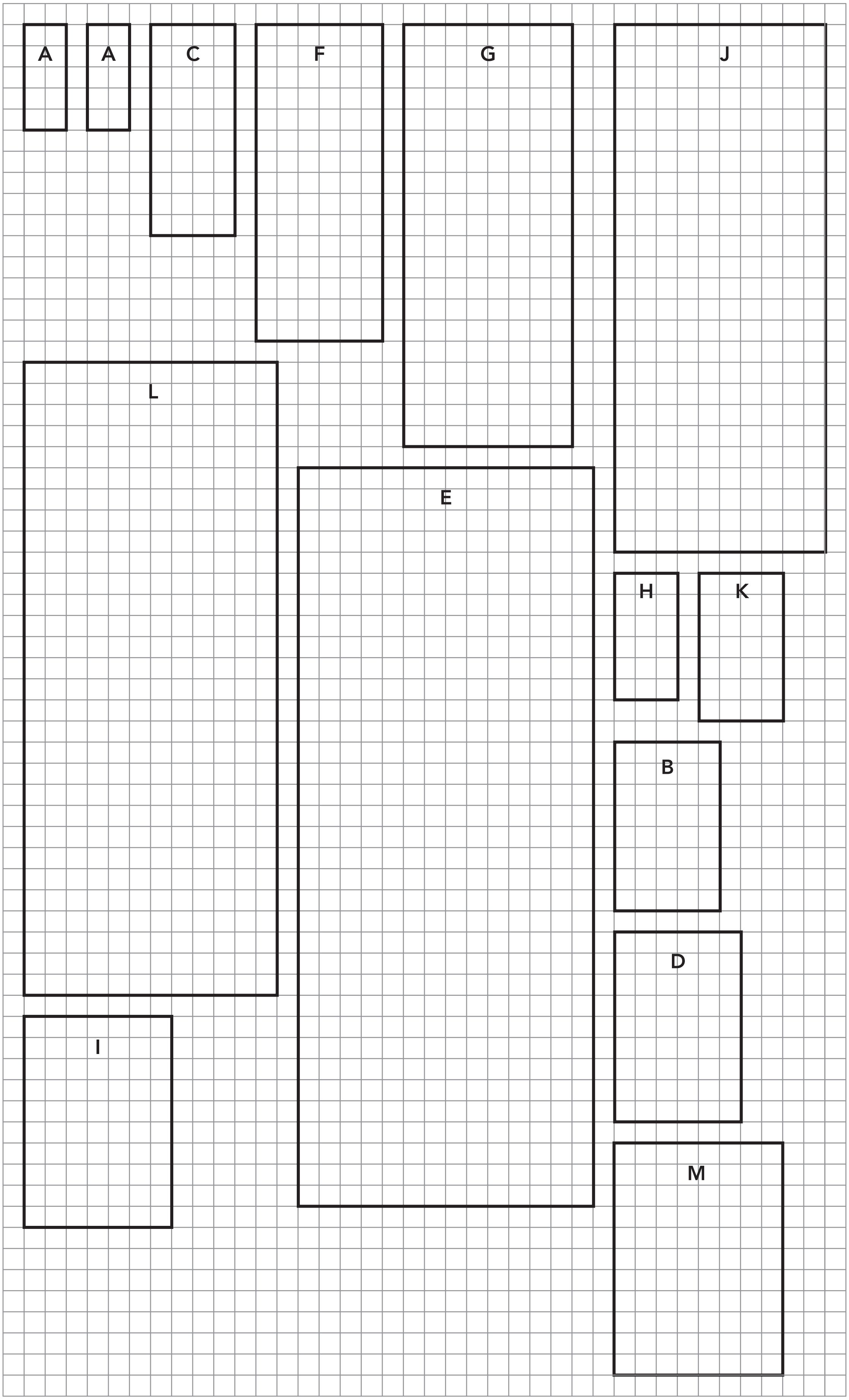
RATIO



EXAMPLE



NON-EXAMPLE


A
A
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M

Assignment

Write

Compare the graph of a ratio relationship with the graph of a relationship that is not represented by a ratio. How are they similar and different? Use an example to explain.

Remember

Just as equivalent ratios can be represented using tables and double number lines, they can also be represented in the coordinate plane. The ratio $\frac{y}{x}$ is plotted as the ordered pair (x, y).

When you connect the points that represent the equivalent ratios, you form a straight line that passes through the origin. In contrast, non-equivalent ratios are those represented by points that cannot be connected by a straight line through the origin.

Practice

Create a graph to represent the values shown in each ratio table.

1.

Weight (pounds)	1	2	4	5
Cost (dollars)	3	6	12	15

2.

Time (hours)	1	3	5	7
Distance (miles)	25	75	125	175

3.

Time (minutes)	15	30	45	60
Calories	80	160	240	320

4.

Time (seconds)	1	10	15	20
Data (Mb)	10	100	150	200

5.

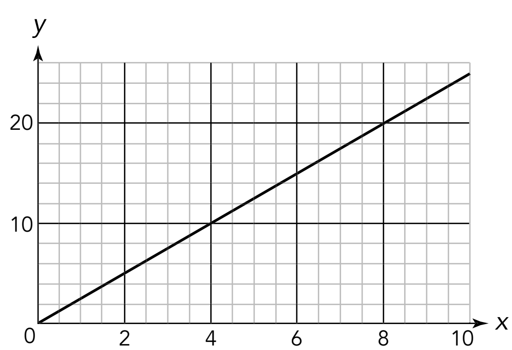
Time (minutes)	15	30	45	60
Distance (miles)	1.5	3	4.5	6

6.

Time (minutes)	1	5	6	10
Height (feet)	6	30	36	60

Stretch

Create a scenario that could be represented by the relationship on the given graph. Describe the quantities, label the axes, and identify at least 4 equivalent ratios.



Review

1. Ellen loves to make her own clothes. With 45 yards of cloth, she can make 5 dresses. Create a double number line to explain your reasoning for each question.
   a. If Ellen has 72 yards of cloth, how many dresses can she make?
   b. If Ellen is going to make a dress for herself, how many yards of cloth does she need?

2. A customer used a \$10 bill to pay for a 39-cent candy bar. Simone returned 61 cents. What mistake did Simone make? Explain how she should correct her mistake.

3. A grocery store is selling ground beef for \$1.89 per pound. How much does it cost to buy 2.5 pounds?

4. Use estimation to place the decimal point in the correct position in each quotient.

   a. $2.1\overline{)48.72} = 232$

   b. $8\overline{)204.8} = 256$

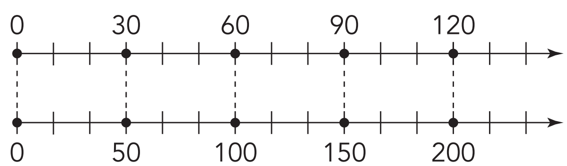
One Is Not Enough

6

Using and Comparing Ratio Representations

WARM UP

1. Use the double number line to create a ratio table.



x					
y					

2. Create a scenario that fits the data on the double number line and ratio table. What ratio is associated with your scenario?

LEARNING GOALS

- Use graphs to compare ratios.
- Read and interpret ratios from graphs, double number lines, and tables.
- Use ratio and rate reasoning and multiple ratio models to solve problems.
- Compare representations of additive and multiplicative relationships.

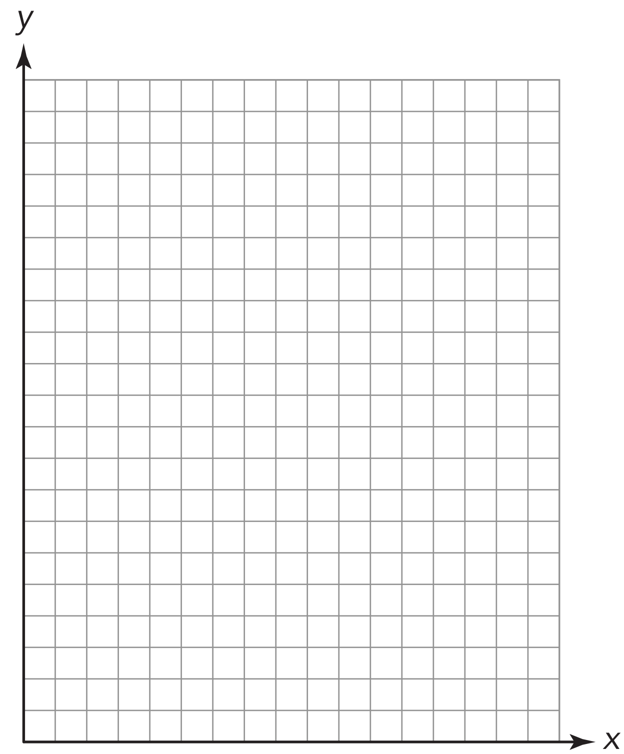
You have used a variety of tools to determine equivalent ratios. How can you compare the different representations as you solve ratio problems?

Getting Started

Just-Right Ratios

Yana's dad is trying to make his own bread. But each time he tries, the bread is either too dry because it has too much flour or too runny because it has too much water.

Flour (cups)	Water (cups)	Dry / Runny
11	4	dry
3	5	runny
6	2	dry
10	9	runny
8	8	runny
10	4	dry
10	5	dry
12	9	runny
15	8	dry
5	4	runny



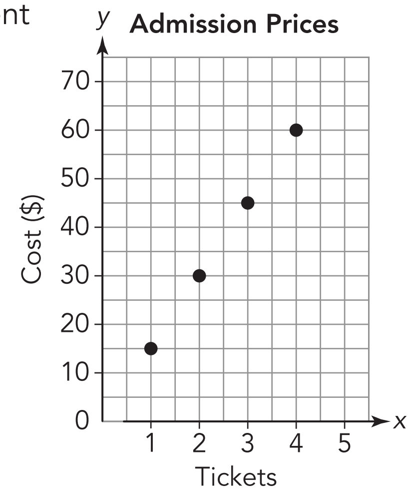
1. Use Xs to graph each attempt that was too dry. Use Os to graph attempts that were too runny.

2. Estimate a ratio that is "just right" and graph the ratio. Explain your reasoning.

3. Compare your graph with your classmates' graphs. Did you all create the same graphs?

ACTIVITY
6.1 Comparing Ratio Graphs

The adult ticket price for admission into the Rollerville Amusement Park is $15. The table and graph show the ratio *number of adult tickets* : *cost.*



Adult Tickets	1	2	3	4
Cost ($)	15	30	45	60

The Rollerville Amusement Park has different charges for students and pre-school age children. Student tickets are $10. Pre-school age children tickets are $5.

1. **Complete each table.**

Student Tickets	1	2	3	4
Cost ($)				

Pre-School Tickets	1	2	3	4
Cost ($)				

2. **Plot each set of equivalent ratios on the graph. Use a △ for the *student tickets* : *cost* ratios and a □ for *pre-school tickets* : *cost* ratios.**

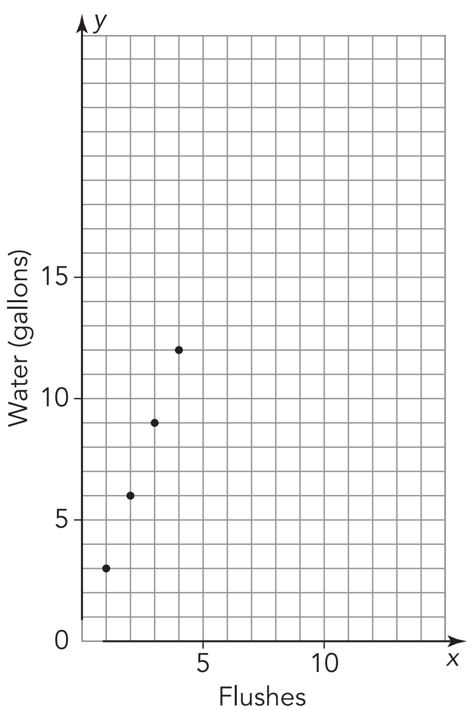
3. **Draw three separate lines through the points that represent each ratio. What do you notice?**

4. **Do all the points on the line you drew make sense in this problem situation? Why or why not?**

5. **How can you tell by looking at the three lines which *cost* to *ticket* ratio is the highest and the lowest?**

ACTIVITY
6.2 Choosing a Strategy to Solve Ratio Problems

You know different ways to think about ratios. So, you can use different strategies to solve problems.



1. The graph shown represents the number of gallons of water used for the number of times a toilet is flushed.

a. Write each point on the graph as the ratio of *gallons of water used : number of flushes.*

b. What do you notice about each ratio?

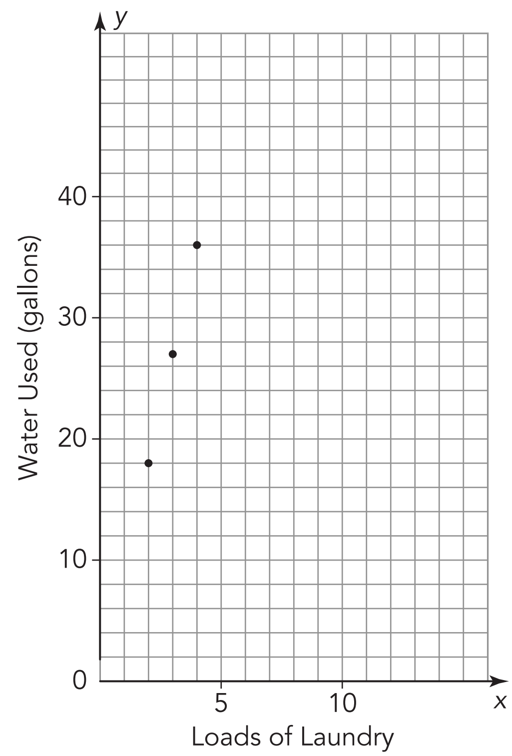
c. How many gallons of water would be used if the toilet was flushed 8 times? Explain the method you used.

d. How many times would the toilet be flushed to use 18 gallons of water? Explain the method you used.

e. Did you use the same method to answer each question? If not, why?

2. The graph shown represents the number of gallons of water used for the number of loads of laundry washed.

   a. Write each point on the graph as the ratio of *gallons of water used* : *number of loads of laundry.*



   b. What do you notice about each ratio?

   c. How many gallons of water would be used for 7 loads of laundry? Explain the method you used.

   d. How many loads of laundry can be done if 45 gallons of water are used? Explain the method you used.

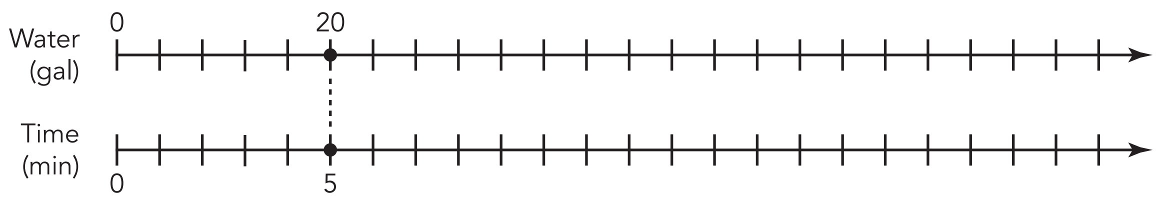
   e. Did you use the same method to answer each question? If not, why?

ACTIVITY
6.3

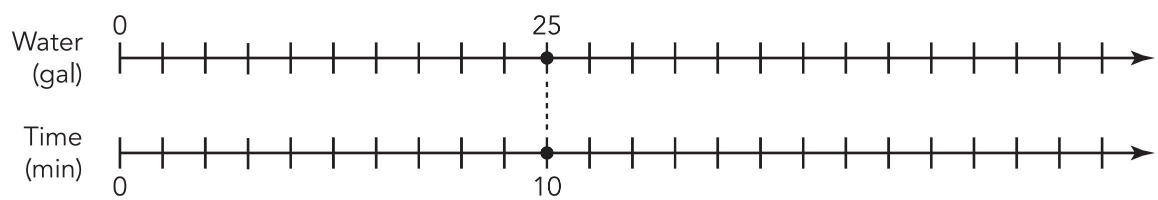
Comparing Ratios with Double Number Lines

Showerheads come in various styles and allow different rates of water to flow. The ratio *gallons of water : time* is given for three different showerhead models.

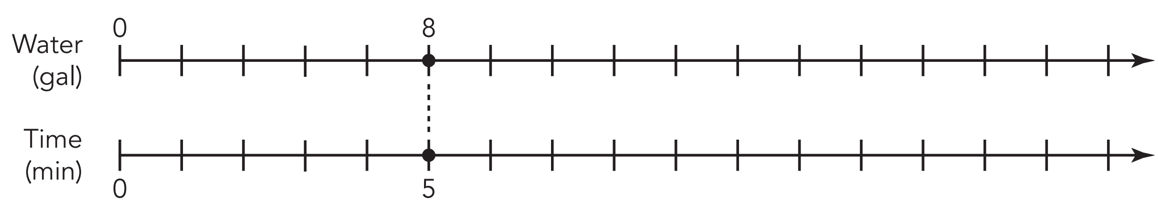
The first showerhead uses 20 gallons of water for every 5 minutes.



A second showerhead model uses 25 gallons of water for every 10 minutes.



A third showerhead model uses 8 gallons of water for every 5 minutes.



1. **Which of the three showerheads used the least amount of water per minute?**

2. **Explain your reasoning using double number lines.**

ACTIVITY
6.4

Additive and Multiplicative Representations

Two different jogging situations are given on the next two pages, along with a diagram showing the current relationship between the joggers.

1. **At the end of the lesson, there are diagrams, equations, graphs, and verbal statements that each match one of the situations. Cut them out and tape them in their appropriate location. Then explain why each representation describes that relationship between the two joggers.**

   a. **Choose the diagram that shows the relationship between the joggers after 5 minutes.**

   b. **Choose the equation that represents the relationship between the two joggers.**

   c. **Choose the graph that models the relationship between the two joggers.**

   d. **Choose the type of relationship that exists between the two joggers.**

In a proportion, the quantities composing each part of the ratio have the same multiplicative relationship between them. A multiplicative relationship is also known as a proportional relationship.

Two joggers are running at the same speed.

Diagram of the current position of the two joggers.

Diagram of the two joggers after 5 minutes.

Explanation:

Equation

Explanation:

Graph

Explanation:

Verbal Statement

Explanation:

Jogger 2 runs twice as fast as Jogger 1.

Diagram of the current position of the two joggers

J_1 J_2

Diagram of the two joggers after 5 minutes.

Explanation:

Equation

Explanation:

Graph

Explanation:

Verbal Statement

Explanation:

NOTES

TALK the TALK

In Goes the Kitchen Sink

You are given the ratio *6 red marbles* : *9 blue marbles*. For each model in the graphic organizer, write two ratios equivalent to the given ratio: one with numbers larger than the given and one with numbers smaller than the given. Show how you can use each model to determine the equivalent ratios.

SCALE UP/
SCALE DOWN

TABLE

**6 red marbles :
9 blue marbles**

DOUBLE NUMBER
LINES

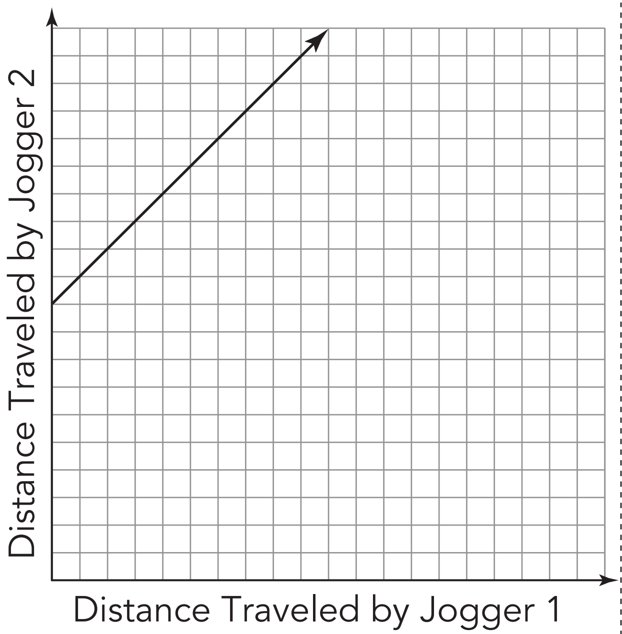
GRAPH

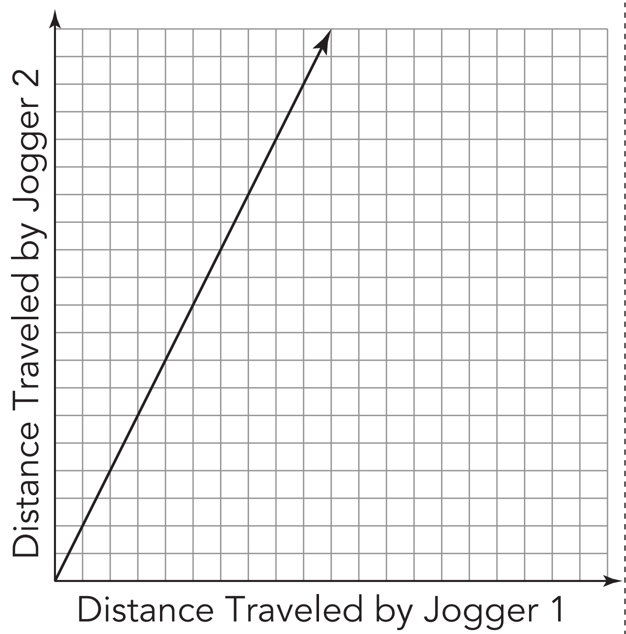
Cut Out for Activity 6.4

J_1 J_2

J_1 J_2

$J_2 = J_1 + 10$	$J_2 = 2\,J_1$





Ratio Relationship	Additive Relationship

Assignment

Write

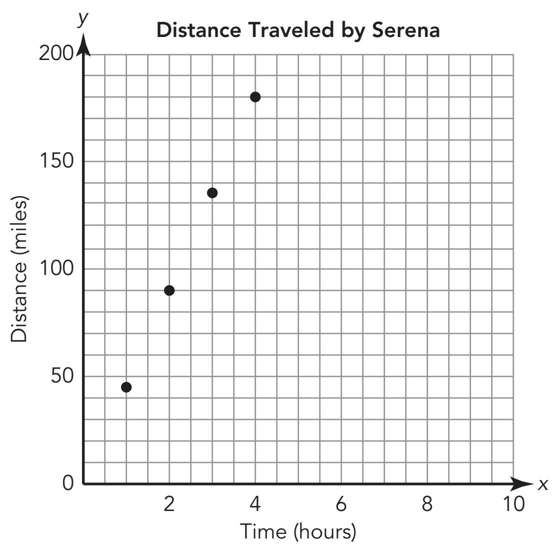
Describe the advantages and disadvantages of using double number lines, tape diagrams, equations, tables, and graphs to write, represent, and compare ratios.

Remember

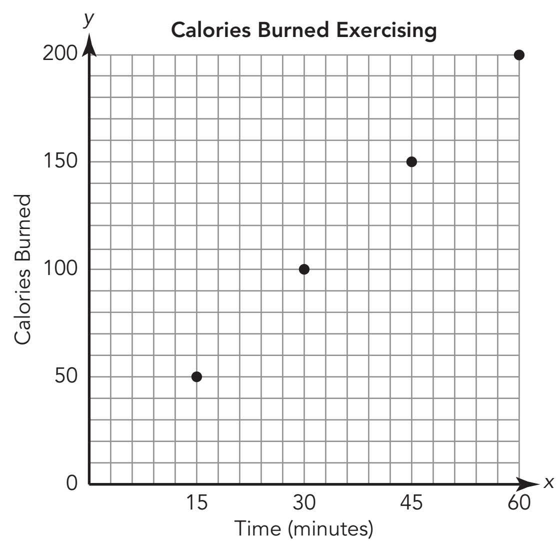
You can use a number of different models, like graphs, tables, double number lines, and tape diagrams to analyze ratios and ratio relationships and to solve problems.

Practice

1. Use a graph to answer each question.
   a. Serena is driving to the mountains for a summer camping trip. She is traveling at a constant rate of 45 miles per hour. The graph shows the ratio *time* : *distance*. How far has Serena traveled after 4 hours?



   b. Cisco is exercising. The graph shows the ratio *calories burned* : *time* for Cisco. How many calories did Cisco burn in 30 minutes?



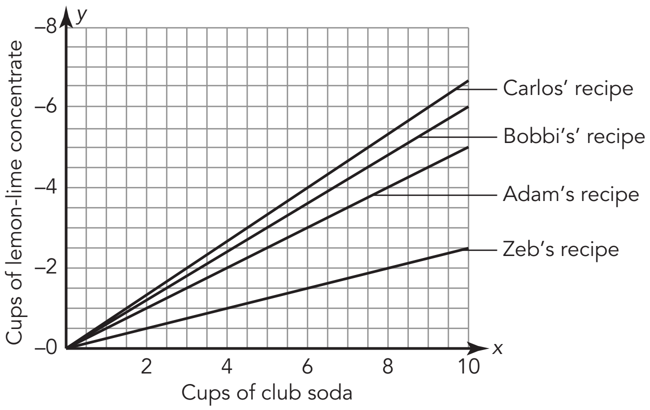
2. A recipe calls for 2 eggs for every 5 cups of milk. How many eggs were used if 20 cups of milk were used? Draw a double number line to answer the question.

3. Alberto is in charge of making lunch at a summer camp. He knows that 3 tuna casseroles will serve 15 campers. How many tuna casseroles should Alberto make to serve 35 campers?

Casseroles	1	3		
Campers		15	30	35

Stretch

Four recipes for lemon-lime punch are represented on the graph shown. Which recipe has the strongest taste of lemon-lime? Which recipe has the weakest taste of lemon-lime? Use the graph to explain your answer.



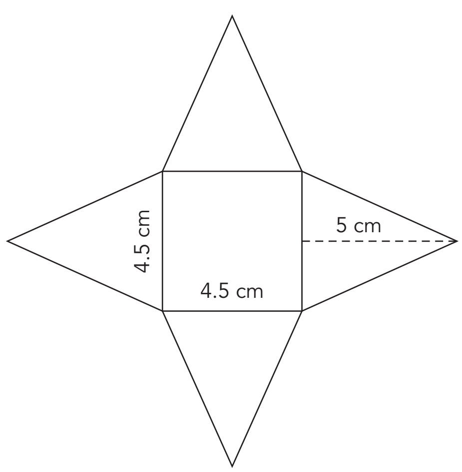
Review

1. Morgan and her friends are testing their typing skills. Morgan took an online typing test to compare her typing speed with her friends' speeds. During the 2 minute test, she typed 144 words. Her friend, Elizabeth, took a longer test; she typed 150 words in 3 minutes. Their other friend, Ruth, typed 65 words in 1 minute.
   a. Create a ratio table to show each girl's typing speed for 1 through 6 minutes.
   b. Plot each set of equivalent ratios on a coordinate plane. Use × to denote Morgan's typing speed, □ to denote Elizabeth's typing speed, and ⋆ to denote Ruth's typing speed.
   c. Draw three separate lines through the points that represent each ratio. What do you notice?
   d. Who is the fastest typist? Who is the slowest typist? Explain how you can tell by looking at the three lines on your graph.

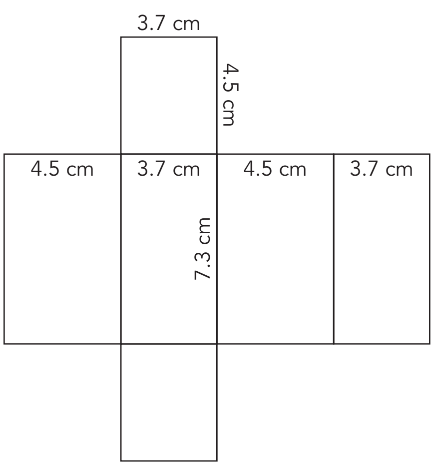
2. Morgan uses her typing skills to write a research paper for her history class. When she hits "Print," she realizes that her printer is broken—for every 5 pages she attempts to print, the printer messes up 3 of them! Create a ratio table to display the number of pages her printer would mess up. Then create a graph for your table of values. Be sure to label the axes and title the graph.

3. Determine the surface area of each figure based on the measurements of its net.

a.



b.



Topic 1

Ratios

Name ______________________________ Date ______________

I. Understanding Ratio Relationships

A. Determine whether each statement represents additive reasoning or multiplicative reasoning.

1. Ellie's plant has grown a total of 8 inches, and Lin's plant has grown a total of 9 inches. Lin's has grown more than Ellie's.

2. Juan has 7 apples, and Latanya has 4 times as many, or 28 apples.

3. Melanie is 8 years old, and Justin is 4 years older than Melanie.

4. Tim ran 15 laps, which was 3 times as many laps as Nathan ran.

5. The Hawks scored 20 points in the first half of the game. The team scored twice as many points in the second half of the game.

6. The temperature was 70 degrees Fahrenheit. It rose 3 degrees in one hour.

B. Nina buys a variety box of cereal bars. The box contains 5 blueberry bars, 3 strawberry bars, and 2 apple bars. Write the ratio that represents each relationship in words, in colon form, and in fractional form.

1. strawberry bars to blueberry bars

2. apple bars to blueberry bars

3. strawberry bars to total bars

4. apple bars to total bars

5. blueberry bars to total bars

6. apple bars to strawberry bars

C. Write a part-to-part and a part-to-whole ratio for each problem situation.

1. Of the 200 students surveyed in 5th grade, 120 prefer bananas and 80 prefer apples.

2. Serena's book collection contains 23 fiction books and 4 non-fiction books.

3. Of the 100 students surveyed, 53 prefer to watch football and 42 prefer to watch baseball.

4. Of the 100 students surveyed, 42 prefer to play basketball and 28 prefer to play hockey.

5. Kata's movie collection consists of 45 action movies and 31 comedy movies.

6. Juanita received a bouquet of 2 dozen roses. In the bouquet, 12 were red and 12 were pink.

7. Wei planted 15 daffodils and 14 day-lilies in her garden.

8. Of the 31 students surveyed, 19 prefer white bread. The remaining students prefer wheat bread.

9. Of the 400 students surveyed, 139 packed lunch and 261 bought lunch from the school cafeteria.

10. Emilio's vegetable garden consists of 8 tomato plants and 3 zucchini plants.

Name ______________________ Date ____________

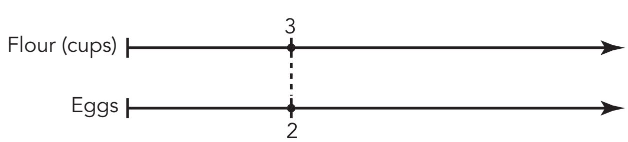
11. Of the 250 students surveyed, 142 prefer carrots and 97 prefer peas.

12. Raul collected the mail from his mailbox. It contains 3 catalogues and 2 bills.

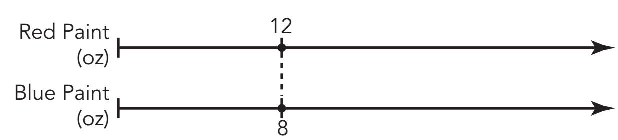
II. Problem Solving with Equivalent Ratios and Rates using Double Number Lines

A. Use a double number line to answer each question.

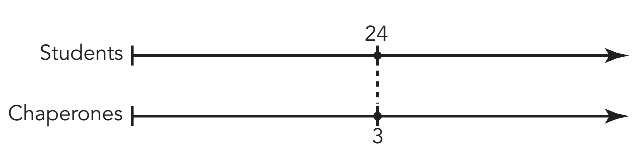
1. Yuko is making pancakes. The double number line shows the ratio flour : eggs. If Yuko accidentally uses 3 eggs instead of 2 eggs, how much flour should he use?



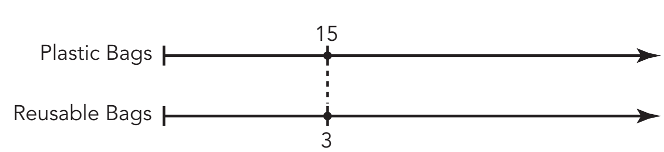
2. Teresa is mixing red paint and blue paint to create a shade of purple paint. The double number line shows the ratio red paint : blue paint. If Teresa has 75 ounces of red paint, how much blue paint does she need?



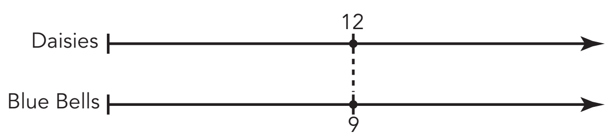
3. Pedro is going on a school field trip. The double number line shows the ratio students : chaperones. If 32 students are going on the field trip, how many chaperones must also go on the trip?



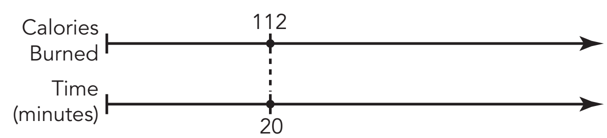
4. Ling is conducting a survey outside of a grocery store. The double number line shows the ratio of customers using reusable shopping bags to customers using plastic bags on a typical day. If there are 50 customers that use plastic bags, how many use reusable shopping bags?



5. Aiko is planting a flower garden. The double number line shows the ratio of daisies to blue bells. If Aiko plants 16 daisies, how many blue bells will she plant?



6. Marcus is exercising. The double number line shows the ratio of calories burned to time. If Marcus exercises for 45 minutes, how many calories will he burn?



III. Problem Solving with Equivalent Ratios and Rates using Tables

A. Complete each ratio table. Show your calculations.

1.

Yellow paint (oz)			8	16
Blue paint (oz)	4	8	16	

2.

Yellow paint (oz)	1	2	10	
Red paint (oz)		6		60

3.

Red paint (oz)	1		50	100
Blue paint (oz)		20		400

4.

Green paint (oz)		15	30	
White paint (oz)	5	25		75

5.

White paint (oz)	2	6	8	
Red paint (oz)	3			36

6.

White paint (oz)	1	3		
Purple paint (oz)		30	40	60

Name ______________________________ Date ______________

B. Complete the ratio table to answer each question. Show your calculations.

1. Alberto is in charge of making lunch at a summer camp. He knows that 3 tuna casseroles will serve 15 campers. How many tuna casseroles should Alberto make to serve 35 campers?

Casseroles	1	3		
Campers		15	30	35

2. Shawna is mixing red and white paint to create a shade of pink to paint her room. After experimenting, Shawna decides that the perfect shade of pink is created by mixing 3 ounces of red paint and 1 ounce of white paint. How much red and white paint does Shawna need to make 1 gallon of pink paint? (1 gallon = 128 fluid ounces)

Pink Paint (oz)		128
Red Paint (oz)	3	
White Paint (oz)	1	

3. Perry is responsible for distributing soccer balls to the kids at soccer camp. During practice, Perry would like each group of 5 children to share two soccer balls. How many soccer balls does Perry need if 25 kids attend camp?

Soccer balls	2		
Children	5	20	25

4. Leon is bringing boxes of fruit snacks to class for a holiday party at school. Leon knows that 2 boxes of fruit snacks will serve 11 students. How many boxes of fruit snacks does Leon need to serve 33 students?

Boxes	2		
Students	11	22	33

5. Eva is planting flowers in her garden. Each variety pack of bulbs contains 4 lilies and 6 dahlias. How many dahlias will Eva plant if she plants 12 lilies?

Lilies	4	8	12
Dahlias	6		

6. Olivia is celebrating her birthday at a movie theater. She invites 12 friends for a movie and popcorn. She is told that 1 large bucket of popcorn can be shared by 3 people. How many buckets of popcorn does Olivia need?

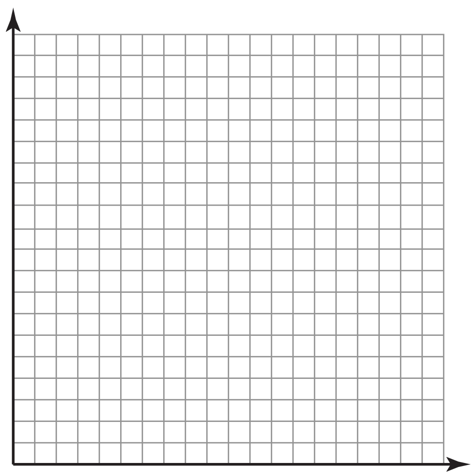
Buckets of popcorn	1		
People	3	9	12

IV. Problem Solving with Equivalent Ratios and Rates using Graphs

A. Create a graph that represents the values shown in each ratio table.

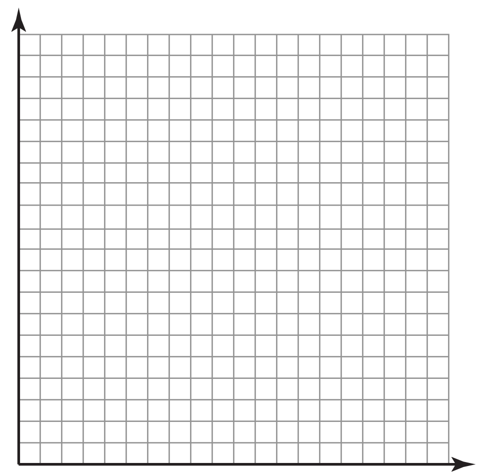
1.

Weight (pounds)	1	2	4	5
Cost (dollars)	3	6	12	15



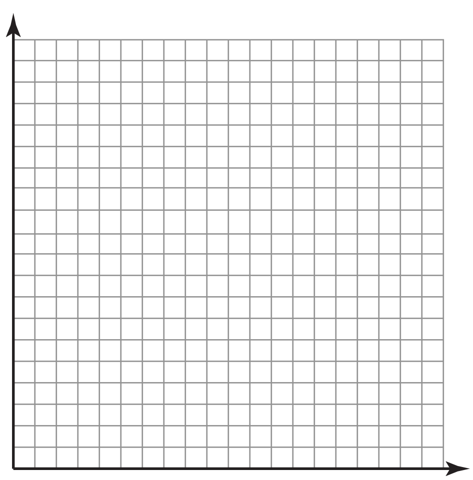
2.

Distance (miles)	25	75	125	175
Time (hours)	1	3	5	7



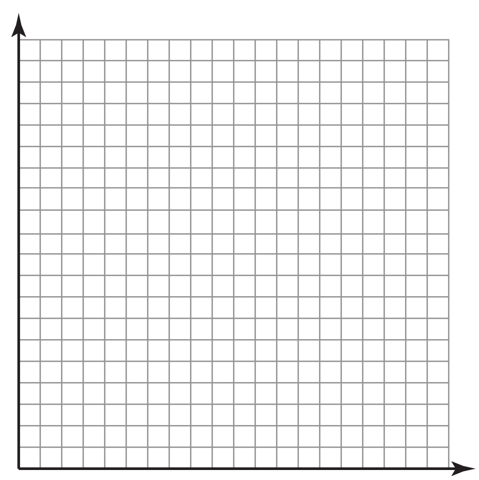
3.

Calories	80	160	240	320
Time (minutes)	15	30	45	60



4.

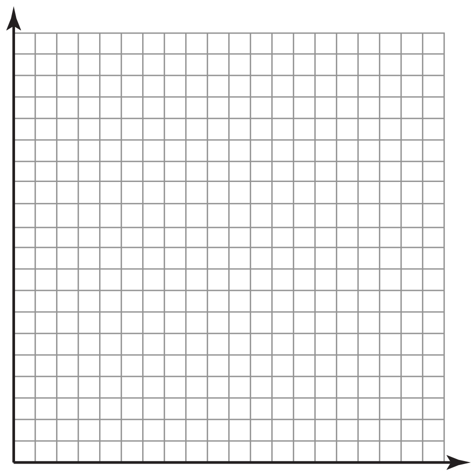
Data (Mb)	10	100	150	200
Time (seconds)	1	10	15	20



Name ______________________________ Date ______________

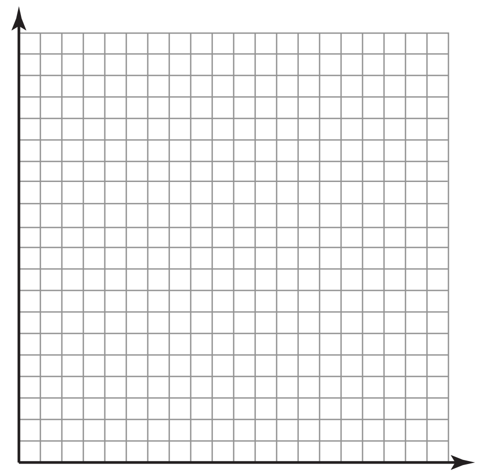
5.

Distance (miles)	1.5	3	4.5	6
Time (minutes)	15	30	45	60



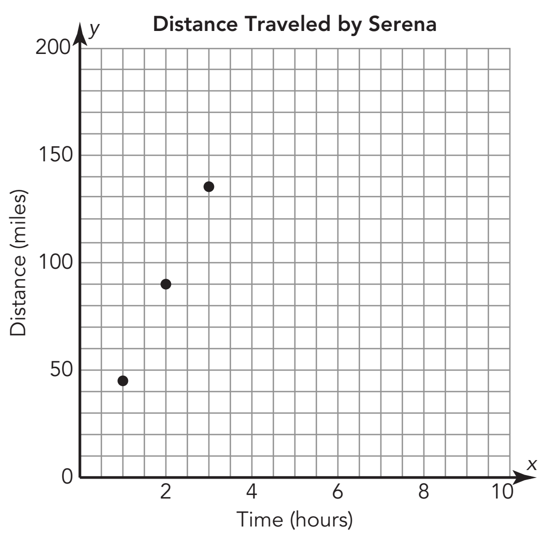
6.

Height (feet)	6	30	36	60
Time (minutes)	1	5	6	10

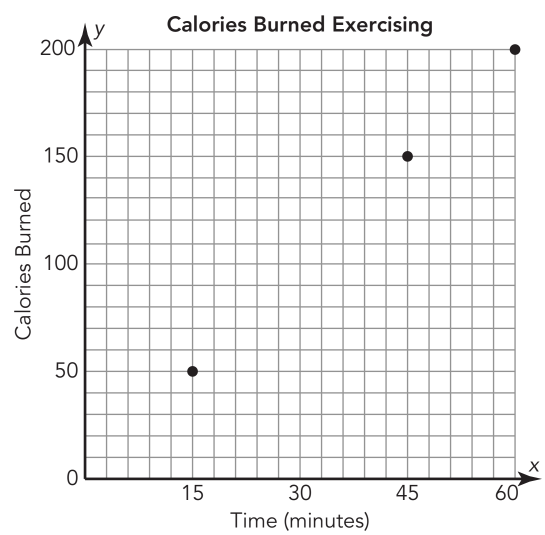


B. Use the given graph to answer each question.

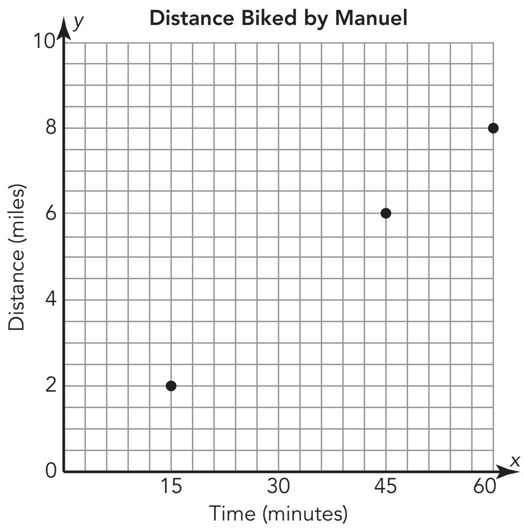
1. Serena is driving to the mountains for a summer camping trip. She is traveling at a constant rate of 45 miles per hour. The graph shows the ratio time : distance. How far has Serena traveled after 4 hours?



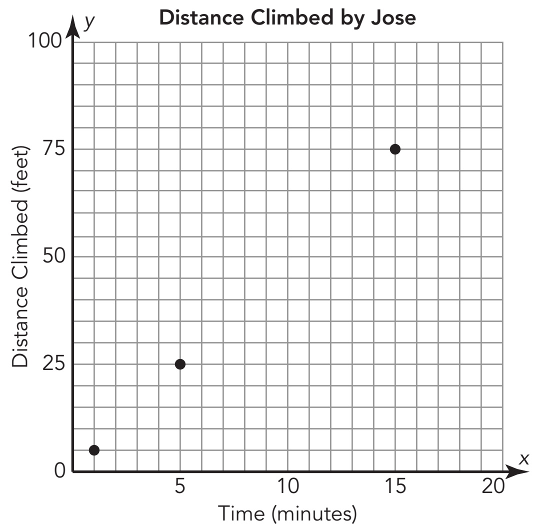
2. Cisco is exercising. The graph shows the ratio calories burned : time for Cisco. How many calories did Cisco burn in 30 minutes?



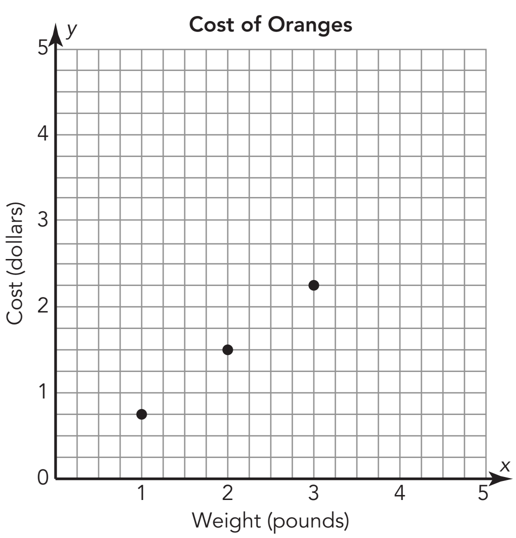
3. Manuel is biking at a constant rate. The graph shows the ratio time : distance. How long did it take Manuel to bike 4 miles?



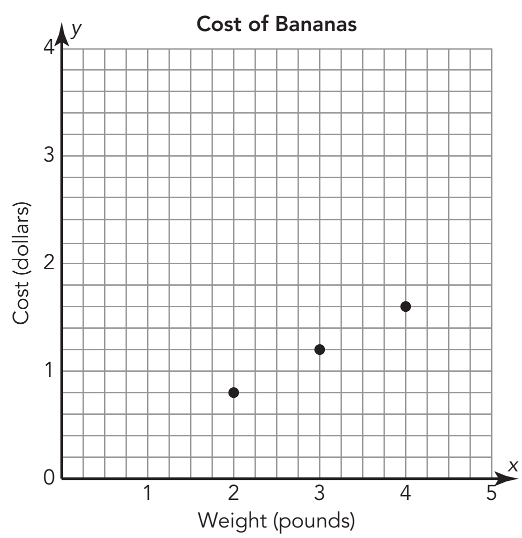
4. Jose is climbing a challenging section of a mountain. The graph shows the ratio time : distance climbed. How far did Jose climb after 10 minutes?



5. Sofia is grocery shopping. Oranges are on sale. The graph shows the ratio cost : weight. How much will it cost Sofia to purchase 4 pounds of oranges?



6. Hector is grocery shopping. Bananas are on sale. The graph shows the ratio cost : weight. If Hector wants to spend $2, how many pounds of bananas can he purchase?



We Are Family!

1

Percent, Fraction, and Decimal Equivalence

WARM UP

Rewrite each fraction as an equivalent fraction with a denominator of 100.

1. $\frac{1}{10}$

2. $\frac{2}{5}$

3. $\frac{3}{20}$

4. $\frac{24}{40}$

LEARNING GOALS

- Write equivalent fractions, decimals, and percents.
- Model percents as rates per 100 on a hundredths grid.
- Explain the similarities and differences among percents, fractions, and decimals.

You have learned that percents are special types of ratios. How are percents like another special type of ratio—fractions? You also know that fractions can be written as decimals. How are percents like decimals?

Getting Started

They're All Part of the Same Family

Percents are everywhere! Write one or two sentences to explain the meaning of each statement.

1. **Big Sale! 25% discount on all regularly priced items.**

2. **There is a 60 percent chance of snow tomorrow.**

3. **The star of the high school basketball team makes 80 percent of her free throws.**

4. **I scored an 80% on the 20-question test.**

ACTIVITY 1.1

Determining Equivalences

The sixth grade class is planning a field trip to Philadelphia. To decide which historical site they will visit, the 100 sixth-graders completed a survey.

1. **The results of the survey are provided in the table. Complete the Ratio, Fraction, Decimal, and Grid columns with these representations of the survey results:**

   - **a ratio using colon notation**
   - **a fraction in lowest terms**
   - **a decimal**
   - **a shaded grid**
   - **an equivalent percent**

	Ratio	Fraction	Decimal	Grid	Percent
Which excursion would you like to take while in Philadelphia?					
35 of the students chose the Liberty Bell.					
22 of the students chose Independence Hall.					
30 of the students chose the National Constitution Center.					
13 of the students chose the Betsy Ross House.					
0 of the students chose Reading Terminal Market.					
Are you planning on going on the trip?					
100 of the students responded *Yes*.					

Recall that a percent can be a special part-to-whole ratio with a whole of 100. You can also think of a percent as a fraction in which the denominator is 100.

Percents, fractions, and decimals can be used interchangeably.

WORKED EXAMPLE

You can write 15 out of 100 as the fraction $\frac{15}{100}$ or $\frac{3}{20}$.

Written as a decimal, 15 out of 100 is 0.15.

Because percent means "out of 100," 15 out of 100 can also be written as 15%.

The percent symbol "%" means "per 100" or "out of 100."

2. **Express each of the ratios in the survey as a percent in the last column of the table.**

3. **Write a summary of the results of the student survey using percents.**

4. **Look at the percents and the decimals you wrote for Question 1 to determine a pattern. Use this pattern to describe how you can write any percent as a decimal.**

5. **Write each percent as a decimal.**

a. 80%

b. 3%

c. 12.5%

d. 125%

6. **Write each decimal as a percent.**

a. 0.4

b. 0.07

c. 0.7381

d. 1.52

When the denominator is a factor of 100, scale up the fraction to write it as a percent. When the denominator is not a factor of 100, you can divide the numerator by the denominator to write the fraction as a decimal, which you can then write as a percent.

7. **Write each fraction as a percent. Round your answer to the nearest tenth of a percent.**

a. $\frac{4}{5}$

b. $\frac{3}{10}$

c. $\frac{3}{8}$

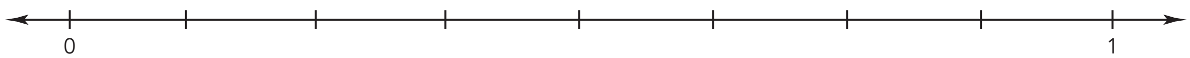
d. $\frac{3}{2}$

8. **Label each mark on the number line with a fraction, decimal, and percent. Make sure your fractions are in lowest terms.**

a.

Fraction	0	$\frac{1}{3}$	____	1
Decimal	0.0	____	$0.6\overline{6}$	1.0
Percent	0%	____	____	100%

b.



Fraction	0	____	____	____	$\frac{1}{2}$	____	____	$\frac{7}{8}$	1
Decimal	0.0	0.125	____	____	____	0.625	0.75	____	1.0
Percent	0%	____	25%	37.5%	____	____	____	____	100%

c.

Fraction	0	$\frac{1}{10}$	____	____	$\frac{2}{5}$	____	____	$\frac{7}{10}$	____	____	1
Decimal	0.0	____	0.2	____	____	0.5	____	____	____	0.9	1.0
Percent	0%	____	____	30%	____	____	60%	____	80%	____	100%

ACTIVITY 1.2

Reasoning with Ratio and Percent

On Saturday, Melanie won 3 out of 4 of her tennis matches at the Redstone Tournament. On Sunday, she won 1 out of 4 of her matches at the Mesa Tennis Tournament.

Each student summarized Melanie's record over the weekend.

Remember, you can write both part-to-part and part-to-whole ratios in fractional form and in colon notation.

Labeling ratios with units is important.

Patrick

Melanie won 100% of her matches!

$$\frac{3}{4} + \frac{1}{4} = \frac{4}{4} = 1$$

Laura

Melanie won 50% of her matches!

$$\frac{3 \text{ matches won}}{4 \text{ matches played on Sat}} + \frac{1 \text{ match won}}{4 \text{ matches played on Sun}}$$

$$= \frac{4 \text{ matches won}}{8 \text{ total matches played}}$$

Jonathon

Melanie won 4 out of 8 matches played.

3 matches won : 4 matches played on Saturday

1 match won : 4 matches played on Sunday

---

4 matches won : 8 total matches played

1. What is wrong with Patrick's reasoning?

2. How did Laura make her reasoning explicit?

3. **What is the same about Laura's and Jonathon's reasoning? What is different?**

NOTES

4. **Why do Laura's and Jonathon answers make sense?**

ACTIVITY 1.3 Matching Percents, Fractions, and Decimals

It's time to play The Percentage Match Game. In this game, you will use your knowledge of percents, fractions, and decimals.

Rules of the Game:

- For this 2-person game, 1 person needs to cut out the cards located at the end of the lesson.
- Lay out all the cards facedown.
- The first player chooses any card. That player then turns over another card to see if it is an equivalent match. If the value on the two cards are equivalent, then the match is put into the player's pile. The first player then picks again and repeats the process until a match is not found.
- If the first player does not have an equivalent match, turn the cards back over. It is the second player's turn. The same process for picking and matching cards described is now followed by the second player.
- Continue taking turns until all possible matches are made.
- The player with the greater number of correct equivalent matches wins the game.

TALK the TALK

Family Resemblances

Percents, fractions, and decimals can be used interchangeably. The chart shows some common equivalent fractions, decimals, and percents.

Common Equivalent Fractions, Decimals, and Percents									
Fraction	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{2}{5}$	$\frac{1}{2}$	$\frac{3}{5}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{4}{5}$
Decimal	0.2	0.25	$0.\overline{3}$	0.4	0.5	0.6	$0.\overline{6}$	0.75	0.8
Percent	20%	25%	$33\frac{1}{3}\%$	40%	50%	60%	$66\frac{2}{3}\%$	75%	80%

1. **How are percents similar to decimals? How are percents and decimals different?**

2. **How are percents similar to fractions? How are percents and fractions different?**

3. **How are percents similar to ratios? How are percents and ratios different?**

$\frac{3}{5}$	$\frac{3}{10}$	$\frac{6}{10}$	30%
0.6	$\frac{1}{3}$	60%	33%
$\frac{1}{8}$	$\frac{2}{6}$	12.5%	$0.\overline{3}$
$\frac{1}{10}$	$\frac{1}{2}$	1%	50%
0.1	$\frac{2}{3}$	10%	$66.\overline{6}\%$
$\frac{1}{5}$	$\frac{3}{4}$	$\frac{2}{10}$	$\frac{6}{8}$
$\frac{1}{4}$	0.75	$\frac{2}{8}$	75%

Assignment

Write

Define *percent* in your own words. Then describe how to write fractions and decimals as percents.

Remember

Percent can be used to represent a part-to-whole relationship with a whole of 100. The symbol % means "out of 100."

Practice

1. Label each mark on the number line with a fraction, decimal, and percent. Make sure your fractions are in lowest terms.

	0					1
Fraction	0	$\frac{1}{5}$	______	$\frac{3}{5}$	______	1
Decimal	0.0	______	0.4	______	______	1.0
Percent	0%	______	______	______	80%	100%

2. The table shows the portion of sixth graders at your school who have a particular number of siblings. Complete the table by representing each portion as a part-to-whole ratio, a fraction, a decimal, and a percent. Make sure your ratios and fractions are in lowest terms.

Number of Siblings	Ratio	Fraction	Decimal	Percent
0		$\frac{3}{20}$		
1				20%
2	3:8			
3			0.24	
4 or more		$\frac{7}{200}$		

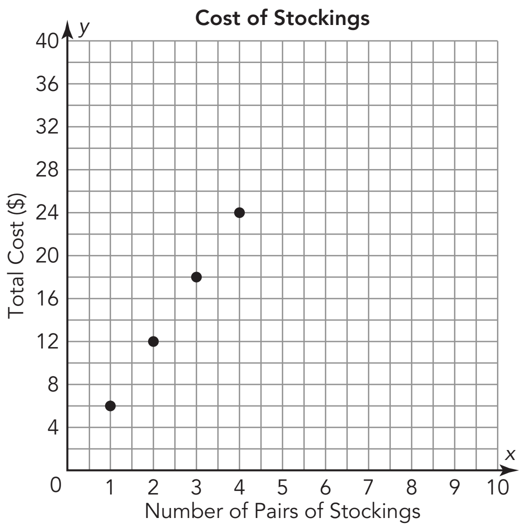
Stretch

Write each percent as a fraction and as a decimal. Explain your strategy.

1. 117%
2. 1048%
3. 0.15%
4. 0.0593%

Review

1. Ellen loves to make her own clothes. With 45 yards of cloth, she can make 5 dresses. To accessorize her new dresses, Ellen decides to order textured stockings from an online store. The graph shows the costs of orders of stockings.



   a. If Ellen has 18 yards of cloth, how many dresses can she make? Create a double number line to show your answer.
   b. If Ellen wants to make dresses for 6 cousins, how many yards of cloth does she need? Create a double number line to show your answer.
   c. Write each point on the graph as a ratio of *number of pairs of stockings* : *total cost of the order.*
   d. How much would an order of 8 pairs of stockings cost? Explain the method you used.

2. Use the standard algorithm to determine each quotient.
   a. $885 \div 6$
   b. $9218 \div 330$

Science

Everyday Mysteries: Why don’t I fall out of an upside-down roller coaster?

By Library of Congress, adapted by Newsela staff on 01.04.17

Word Count **655**
Level **890L**

TOP: An amusement park steel rail roller coaster with its cars full of screaming riders; MyLoupe/UIG Via Getty Images. BOTTOM: The Sidewinder at Six Flags Elitch Gardens in Denver, Colorado; Wikimedia Commons

Question: Why don't I fall out when a roller coaster turns upside down?

Answer: Inertia is what keeps you from falling out. Inertia is a resistance against a change in direction. It keeps you pressed against the bottom of the car with a force stronger than gravity.

Have you ever wondered how roller coasters stay on their tracks and why people can hang upside down in them? It is all a matter of different forces and different kinds of energy acting together. Energy is the ability to do work. It is a kind of power.

A Cable Helps It Climb

A roller coaster does not have an engine. A cable pulls it up the first hill it climbs. As the coaster goes higher and higher, it builds up stored energy. Stored energy is also called potential energy. This energy will be used to go down the hill as the train is pulled by gravity.

Then, at the bottom of the hill, all of that stored energy is converted into kinetic energy. Kinetic energy is the energy that builds up when a body or object is moving. It is what gets the train to go up the next hill. This type of energy pushes the coaster to the top of the next hill. Then the process repeats all over again. So, as the train travels up and down hills, its motion is constantly switching between potential and kinetic energy.

The taller the hill the coaster is coming down, the more kinetic energy there will be to push the cars up the next hill, and the faster the train will go. Over time, though, the train's wheels and the wind blowing in the opposite direction will gradually slow the coaster down. So toward the end of the ride, the coaster has less energy. For that reason, the coaster's final hills tend to be made lower than the first hills.

Wood Versus Steel

Most roller coasters are either wooden or steel. Wooden tracks are not as bendable as steel tracks. For that reason, they usually do not have complicated shapes, such as loops that flip passengers upside down. After steel tracks were introduced in 1959, more complicated and adventurous coasters became possible.

Roller coaster wheels are designed to prevent the cars from flipping off the track. They secure the train to the track while it travels through fancy loops and twists.

Not A Perfect Circle

When you go upside down on a roller coaster, inertia keeps you from falling out. This resistance to a change in motion is stronger than gravity. It is what presses your body to the outside of the loop as the train spins around.

Gravity keeps pulling you toward the Earth when you go upside down, but inertia pushes you against the floor of the roller coaster car. This pushing force is stronger than gravity.

The loop cannot be a perfect circle, though. If it was, the pushing force would be too strong for safety and comfort. For that reason, roller coaster loops are elliptical. They are shaped like stretched-out circles.

America's First Coaster

The earliest version of the roller coaster was a Russian sled ride from the 1400s. It was called Russian Mountains.

La Marcus Thompson built the first American roller coaster. Known as the Switchback Railway, it opened at Coney Island in Brooklyn, New York, in 1884.

One of the first high-speed coasters was the Drop-The-Dip. It opened at Coney Island in 1907, and it was the first roller coaster to use seat belts.

In 1975 Knott's Berry Farm in Buena Park, California, introduced the Corkscrew. It was the first coaster to turn passengers completely upside down.

The world's tallest and fastest steel roller coaster is the Kingda Ka. It is located at Six Flags Great Adventure in Jackson Township, New Jersey. Kingda Ka is 456 feet tall. It travels at a speed of 128 miles per hour.

Quiz

1 How does inertia keep you safe on a roller coaster?

(A) It presses your body towards the loop at a lesser force than gravity is pulling you to Earth.

(B) It presses your body towards the loop at a greater force than gravity is pulling you to Earth.

(C) It pulls you towards the Earth at a greater force than gravity is pressing your body towards the loop.

(D) It pulls you towards the Earth at a lesser force than gravity is pressing your body towards the loop.

2 Based on the article, which of the following statements is TRUE?

(A) Kinetic energy is the energy that is stored while going downhill and potential energy is the energy released to get it up the hill.

(B) Roller coasters store most energy for the end of the ride where hills are taller.

(C) Inertia resists a change in direction and keeps riders inside a roller coaster even when it is upside down.

(D) The world's tallest roller coaster was invented in 1975.

3 As the cable pulls the coaster up the first hill what is happening?

(A) The higher the coaster travels, the more inertia it builds.

(B) The higher the coaster travels, the more potential energy it builds.

(C) The higher the coaster travels, the greater the kinetic energy becomes.

(D) The higher the coaster travels, the greater the gravity pulls them to the ground.

4 Which sentence from the article suggests that roller coasters have improved safety features?

(A) Inertia is what keeps you from falling.

(B) After steel tracks were introduced in 1959, more complicated and adventurous coasters became possible.

(C) It opened at Coney Island in 1907, and it was the first roller coaster to use seat belts.

(D) It was the first coaster to turn passengers completely upside down.

5 If energy keeps switching to keep the coaster moving up and down hills, why does it eventually stop?

(A) The gravity is greater than the inertia of the coaster.

(B) The kinetic energy increases more than the potential energy.

(C) The coaster travels through wind blowing in the opposite direction.

(D) The loop of the roller coaster is shaped like a stretched-out circle.

6 Which answer choice is an accurate summary of the section "A Cable Helps It Climb"?

(A) A roller coaster does not have an engine, so it needs a cord to pull it up the hills on the track. When it runs out of kinetic energy at the end of the ride, another cable is needed to pull it over lower hills.

(B) A roller coaster gathers potential energy as it travels uphill, and at the bottom of the hill the energy is converted into kinetic energy. This alternation is what allows a roller coaster to move around a track.

(C) A roller coaster is usually made of wood or steel, but wooden tracks are not as bendable as steel tracks. In either case, potential and kinetic energy are used to push the roller coaster through loops and twists.

(D) A roller coaster has to build up stored energy to defeat the forces of wind and the wheels on the track to keep going. Other kinds of energy called centripetal force and inertia keep riders in their seats.

7 How could you decrease the speed of a roller coaster?

(A) Make the first hills taller.

(B) Make the first hills shorter.

(C) Reduce the wind resistance of the coaster.

(D) Increase the kinetic energy of the coaster.

8 What would be another good title to express a MAIN idea of the section "Not A Perfect Circle"?

(A) "The Train Spins Around"

(B) "Different Forces Defeat Gravity"

(C) "Too Strong For Safety"

(D) "Fancy Loops And Twists"

Dream Jobs: Designing thrilling rides

By Marcia Amidon Lusted, Cricket Media on 08.19.19
Word Count **853**
Level **MAX**

Amusement park-goers enjoying the thrills of a roller coaster. Photo by: Pixabay, Creative Commons

The loops twist you upside down and sideways. The gravity-defying hills swoop up and down. As the car crests a hill, you look down at the track ahead of you and desperately hope that whoever designed this roller coaster knew what he or she was doing!

If you love roller coasters, then you probably think that designing them would be one of the coolest jobs in the world. And you'd be right. But designing a roller coaster isn't as simple as just deciding where the loops and twists will be. It takes both design and engineering to make sure that a roller coaster is both fun and safe.

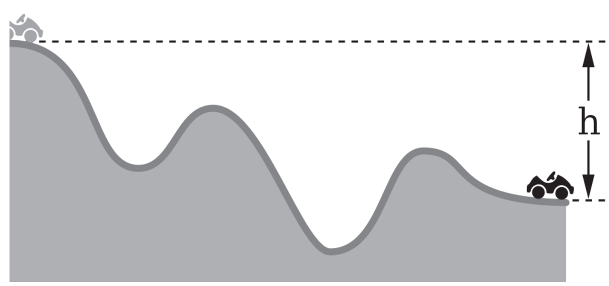
Roller coasters are always custom designed for the park where they will be built. Designers start by thinking about the type of coaster that they will be building, based on the requirements of the amusement park it will be constructed in. Will the coaster be made from traditional wood or steel? What types of riders will use the coaster? How many riders will it need to be able to handle at any time? Will it be a gentle, slow ride? Or one that's fast and includes tall hills, thrilling loops, and drops? The coaster can be basic, suspended, looping or straight. It can even be a log ride that uses water instead of track. The designer also looks at the landscape where the coaster will be built and whether it includes hills or great views that shou be incorporated into the design. Roller coasters take up a lot of space, and a new coaster might have to be threaded around the existing rides and landscaping in an established park.

Next, the designer decides what kind of "feel" he or she wants the coaster to have. The coaster's ride should be unique for its riders. Then the designer decides on the material that the coaster will be constructed from. Wooden coasters don't usually have a loop-the-loop feature, and they aren't as fast as steel coasters, but they have another advantage: They sway when you ride on them! Coasters made of tubular steel can have loops as well as higher, steeper hills, deeper drops and rolls, and faster speeds.

Once they've determined what material to use, a designer might start with a steep hill with a sharp drop at the very beginning of the ride. Then they might flatten out the hills in the middle. Or they might add a drop with a quick change to a flat section. This is called a "slammer" because it slams the riders back in their seats. Because roller coasters can now be built out of steel, designers have even more options for creating a great ride. They can also use computers to help them calculate the force of the ride and the effect it will have on the passengers. After all, they don't want to design a roller coaster that makes its riders black out! Once the designer has created a proposal for the new roller coaster and the amusement park has approved it, he or she will go on to design the structures and controls that go with the coaster.

Finally, the coaster is built. Steel coasters are built in a factory in segments and then assembled at the amusement park. Wooden coasters are usually built from scratch at the site. Builders erect the supports first, and then install the track, walkways, and handrails. The chain mechanisms and the device that keeps the cars from rolling backward come next. Meanwhile, the cars have been built at another factory with their bodies stamped from aluminum or molded from fiberglass, and have running wheels and guide wheels bolted on.

Once everything is finished, the coaster must be tested for safety. The cars are filled with weighted bags of sand. These are meant to be about the same weight as human riders. Then, they are sent through the ride many times. Government inspectors also have to approve the ride. And then, usually a year from the start of the project, the day comes when roller coaster enthusiasts can line up to be the first ones to ride!



Being a roller coaster designer isn't for everyone, and there are only about 100 companies in the United States that design the rides. These companies employ teams that include electrical and mechanical engineers, drafting engineers, and structural designers. There are no special schools for roller coaster designers. After aspiring designers have earned a college engineering degree, they learn on the job. Kent Seko, who works as a roller coaster designer for Arrow Dynamics, comments, "It's a great business to be in. It really gets in your blood." So get your pencil out and start sketching your ideas. And who knows? Maybe someday you'll design the next amazing roller coaster!

Quiz

1 Read the following selection from the article.

> *There are no special schools for roller coaster designers. After aspiring designers have earned a college engineering degree, they learn on the job.*

What does the phrase "aspiring designers" mean?

(A) people who have been designing for a long time

(B) people who are good at designing

(C) people who have been hired as designers

(D) people who are interested in becoming designers

2 Read the following sentence from the article.

> *And then, usually a year from the start of the project, the day comes when roller coaster enthusiasts can line up to be the first ones to ride!*

Which of the following words, if it replaced the word "enthusiasts" in the sentence above, would CHANGE the meaning of the sentence?

(A) lovers

(B) fanatics

(C) devotees

(D) supervisors

3 Based on Image 2 and the description in the article, what conclusion can be made?

(A) The roller coaster in Image 2 has a loop-the-loop feature.

(B) The roller coaster in Image 2 is faster than other types of coasters.

(C) The roller coaster in Image 2 was probably built from scratch on site.

(D) The roller coaster in Image 2 was probably assembled in a factory.

4 What does Image 3 teach the reader?

(A) that a roller coaster typically starts with sharp drops that become less steep

(B) that a roller coaster typically starts with gradual hills that become more steep

(C) that a roller coaster typically includes three steep dips over the course of the ride

(D) that a roller coaster typically ends at a higher point than it begins

Rolling cans down a hill

By Scientific American, adapted by Newsela staff on 01.09.20
Word Count **638**
Level **950L**

Everyday items like aluminum cans can teach us about physics. A filled can has more mass. It will roll differently than a can that is empty.
Photo by: ziodanilo/Pixabay

When two objects roll down a hill, which one will be first? Try this activity to find out.Background

When you lift an object up off the ground, it has potential energy. Potential energy is the energy that an object has because of its position. The amount of potential energy depends on the object's mass, gravity and how high the object is off the ground. When you drop the object, this potential energy is converted into kinetic energy. Kinetic energy is the energy of motion. It depends on an object's mass and its speed.

In a rolling object, there are two kinds of kinetic energy. Motion in a straight line is called translational kinetic energy. Spinning motion is called rotational kinetic energy. When you roll a ball down a ramp, it has the most potential energy when it is at the top. This potential energy is converted to both translational and rotational kinetic energy as it rolls down.

Acceleration is a change in speed or direction. Will all rolling objects accelerate down the ramp at the same rate, regardless of their mass or diameter?

The answer depends on its moment of inertia. This measures how spread out an object's mass is. Inertia is a term used to describe matter and its resistance to movement. Does the moment of inertia affect how fast an object will roll down a ramp?

MaterialsTwo soup or bean or soda cans (one empty and one full) A hollow sphere like a ballA solid sphere like a marble Cardboard box or stack of textbooksFlat, rigid material to use as a ramp. (The longer the ramp, the easier it will be to see the results.)## PreparationProp up one end of your ramp on a box or stack of books. Make sure it forms an angle that is about 10 or 20 degrees. ## ProcedureWrite down your observations during this experiment. Think about what you can see, hear or feel happening. 1\. Hold both cans next to each other at the top of the ramp. Which one do you think will get to the bottom first?2\. Let go of both cans at the same time. Record which one reaches the bottom first. Do this a few more times.3\. Now try the race with your solid and hollow spheres. Which one do you think will get to the bottom first?

Observations And Results

A solid object will always roll down the ramp faster than a hollow object of the same shape. It does not matter what their mass and diameter are.

Yet if you roll two cylinders down a ramp — one solid and one hollow — the solid one will reach the bottom first. That's as long as they both have the same mass and diameter. The diameter is a line through the center of a circle.

The solid cylinder reaches the bottom first. That is because the solid cylinder has a lower moment of inertia than the hollow one does.

This means that the mass and diameter of the cylinder do not matter when calculating how fast it will move down the ramp — only whether it is hollow or solid.

Full Cans And Empty Cans

There are examples of this phenomenon in the real world. For example, a full can of beans has a higher moment of inertia than an empty can, because both have the same diameter. But a full can is heavier than the empty one. So a full can rolls down the ramp faster than an empty can.

If you have two empty cans or two full cans, both will roll down at the same time, even if they have different diameters.

In the same way, a solid sphere, such as a marble, should roll faster than a hollow sphere such as an air-filled ball, regardless of their diameters.

Quiz

1 Which answer choice accurately characterizes a rolling object's reaction to being dropped or rolled?

(A) The object that is dropped immediately gains speed and continues to roll at the same speed.

(B) The object that is dropped gains mass and gravity depending on how high it is when dropped.

(C) The object that is dropped uses the moment of inertia to increase its speed and change direction.

(D) The object that is dropped converts potential energy into translational and rotational kinetic energy.

2 How does the author build understanding of energy in solid and hollow objects?

(A) by describing how potential energy is changed to kinetic energy, and explaining what can be observed when rolling the two types of objects

(B) by listing the differences between mass and diameter, and explaining what kinds of materials will be needed to see these differences

(C) by exploring the number of books that are required to build a ramp that is high enough for both objects to roll at the same speed

(D) by narrating the anecdotes that students have shared about their observations of a race between the two types of objects

3 Read the sentence from the section "Background."

Does the moment of inertia affect how fast an object will roll down a ramp?

What is one way the placement of this sentence develops the purpose of the experiment?

(A) It elaborates on the difference between the moment of inertia and potential energy.

(B) It emphasizes the relationship between the ideas that readers should observe.

(C) It introduces the idea that inertia can be a powerful force on hollow objects.

(D) It illustrates the effect of the type of ramp that is used on the shape of the object.

4 Read the section "Full Cans And Empty Cans."

How effective is this conclusion at closing the topic of the rolling race experiment?

(A) It is effective because it encourages readers to think about how the same idea exists in the real world.

(B) It is effective because it helps provide solutions to problems with the experiment on other objects.

(C) It is not effective because it indicates a contrasting result with the experiment in the real world.

(D) It is not effective because it suggests that using a solid or a hollow can has no effect on the speed.

How roller coasters work

By Tom Harris and Cherise Threewitt, How Stuff Works on 05.09.19

Word Count **598**
Level **MAX**

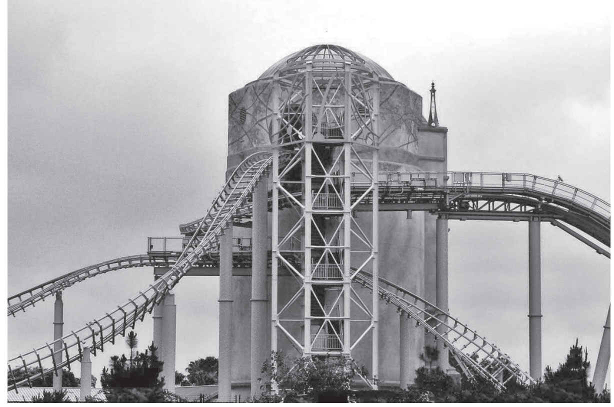
Image 1. A roller coaster in a loop-the-loop. To get through such an impressive loop, the roller coaster's cars need a lot of energy. Photo by: Hauke-Christian Dittrich/Getty Images

If you enjoy studying physics (and who doesn't), there are few more exhilarating classrooms than roller coasters. Roller coasters are driven almost entirely by basic inertial, gravitational and centripetal forces. All these are manipulated in the service of a great ride. Amusement parks keep upping the ante. They are building faster and more complex roller coasters. Still, the fundamental principles at work remain basically the same.

In this article, we'll examine the principles that keep coaster cars flying around on their tracks.

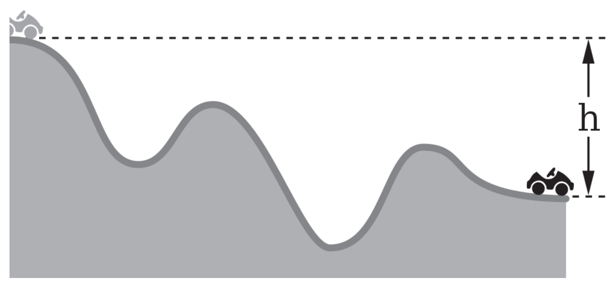
At first glance, a roller coaster is something like a passenger train. It consists of a series of connected cars that move on tracks. But unlike a passenger train, a roller coaster has no engine. It has no power source of its own. For most of the ride, the train is moved by gravity and momentum. To build up this momentum, the train has to get to the top of the first hill or get a powerful launch.

The purpose of the coaster's initial ascent is to build up a sort of reservoir of potential energy. The concept of potential energy is often referred to as energy of position. This concept is very simple: As the coaster gets higher in the air, gravity can pull it down a greater distance. You experience this phenomenon all the time. Think about driving your car, riding your bike or pulling your sled to the top of a big hill. The potential energy you build going up the hill can be released as kinetic energy — the energy of motion that takes you down the hill.



Once you start cruising down that first hill, gravity takes over. Then, all the built-up potential energy changes to kinetic energy. Gravity applies a constant downward force on the cars. The coaster tracks serve to channel this force — they control the way the coaster cars fall. If the tracks slope down, gravity pulls the front of the car toward the ground, so it accelerates. If the tracks tilt up, gravity applies a downward force on the back of the coaster, so it decelerates.

An object in motion tends to stay in motion. This is Newton's first law of motion. Because of this, the coaster car will maintain a forward velocity even when it is moving up the track, opposite the force of gravity. When the coaster ascends one of the smaller hills that follows the initial lift hill, its kinetic energy changes back to potential energy. In this way, the course of the track is constantly converting energy from kinetic to potential and back again.



This fluctuation in acceleration is what makes roller coasters so much fun. In most roller coasters, the hills decrease in height as the train moves along the track. This is necessary because the total energy reservoir built up in the lift hill is gradually lost to friction between the train and the track, as well as between the train and the air. When the train coasts to the end of the track, the energy reservoir is almost completely empty. At this point, the train either comes to a stop or is sent up the lift hill for another ride.

At its most basic level, this is all a roller coaster is — a machine that uses gravity and inertia to send a train along a winding track.

Quiz

1 At which point does the roller coaster have the most potential energy?

(A) at the bottom of a hill, before going up the hill

(B) at the beginning of the track, which is flat

(C) at the top of the hill

(D) at the end of the track, which is flat

2 Which sentence from the article BEST introduces to the reader how roller coasters work?

(A) If you enjoy studying physics (and who doesn't), there are few more exhilarating classrooms than roller coasters.

(B) Roller coasters are driven almost entirely by basic inertial, gravitational and centripetal forces.

(C) They are building faster and more complex roller coasters.

(D) In this article, we'll examine the principles that keep coaster cars flying around on their tracks.

3 At which point does the roller coaster have the most kinetic energy?

(A) at the bottom of a hill, before going up the hill

(B) at the bottom of a hill, after coming down the hill

(C) at the beginning of the track, which is flat

(D) at the end of the track, which is flat

4 What is MOST LIKELY the reason the author included a description of Newton's first law of motion?

(A) to demonstrate a problem that can interfere with the roller coaster moving smoothly on the hills

(B) to show a type of energy that forces a car that is not moving at the top to start going down

(C) to describe the reason why a roller coaster car begins to slow down as it ascends up a hill

(D) to explain why the roller coaster car keeps moving up the hill despite gravity pulling it down

5 At which point does the roller coaster have very little kinetic energy and very little potential energy?

(A) at the bottom of a hill, before going up the hill

(B) at the bottom of a hill, after coming down the hill

(C) at the top of the hill

(D) at the end of the track, which is flat

6 Read the following sentence from the article.

> *This is necessary because the total energy reservoir built up in the lift hill is gradually lost to friction between the train and the track, as well as between the train and the air.*

Which of the following words, if it replaced the word "gradually" in the sentence above, would CHANGE the meaning of the sentence?

(A) steadily

(B) slowly

(C) abruptly

(D) progressively

7 What happens as s a roller coaster car moves down a hill?

(A) The car’s potential energy turns into kinetic energy.

(B) The car's momentum turns into gravity.

(C) The car’s kinetic energy turns into potential energy.

(D) The car's gravity turns into inertia.

8 Read the following selection from the article. Then, fill in the blank.

> *The purpose of the coaster's initial ascent is to build up a sort of reservoir of potential energy. The concept of potential energy is often referred to as energy of position.*

The word "reservoir" in the selection above tells the reader that ____.

(A) the initial ascent of the coaster has used up all of the potential energy

(B) the initial ascent of the coaster is not as important as the other ascents on the ride

(C) the initial ascent of the coaster has created a supply of potential energy

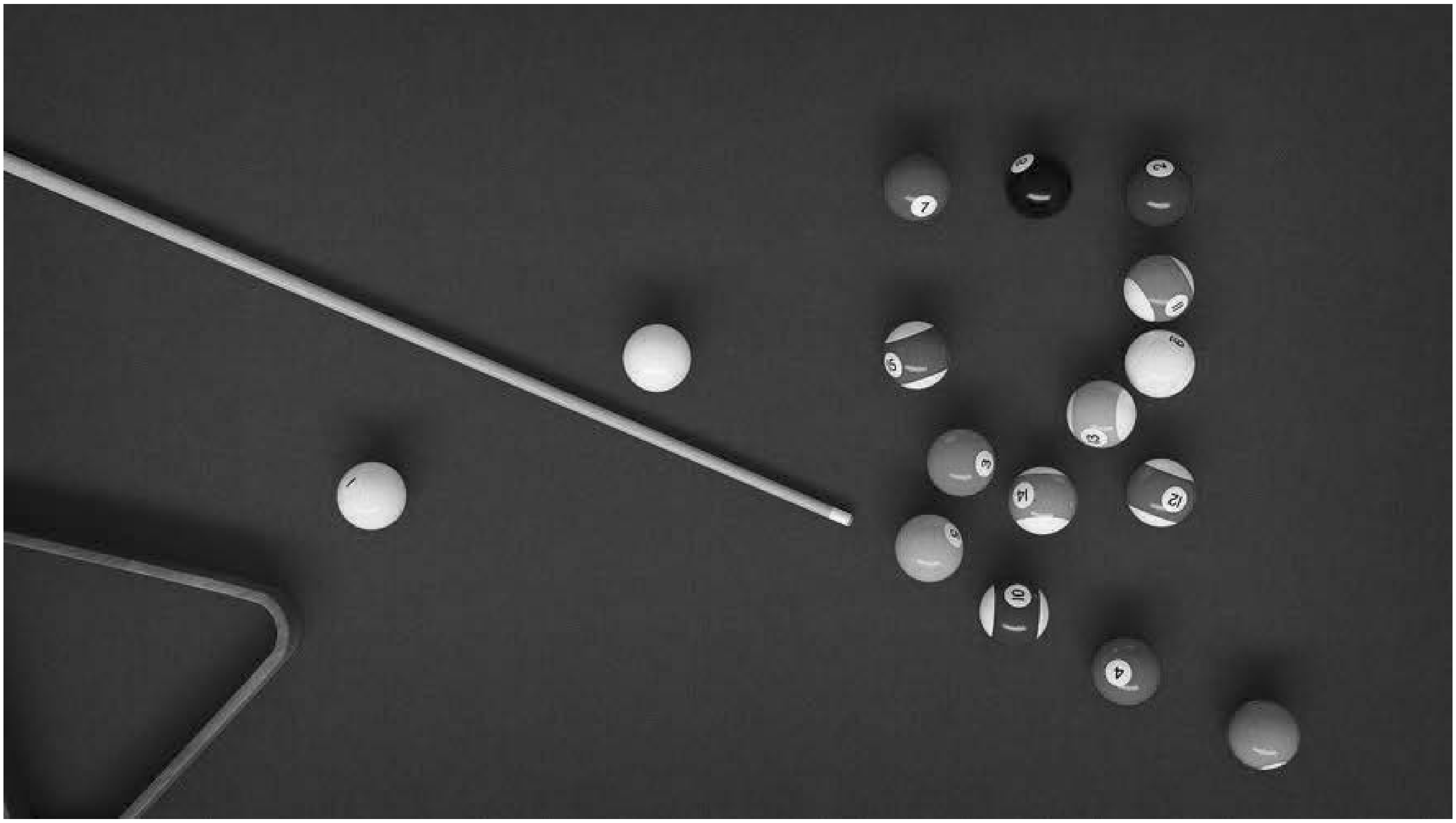
(D) the initial ascent of the coaster works best when it is near a large body of water

An explanation of the two types of energy: potential and kinetic

By Gale, Cengage Learning on 12.15.19

Word Count **543**

Level **MAX**



Billiards, often called pool, is a good example of how energy can be transferred between objects. When a ball is still, it has potential energy. When a ball moves, it has kinetic energy. When one ball hits another, kinetic energy is transferred to the second ball. Photo by PIRO4D/Pixabay

Energy is involved in nearly everything we do. It is defined as the ability to do work, to set an object in motion. There are several different kinds of energy. Kinetic energy is the energy an object has when it is in motion. Vibration, forward motion, turning and spinning are all examples of kinetic energy. Kinetic energy is directly proportional to the mass of an object. If two objects move at the same speed, and one has twice the mass of the other, the object with twice the mass will have twice the kinetic energy.

Potential energy is the energy an object has because of its position; it is energy waiting to be released. For example, a weight suspended above the ground has potential energy because it can be set in motion by gravity. Compressed or extended springs also have potential energy.

Thermal energy is the kinetic energy of atoms vibrating within matter. The faster the atoms move, the hotter the object becomes. Electrical energy is the kinetic energy resulting from the motion of electrons within any object that conducts electricity. Chemical energy is the potential energy stored in molecules. Thermal, electrical and chemical energy are all forms of kinetic or potential energy.

What Laws Control Energy?

One of the most fundamental laws of physics is that energy cannot be created or destroyed, only transformed from one form into another. For example, if a suspended weight falls, its potential energy becomes kinetic energy. When a car burns fuel, the fuel's chemical energy is transformed into thermal energy, which in turn, is transformed into kinetic energy by the engine to make the car move.

Energy can also be transferred from one object to another. Think about a game of pool. When a moving ball hits a still one, the moving ball stops or slows down, and the still one begins to move. The majority of the first ball's kinetic energy has been transferred to the second ball, while a small amount has been converted to thermal energy by the collision. If you could measure the temperature on the surface of each ball, you would find there was a slight rise in temperature at the point of contact. The total amount of energy involved — kinetic and thermal — remains the same. No energy was created or destroyed by the collision.

Who Wrote These Laws?

The person who laid the groundwork for the study of energy was English mathematician and physicist Isaac Newton (1642–1727). Newton developed the laws of motion, which describe how objects are acted upon by forces. Newton's ideas formed the basis for much of physics, in fact. He studied at Cambridge University, where he excelled in mathematics and developed the field of calculus while he was still a student. Newton later became a professor at Cambridge, where he built the first reflecting telescope and studied optics.

He published his most important work in 1687, the Principia Mathematica. This book describes Newton's three laws of motion and the law of gravitation, which are a major part of the foundation of modern science. Newton also had an interesting life. He became Master of Mint in England, where he supervised the making of money, and later became the first scientist to be knighted.

Quiz

1 How does reducing the mass of a moving object by half (1/2) change its kinetic energy?

(A) kinetic energy will be half of what it was before

(B) kinetic energy will be double of what it was before

(C) there is no relationship between mass and kinetic energy

(D) decreasing the mass will make the object go faster, increasing its kinetic energy

2 Which piece of evidence explains the cause of Newton's effect on physics?

(A) The person who laid the groundwork for the study of energy was English mathematician and physicist Isaac Newton (1642–1727).

(B) Newton developed the laws of motion, which describe how objects are acted upon by forces.

(C) Newton later became a professor at Cambridge, where he built the first reflecting telescope and studied optics.

(D) He published his most important work in 1687, the "Principia Mathematica."

3 Why is heat or thermal energy considered a form of kinetic energy?

(A) Heat or thermal energy is a measure of particle vibration, vibration is a type of motion.

(B) Heat or thermal energy increases the speed at which an object moves from place to place.

(C) Heat or thermal energy must always be stored in great quantities for an object to move.

(D) Heat or thermal energy is a form of stored energy.

4 Read the following selection from the introduction [paragraphs 1-3].

> *Potential energy is the energy an object has because of its position; it is energy waiting to be released.*

What conclusion is BEST supported by the selection above?

(A) All still objects have potential energy.

(B) Some objects have more energy than others.

(C) Most still objects do not have potential energy.

(D) Potential energy makes objects move.

5 Which choices are examples of an energy transformation?

1. *baking a cake*
2. *a tennis racket hitting a ball*
3. *a car speeding off from a stop sign*

(A) 1 and 2

(B) 1 and 3

(C) 2 and 3

(D) 1, 2 and 3

6 How are the sections organized to help to develop understanding?

(A) by description; to help to introduce and give examples of several types of energies

(B) by scientific questions; to help readers to understand what they should be asking themselves

(C) by cause and effect; to demonstrate how different types of energies affect each other

(D) by guiding questions; to help readers to understand major concepts in energy

7 Why is Sir Isaac Newton an important person in the field of physics?

(A) Sir Isaac Newton was the first person to calculate the shape and size of the solar system.

(B) Sir Isaac Newton developed many of the laws of physics we still use today.

(C) Sir Isaac Newton developed a mathematical formula to calculate the mass of any object.

(D) Sir Isaac Newton's laws of chemistry and biology changed the way we study science.

8 What is one reason why the author includes the information about what energies a car uses?

(A) to explain how energy makes a car move

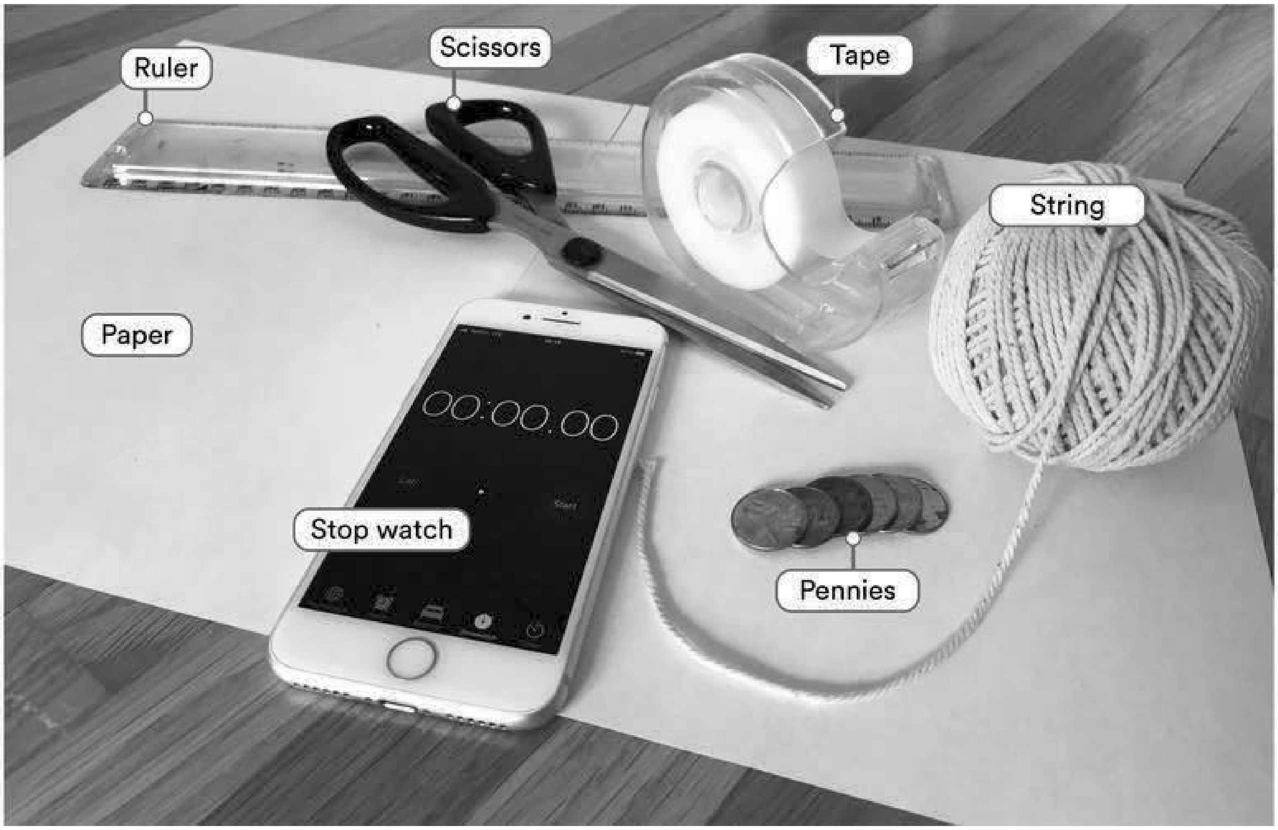
(B) to provide an example of chemical energy

(C) to provide an example of how energy can change

(D) to explain what thermal energy is

Experiment: Swinging with a pendulum

By Scientific American/Science Buddies on 03.28.20
Word Count **666**
Level **MAX**



Use these items to learn more about how the motion of a pendulum is affected by gravity. Newsela staff

The back-and-forth motion of a playground swing is an example of a pendulum.

But pendulums can do more than provide fun at recess and help tell the time. Among other scientific applications, they can show that the Earth is huge! This is because the swinging motion of a pendulum is due to the force of gravity generated by the Earth's size. Other factors, including a pendulum's length, can also affect its motion. Do this activity to learn more.

Materials

Two identical chairs

String or yarn

Ten metal washers of identical size or six pennies

Strong tape

Measuring stick

Scissors

Stopwatch accurate to 0.1 second

An assistant

Preparation

1. Place the two chairs back-to-back. Space them about 1 meter (about 39 inches) apart. Lay the measuring stick on the backs of the two chairs, centered on the back of each.
2. Cut one piece of string to a length of 70 centimeters (about 28 inches). Cut a second piece of string to a length of 35 centimeters (about 14 inches). Tie one end of both strings to the measuring stick, toward the middle of the stick. Space the strings about 20 to 30 centimeters (about 8 to 12 inches) apart on the measuring stick.
3. Tie five metal washers to the free end of each string. Alternatively, if you are using pennies and tape, securely tape three pennies to the free end of each string. Tip: If the measuring stick does not seem to stably sit on the backs of the chairs, you can try to tape the ends of the stick to the chairs.

Procedure

1. Pull the strings tight (by holding on to the washers or pennies at the ends) and position the strings at the same angle from the measuring stick.
2. Have an assistant ready with a stopwatch. Drop the longer pendulum and, at the same time, have the assistant start the stopwatch. Then have the assistant stop the stopwatch when the pendulum returns back to its original position. If the pendulum hit anything as it swung, such as the wall, readjust your setup and try timing the pendulum again. How long does it take the longer pendulum to swing back to its original position? This is the period of the pendulum.
3. Again, pull the strings tight and hold them at the same angle from the meter stick.
4. Have the assistant reset the stopwatch. Drop the shorter pendulum and, once more, have the assistant time the period of the pendulum. How long does it take the shorter pendulum to swing back to its original position?
5. Time the periods of the shorter and longer pendulums a few more times. Are the periods consistent for each pendulum, or do they vary a lot?
6. Is the period of the longer pendulum longer or shorter than the period of the shorter pendulum? How different are the two periods? Is this what you expected?

Extra: Instead of timing the period of the swing, you could time how long each pendulum swings before it comes to rest. What is the total time that each pendulum swings?

Extra: Instead of changing the length of the string, change the number of weights attached to the string or the initial angle of the string. Do mass or initial angle affect the period of the pendulum? Do they affect the pendulum's total time?

Observations And Results

Did the longer pendulum have a longer period than the shorter pendulum? Was the longer pendulum's period not quite twice as long as the shorter pendulum's period?

A pendulum that is twice as long as another pendulum does not simply have a period that is also twice as long. The exact periods of your longer and shorter pendulums might be slightly less than 1.7 seconds and 1.2 seconds, respectively, because of friction and because their lengths were less than 70 centimeters (about 28 inches) and 35 centimeters (about 14 inches) because of strings being used to tie to attachments.

Quiz

1) Instead of timing the period of the swing, you could time how long each pendulum swings before it comes to rest. What is the total time that each pendulum swings?

2) Instead of changing the length of the string, change the number of weights attached to the string or the initial angle of the string. Do mass or initial angle affect the period of the pendulum? Do they affect the pendulum's total time?

3) Did the longer pendulum have a longer period than the shorter pendulum? Was the longer pendulum's period not quite twice as long as the shorter pendulum's period?

A history of rockets

By NASA.gov, adapted by Newsela staff on 11.16.16
Word Count **814**
Level **910L**

TOP: A space shuttle blasts off piggybacking on a rocket. Pixabay. Graphics courtesy of NASA.

Today's rockets are the result of thousands of years of experimentation. There has always been one main principle behind rocket flight: the heating of fuel to produce motion.

In 400 B.C., Archytas, the Greek philosopher and scientist, was one of the first to successfully use this principle. He impressed his fellow citizens by flying a pigeon made of wood. The bird was suspended on wires and powered by hot steam.

The first true rockets may have emerged by accident. In the first century A.D., the Chinese had a simple form of gunpowder, which was used to make colorful explosions during festivals. The Chinese filled bamboo tubes with the gunpowder mixture and tossed the tubes into fires. They soon realized that these tubes could launch themselves just by the power produced from the escaping gas.

From Weapons To Fireworks

The first known use of true rockets was in 1232 during the battle of Kai-Keng. The Chinese fought off the Mongolian army using an early form of rocket similar to their firecracker tubes. After the battle, the Mongols made rockets of their own. They may have been responsible for spreading the technology to Europe.

By the 16th century, rockets were no longer used as weapons. They were used in fireworks displays, though. Johann Schmidlap, a German fireworks maker, invented the step rocket. This was made from a large sky rocket that carried a smaller rocket. When the large rocket burned out, the smaller one continued to go higher. Schmidlap's idea is still used in all rockets today that go into outer space.

During the late 1600s, the English scientist Sir Isaac Newton studied motion. He developed three laws of motion, which are the starting point in explaining how rockets fly. These laws had a major impact on the design of rockets in the years that followed.

"The Rockets' Red Glare"

During the end of the 1700s and early into the 1800s, rockets were once again used as weapons. The British Colonel William Congreve set out to design rockets for the military. His rockets were highly successful. In fact, they inspired the phrase "the rockets' red glare" in a poem by Francis Scott Key, which later became "The Star-Spangled Banner."

The rockets' accuracy still had not improved much from the early days, however. An answer to this problem was found by William Hale. He invented a way to direct the escaping gas so as to make the rocket spin. The same principle is still used today.

In 1898, a Russian schoolteacher, Konstantin Tsiolkovsky, proposed the idea of space travel using rockets. In a report published in 1903, he suggested that liquid fuel - rather than a solid fuel, like gunpowder - could make rockets fly higher.

Father Of Modern Rocketry

The first successful flight with a liquid fuel rocket was achieved by Robert H. Goddard in 1926. Fueled by liquid oxygen and gasoline, Goddard's rocket flew for only two-and-a-half seconds and climbed just 41 feet. By today's standards, the flight was unimpressive. Still, Goddard's gasoline rocket started a new era in rocket flight.

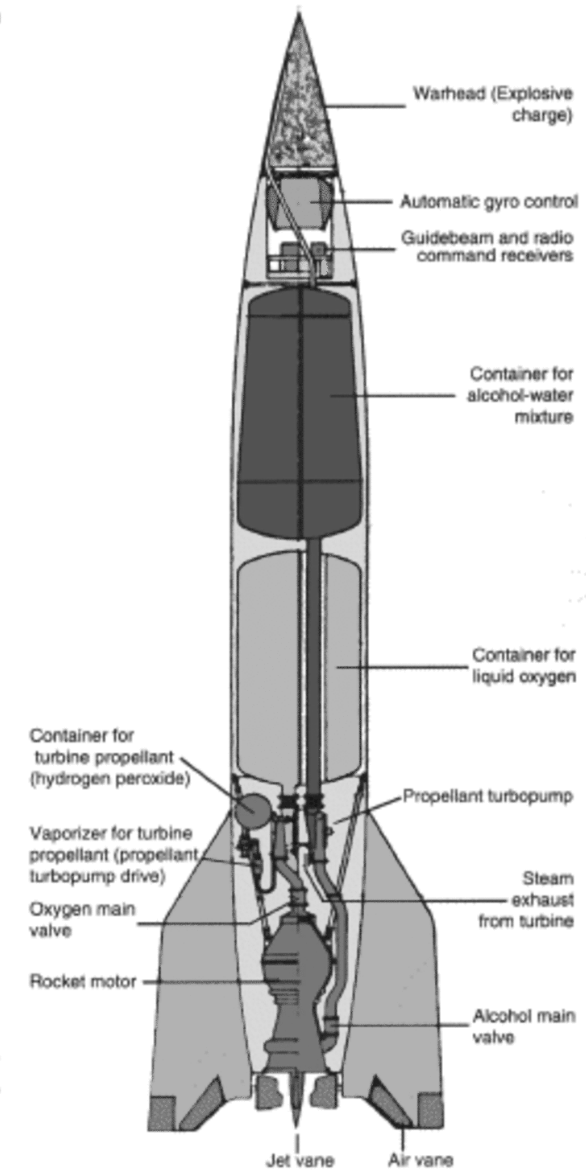
Goddard's experiments continued for many years. He developed a parachute system to return rockets and instruments safely after flight. For his achievements, Goddard has been called the father of modern rocketry.

A third great rocket scientist was Hermann Oberth. His writings inspired the creation of rocket societies around the world. In Germany, one such group was the Society for Space Travel. The formation of this group led to the development of the V-2 rocket, a weapon used by the Germans in World War II.

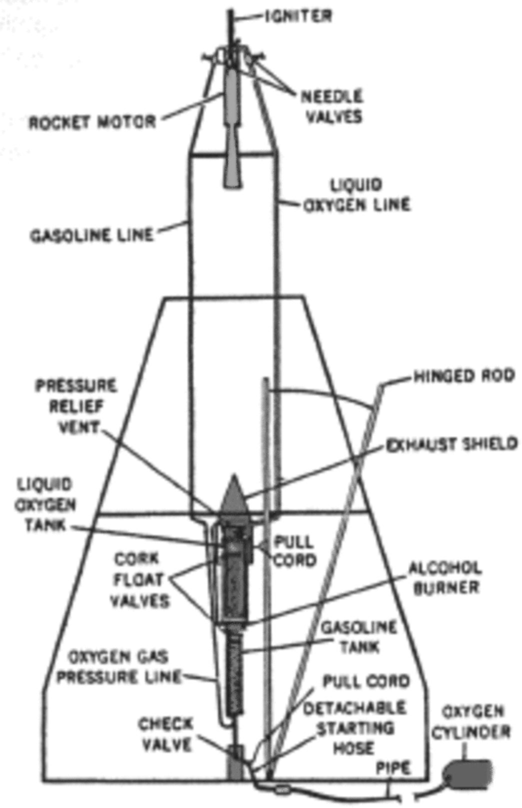
The V-2 rocket was small, but it could destroy entire city blocks. Fortunately, the V-2 came too late in the war to help the Germans win. With the fall of Germany, many German rocket scientists moved to the United States or to the Soviet Union. What followed was an intense period of competition between the two powers.

First Satellites In Space

On October 4, 1957, the Soviet Union launched Sputnik I. It was the first satellite to



German V-2 (A-4) Missile



Dr. Goddard's 1926 Rocket

successfully orbit around the Earth. Less than a month later, the Soviets launched another satellite. This one carried a dog named Laika. Laika survived in space for seven days.

A few months after the first Sputnik, the U.S. sent its first satellite into space. Explorer I was launched by the U.S. Army on January 31, 1958. That year, the United States created NASA, the National Aeronautics and Space Administration.

Soon, many people and spacecraft were being launched into space via rockets. Astronauts orbited Earth and landed on the moon. Satellites helped scientists study the weather and allowed for worldwide communication. More and bigger rockets had to be built to help launch these new tools into space.

Over time, rockets have evolved from simple gunpowder devices into giant space vehicles. They have allowed humans to explore the universe.

Quiz

1 Overall, the article is organized around:

(A) philosophers and astronauts

(B) people and weapons

(C) discoveries and scientists

(D) inventions and accomplishments

2 What is the connection between the article's introduction and the final section?

(A) The introduction describes how people started using rockets, and the final section explains the impact of rockets.

(B) The introduction explains the reason for creating rockets, and the final section describes how to make rockets.

(C) The introduction gives reasons for why rockets are important, and the final section highlights the uses of rockets.

(D) The introduction describes why people use rockets, and the final section lists examples of how rockets are used.

3 Which selection from the article is BEST illustrated by the diagram "Dr. Goddard's 1926 Rocket"?

(A) In 1898, a Russian schoolteacher, Konstantin Tsiolkovsky, proposed the idea of space travel using rockets. In a report published in 1903, he suggested that liquid fuel - rather than a solid fuel, like gunpowder - could make rockets fly higher.

(B) The first successful flight with a liquid fuel rocket was achieved by Robert H. Goddard in 1926. Fueled by liquid oxygen and gasoline, Goddard's rocket flew for only two-and-a-half seconds and climbed just 41 feet.

(C) Goddard's experiments continued for many years. He developed a parachute system to return rockets and instruments safely after flight. For his achievements, Goddard has been called the father of modern rocketry.

(D) His writings inspired the creation of rocket societies around the world. In Germany, one such group was the Society for Space Travel. The formation of this group led to the development of the V-2 rocket, a weapon used by the Germans in World War II.

4 Use the diagrams and information from the article to select the TRUE statement.

(A) Both the V-2 Missile and Goddard's rocket had warheads attached.

(B) Both the V-2 Missile and Goddard's rocket used liquid oxygen as fuel.

(C) Both the V-2 Missile and Goddard's rocket were able to launch into space.

(D) Both the V-2 Missile and Goddard's rocket had a parachute to return from flight.

How does gravity pull things down to Earth?

By Monica Grady, The Conversation on 01.16.20
Word Count **790**
Level **MAX**

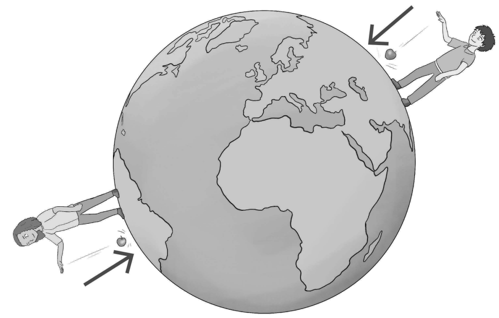
Image 1. Everything in the universe has its own gravitational pull. When you throw an apple into the air, the Earth's gravity pulls it back down. But that's not the only thing that's happening: The gravity of the apple is also pulling on the Earth. Image by: Westend61/Getty Images

Gravity is a force, which means that it pulls on things. But the Earth isn't the only thing which has gravity. In fact, everything in the universe, big or little, has its own pull because of gravity – even you.

Isaac Newton was one of the first scientists to figure out the rules of how gravity behaves. The story goes, he was sitting under an apple tree when one of the fruits fell off. As he saw the apple fall down to the ground, he started to wonder why it didn't go up to the sky instead.

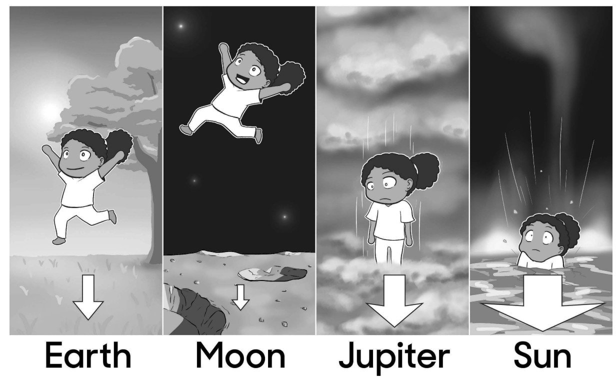
After lots of experiments, and some very clever thinking, he worked out that the force of gravity depends on how heavy objects are, and that the pull of gravity between objects gets smaller the farther apart they are. To see how gravity works in our universe, we're going to take a journey, with a few stops along the way.

First off, we'll go to the park and play a game of football. When you kick the football into the air, the Earth's gravity pulls it back down. But that's not the only thing that's happening: The gravity of the football is also pulling on the Earth. The thing is, the Earth is very heavy – much heavier than the football – so it's unaffected by the pull of the football, while the football itself is pulled back down to Earth.



Our next stop is the moon, and as we journey up into space, there's a good chance you'll see the sun. Now, the sun is much, much bigger than the Earth, which means its pull is very powerful indeed.

You might be wondering why the Earth (and all the other planets) don't just fall into the sun, the same way the football falls to Earth. The answer is that the planets are all moving, and the balance between the force of gravity and the speed of their movement (which comes from when they were first made, about 4.5 billion years ago) keeps them circling round the sun.



When we arrive on the moon, you'll see that the pull of gravity is not the same everywhere. It is related to how heavy – or how massive – an object is. If you jump on the moon, you'll be able to go much higher than you can on Earth. This is because the Earth is bigger than the moon, so the force between you and the Earth – which is what we call weight – is bigger than the force between you and the moon. On the moon, you seem to weigh less than on Earth, so you can jump higher.

Our final stop is the seaside. Sitting on the beach, you can see the sea gradually getting closer and closer to you – this is the tide coming in. After some time, the sea seems to get farther away – now, the tide is going out. But the sea is not actually moving in and out – it is moving up and down. As the sea level rises, the water gets closer to you, because the beach you are sitting on slopes upwards away from the sea. And as the sea level drops down, the water gets farther away from you.

This is also an effect of gravity, and it happens because the moon is close to the Earth. Unlike the football, the moon is heavy enough to have an effect – just a little one, because the Earth is still much heavier – but it's enough for us to notice when we watch the tides. As the water level rises, it is being pulled toward the moon, and the tide comes in. Then the tide goes out, and the water level drops, as the moon rotates around the Earth.

An interesting question is why we don't have enormous tides caused by the sun pulling on the Earth. We know that the sun is much bigger than the moon – so surely it ought to be able to pull water toward it? Actually, it does – but much less than the moon. This is because although the sun is much bigger than the moon, it is much, much farther away – and the pull of gravity gets weaker the bigger the distance between objects.

So, next time you're kicking a football around in the park, you'll know how gravity is bringing the football back down to Earth.

Quiz

1 Which statement BEST compares the force of gravity on a school bus on a school day and a weekend?

(A) The force would be lower on the school day than the weekend.

(B) The force would be higher on the school day than the weekend.

(C) The force would be different on the school day than the weekend.

(D) The force would stay the same on the school day and the weekend.

2 Which piece of evidence explains the cause of ocean tides?

(A) The planet's movement balances out the sun's gravity.

(B) The sun's gravity is strong enough to move the ocean water.

(C) The gravity from the moon pulls ocean water towards it.

(D) The Earth's gravity pulls the ocean back toward its surface.

3 When does a football hurled across a field have the lowest gravity force?

(A) when it has just left the quarterback's hand

(B) when it is traveling up the arc of its path

(C) when it is at its highest point on its path

(D) when it is on its way down the arc

4 Read the following paragraph from the article.

> *First off, we'll go to the park and play a game of football. When you kick the football into the air, the Earth's gravity pulls it back down. But that's not the only thing that's happening: The gravity of the football is also pulling on the Earth. The thing is, the Earth is very heavy – much heavier than the football – so it's unaffected by the pull of the football, while the football itself is pulled back down to Earth.*

What conclusion is BEST supported by the paragraph above?

(A) The force of gravity is relative to an object's mass.

(B) The force of gravity gets weaker as objects move apart.

(C) The pull of an object's gravity increases in the air.

(D) The Earth has the strongest known gravitational pull.

5 Why can a person jump higher on the moon?

(A) The moon is faster than Earth.

(B) The moon is slower than Earth.

(C) The moon is larger than Earth.

(D) The moon is smaller than Earth.

6 Read the following paragraph from the article.

> *After lots of experiments, and some very clever thinking, he worked out that the force of gravity depends on how heavy objects are, and that the pull of gravity between objects gets smaller the farther apart they are. To see how gravity works in our universe, we're going to take a journey, with a few stops along the way.*

Which answer choice is the BEST definition of the phrase "depends on" as used in the paragraph?

(A) is determined by

(B) is undecided about

(C) places trust in

(D) hangs down from

7 Why do the ocean tides ebb and flow on a regular cycle?

(A) The sun's gravitational pull changes with its rotation around Earth.

(B) The sun's gravitational pull changes with Earth's rotation around it.

(C) The moon's gravitational pull changes with its rotation around Earth.

(D) The moon's gravitational pull changes with Earth's rotation around it.

8 Read the following selection from the article.

> *Our final stop is the seaside. Sitting on the beach, you can see the sea gradually getting closer and closer to you – this is the tide coming in. After some time, the sea seems to get farther away – now, the tide is going out. But the sea is not actually moving in and out – it is moving up and down.*

Which two words would BEST replace “gradually” and “actually” in the selection above?

(A) exactly; absolutely

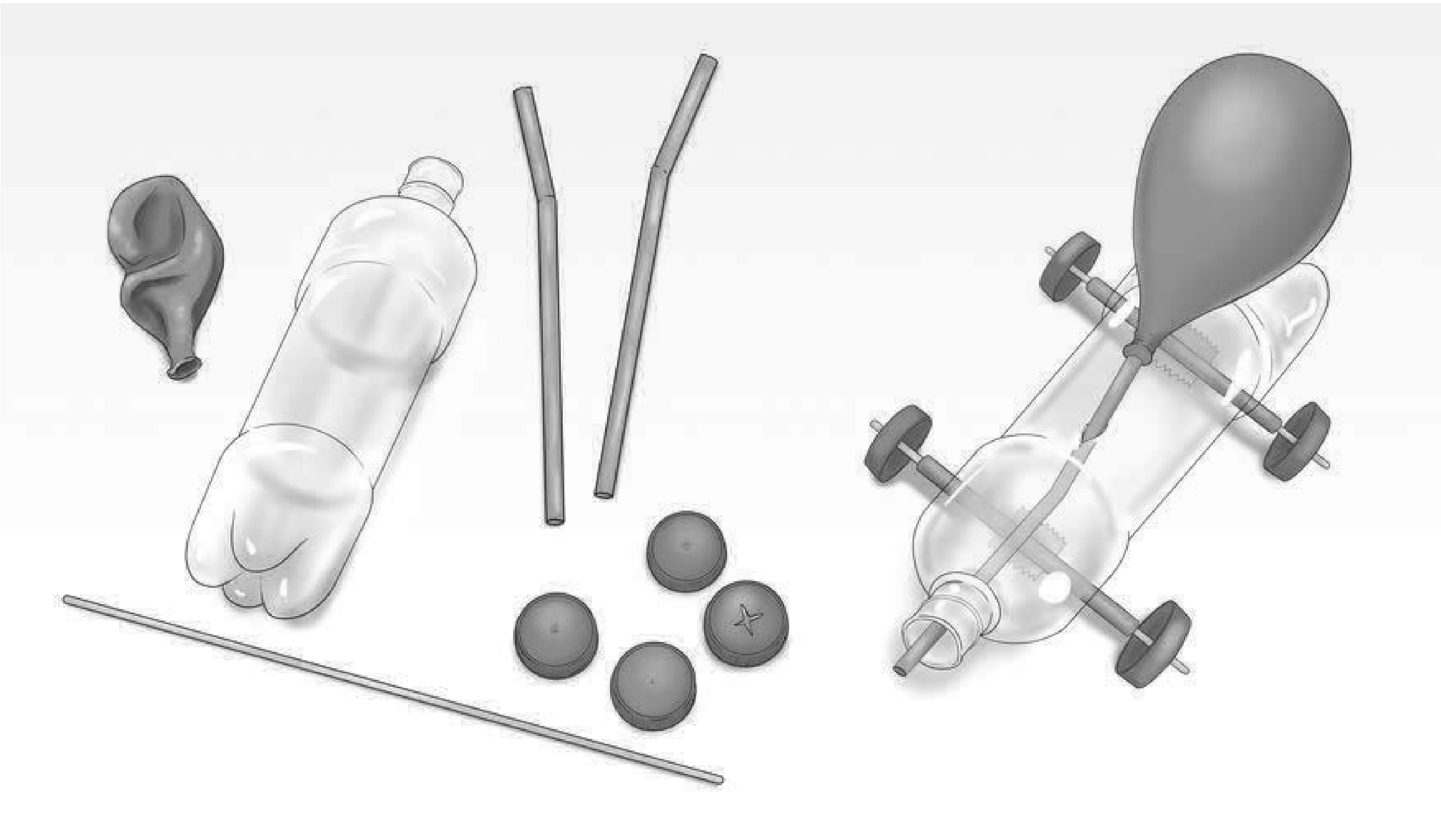
(B) slowly; really

(C) finally; easily

(D) quickly; precisely

Experiment: How to build a balloon-powered car

By Ben Finio, Scientific American on 03.31.20
Word Count **692**
Level **MAX**



Use these items to build a small car that is powered by the kinetic energy of a balloon. Newsela staff

Turn a pile of trash into a toy car — and watch it go! In this activity you will learn some physics concepts and use recycled materials to build a toy car that is propelled by a balloon. You can even find a friend, build two cars and race them against each other. Whose car will go the fastest?

Materials

Plastic bottle

Four plastic bottle caps

Wooden skewer

Two straws

Balloon

Tape

Scissors or sharp knife (Have an adult use or supervise your use of this tool.)

An adult helper

Preparation

1. Cut one of the straws in half.

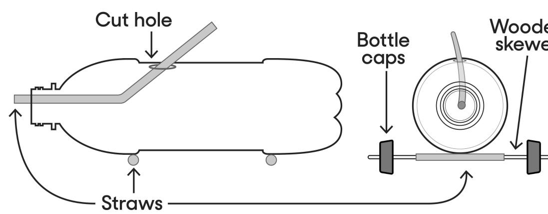
2. Tape both pieces of the straw to one side of the water bottle.

3. Cut the wooden skewer in half and push each piece through one of the straws. These will form your axles. (Have an adult help.)

4. Have an adult help use the scissors to poke a "+"-shaped hole directly in the center of each plastic bottle cap.

5. Press each bottle cap onto the ends of the wooden skewers. These will form your wheels.

Procedure



1. Put your car down on a flat surface and give it a good push. Make sure the car rolls easily and coasts for a bit before stopping. If your car gets stuck or does not roll smoothly make sure: your axles are parallel to each other; the hole in each bottle cap is centered; and the straws are securely taped to the water bottle and do not wobble. You can add some glue if tape is not sufficient.

2. Tape the neck of the balloon around one end of the other straw. Wrap the tape very tightly so the connection is airtight.

3. Cut a small hole in the top of the water bottle, just big enough to push the straw through.

4. Push the free end of the straw through the hole and out the mouth of the bottle.

5. Use tape to secure the straw to the bottle.

6. Blow through the straw to inflate the balloon, then put your finger over the tip of the straw to trap the air. What do you think will happen when you put the car down and release your finger?

7. Put the car down on a flat surface and release your finger. What happens?

See what adjustments you can do to make the car go farther. What happens if you inflate the balloon more? What happens if you adjust the direction the straw is aimed? Does it work best if the straw is aimed straight back?

Extra: There are many different ways to build a balloon car. Turn this into an engineering design project and try building your car with different materials. For example: What happens if you use a cardboard box instead of a plastic bottle for the body? What happens if you use different diameter straws? What about different materials for the wheels and axles? Get some friends and try building different cars and racing them against one another. What materials work the best?

Observations And Results

When you inflate a balloon and let it go, it zips randomly around the room. When you tape the balloon to a straw and attach it to the body of your car, however, you can control the direction of the escaping air. When the end of the straw is aimed backward, the air pushes your car forward, as described by Newton's third law of motion. Your design will be most efficient if the straw is pointed straight back and not downward or to the side. The more you inflate the balloon the more potential energy it stores, which in turn is converted to more kinetic energy, according to the law of conservation of energy — so the car will go faster.

Quiz

1) What is Newton's third law of motion and how does this law apply to the balloon-powered car?

2) Why is the design of the car most efficient if the straw is pointed backwards?

3) Choose two of the following three questions to answer:
    a. What do you think will happen if you use a cardboard box instead of a plastic bottle for the body?
    b. What will happen if you use different diameter straws?
    c. What about different materials for the wheels and axles?

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Explaining energy transfer and transformation

By National Geographic Society, adapted by Newsela staff on 09.12.19
Word Count **769**
Level **940L**

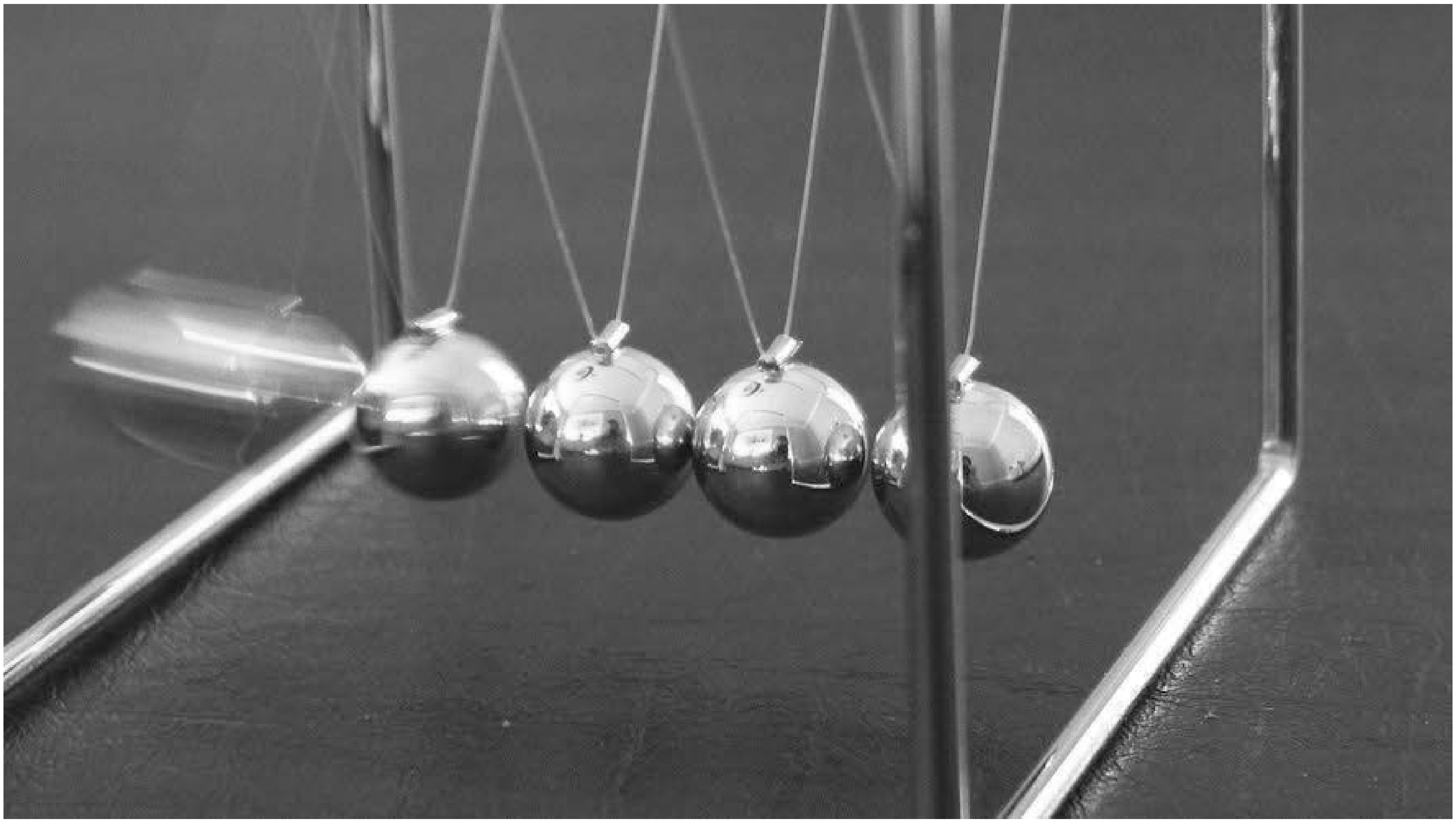


Image 1. Newton's cradle is a device that demonstrates the transfer of kinetic energy. Photo from: Wikimedia Commons

Energy cannot be created or destroyed. This means the total amount of energy in the universe has always been and will always be constant. However, energy can change form and even transfer between objects.

A common example of energy transfer is the transfer of kinetic energy — the energy of motion — from a moving object to a stationary object. When a golf club is swung and hits a golf ball, some of the club's kinetic energy transfers to the ball. In this type of energy transfer, energy moves from one object to another but stays in the same form. A kinetic energy transfer is easy to observe and understand, but other important transfers are not as easy to visualize.

Thermal energy has to do with the internal energy of a system from its temperature. When a substance is heated, its temperature rises because its molecules move faster and gain thermal energy. Temperature measures the "hotness" or "coldness" of an object. The term heat refers to thermal energy being transferred from a hotter system to a cooler one. Thermal energy transfers occur in three ways: conduction, convection and radiation.

Conduction is when thermal energy is transferred between molecules in contact with one another. If you place a metal spoon in a pot of boiling water, the end not touching the water gets very hot. This happens because metal is an excellent conductor. Heat travels easily through the material. Vibrations of molecules at the end of the spoon touching the water spread up the spoon, until all the molecules are vibrating faster. The whole spoon gets hot. Some materials, such as wood and plastic, are poor conductors. Heat does not travel through them easily. They are known as insulators.

Radiation Transfers Heat Through Space

Convection only occurs in liquids and gases. When water is boiled on a stove, water molecules at the bottom of the pot are closest to the heat source. They gain thermal energy first. They move faster and spread out. They create a lower density of molecules, or quantity of molecules in that volume, at the bottom of the pot. These molecules rise. They are replaced at the bottom by cooler, denser water. The process repeats, creating a current of molecules sinking, heating up, rising, cooling down and sinking again.

The third type of heat transfer — radiation — is critical to life on Earth. With radiation, a heat source does not have to touch the object being heated. Radiation can transfer heat even through the vacuum of space. Nearly all thermal energy on Earth comes from the sun. It radiates to the surface of our planet. It travels in the form of energy waves, such as visible light. Materials on Earth absorb these waves to use them for energy or reflect them back into space.

In an energy transformation, energy changes form. A ball sitting on a hill has gravitational potential energy, which is the ability for an object to do work due to its position in a gravitational field. The higher on the hill this ball is, the more gravitational potential energy it has. When a force pushes it down the hill, that potential energy transforms into kinetic energy. The ball loses potential energy and gains kinetic energy.

In a frictionless universe, the ball would continue rolling forever. On Earth, however, the ball's kinetic energy is transformed into heat by the opposing force of friction. The ball stops at the bottom of the hill. Just as with energy transfers, energy is conserved in transformations.

Energy Moves From One Form To Another

In nature, energy transfers and transformations happen constantly, such as in a coastal dune environment.

Thermal energy radiates from the sun, heating the land and ocean. However, water heats up more slowly than land. This temperature difference creates a convection current, which appears as wind.

This wind possesses kinetic energy, which it transfers to sand by carrying it short distances. If the moving sand hits something, it stops due to the friction created. Its kinetic energy is then transformed into thermal energy, or heat. Once enough sand builds up, these impacts can create sand dunes.

These newly formed sand dunes provide a special environment. Plants grow there, using light energy to transform water and carbon dioxide into chemical energy, which is stored in sugar. When an animal eats the plant, it uses the stored energy to heat its body and move around. This transforms the chemical energy into kinetic and thermal energy.

Though it may not always be obvious, energy transfers and transformations happen constantly. They are what enable life to exist.

Quiz

1 How is kinetic energy transferred when a person is riding a bicycle?

(A) The person moves their legs, which transfers energy to the pedals and finally the wheels.

(B) The wheels of the bicycle transfer kinetic energy to the person pedaling.

(C) The person moves their legs and the heat generated creates kinetic energy in the wheels of the bicycle.

(D) Kinetic energy is transferred when the person first starts riding the bike.

2 Which detail in the section "Radiation Transfers Heat Through Space" BEST supports the conclusion that the amount of potential energy in a ball at the top of a hill is the same as the amount of kinetic energy in the same ball at its fastest point?

(A) In an energy transformation, energy changes form. A ball sitting on a hill has gravitational potential energy, which is the ability for an object to do work due to its position in a gravitational field.

(B) The higher on the hill this ball is, the more gravitational potential energy it has.

(C) When a force pushes it down the hill, that potential energy transforms into kinetic energy. The ball loses potential energy and gains kinetic energy.

(D) On Earth, however, the ball's kinetic energy is transformed into heat by the opposing force of friction.

3 A student is creating a new cake recipe. The student read that glass pans require different bake times than metal pans.

Why do different pans require different bake times?

(A) Different materials radiate heat in different ways.

(B) Different materials allow heat to travel through them more easily such as metal.

(C) Cake reacts to a metal pan differently than it does a glass pan when it comes in contact with the material.

(D) Cake bakes faster in a metal pan because it is a stronger material that can handle the heat and will not break.

4 How does wind occur? How do you know?

(A) Different temperatures on land and water create a convection current in the air. "This temperature difference creates a convection current, which appears as wind."

(B) Heat energy is absorbed differently by land and water. "However, water heats up more slowly than land."

(C) Air has kinetic energy, which is energy of movement. "This wind possesses kinetic energy, which it transfers to sand by carrying it short distances."

(D) Radiation from the sun causes molecules in the air to heat up and move. "Thermal energy radiates from the sun, heating the land and ocean."

5 Why does a pot of water start to steam after it boils?

(A) Convection currents moves the existing thermal energy around in the pot until the water molecules have enough potential energy to change phase.

(B) Convection currents transfers thermal energy from the pot to the water. Then the water molecules start moving closer together which allows steam to be visible.

(C) The thermal energy decreases the kinetic energy of the water molecules until it reaches the point it can condense into steam.

(D) The thermal energy increases the particle motion of the water molecules until it reaches boiling point. Then the added thermal energy changes the liquid water into gaseous water.

6 Read the selection below.

> *This wind possesses kinetic energy, which it transfers to sand by carrying it short distances. If the moving sand hits something, it stops due to the friction created. Its kinetic energy is then transformed into thermal energy, or heat. Once enough sand builds up, these impacts can create sand dunes.*
>
> *These newly formed sand dunes provide a special environment. Plants grow there, using light energy to transform water and carbon dioxide into chemical energy, which is stored in sugar. When an animal eats the plant, it uses the stored energy to heat its body and move around. This transforms the chemical energy into kinetic and thermal energy.*

WHY did the author include this event?

(A) to describe how sand dunes are created by isolated energy transfers

(B) to introduce how energy is conserved in nature

(C) to elaborate on how energy is transferred and transformed in a variety of real-life settings

(D) to show how different types of energy can be seen throughout nature in various landscapes.

7 Which statements are examples of energy transformations?

1. *Animals eat plants.*
2. *A metal pot conducts heat.*
3. *A plant grows on a sand dune.*
4. *The sun radiates thermal energy.*

(A) 1 and 2

(B) 1 and 3

(C) 2 and 4

(D) 3 and 4

8 Which sentence from the section "Radiation Transfers Heat Through Space" BEST introduces energy transfers?

(A) Energy cannot be created or destroyed.

(B) This means the total amount of energy in the universe has always been and will always be constant.

(C) However, energy can change form and even transfer between objects.

(D) A common example of energy transfer is the transfer of kinetic energy — the energy of motion — from a moving object to a stationary object.

Heat, or thermal energy, can be transferred in three ways

By National Geographic Society, adapted by Newsela staff on 02.13.20

Word Count **903**

Level **940L**

Image 1. Radiation is one way that heat transfer occurs. All objects radiate some amount of heat as electromagnetic waves, even humans. Hotter objects, like light bulbs and campfires, radiate higher-energy light that we can see. Photo by National Geographic

Thermal energy is the energy that matter has due to the movement of its atoms. All matter is made of atoms, so every gas, liquid and solid has thermal energy. Atoms are constantly moving, whether they are zipping around in a gas or vibrating in a solid.

Even though all objects have thermal energy, they do not all have the same amount. Extremely hot objects such as the sun have more thermal energy than cold objects like ice. The sun can transfer some of its thermal energy to ice, and this is what causes an ice cube to melt on a warm, sunny day. The movement of thermal energy from a hotter object to a colder object is called heat transfer.

Heat transfer can happen in three different ways: through conduction, convection and radiation. All three forms of heat transfer happen constantly in your daily life.

Conduction

Conduction is a type of heat transfer that requires contact between the objects that are involved. For conduction to happen, there must be a temperature difference between the objects. This is true for all forms of heat transfer. Thermal energy is always transferred from the hotter object to the colder one. Once the objects reach the same temperature, the heat transfer stops. This is called thermal equilibrium.

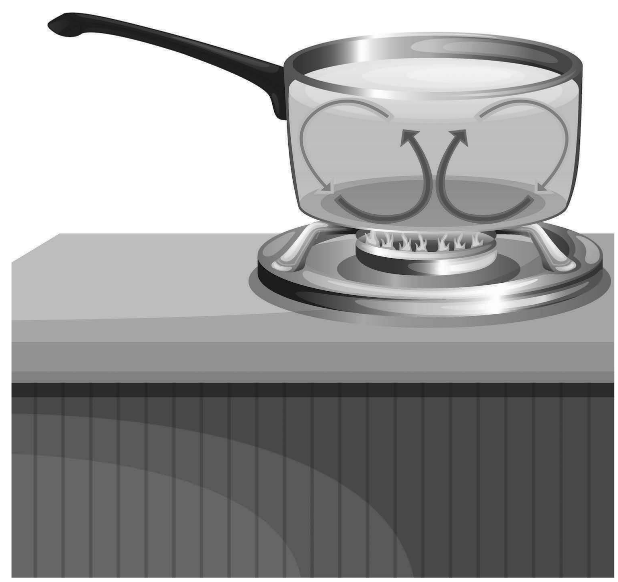
Solids, liquids and gases can all conduct heat. Conduction happens when particles bump into each other. Consider a cold metal spoon in a hot cup of coffee: The molecules in the coffee move freely and the metal molecules in the spoon vibrate. Since the coffee is hotter than the spoon, its molecules move more. The coffee molecules bump up against the spoon, transferring some of their energy to the spoon molecules. The spoon gets warmer and the coffee gets slightly cooler until both are at the same temperature. They are now in thermal equilibrium.

The two objects will remain at the same temperature unless something else adds or subtracts heat from them. In most cases, that something is the air in the room, which draws heat from the coffee. If allowed to sit, the coffee cup, the coffee and the spoon will all reach the same temperature as the surrounding air. They are once again at thermal equilibrium, but this time with their surroundings.

Some materials conduct heat better than others. Materials that conduct heat well, like metals, are called conductors. Materials that do not conduct heat well, like wood and plastic, are called insulators. This is why people choose wooden or plastic-handled spoons when cooking – they do not get as hot as metal spoons.

Convection

Convection is another type of heat transfer. It happens when heated molecules move from one place to another, taking heat with them. This only happens in fluids, such as liquids and gases.



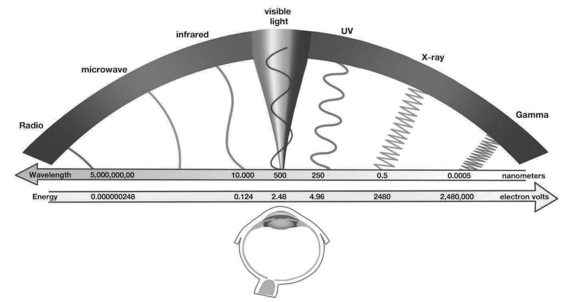
Consider a pot of water heating on a stove. Water near the bottom of the pot heats up first. Fluids expand when they heat up, so the water near the bottom expands. This means its molecules spread out and it becomes less dense.

Hotter, less-dense water begins to rise and takes the place of colder, denser water at the top. The colder, denser water sinks to the bottom. There, it is heated and the cycle gets repeated. The repeated movements of water are called convection currents. As time goes on, more of these convection currents develop, transferring heat throughout the liquid.

You can see these currents when you boil rice in water. Convection currents also allow heated air to circulate through a room.

Radiation

The third type of heat transfer is radiation, which involves the science of light. Scientists know that light can act as both a particle and a wave. When it acts as a wave, the waves are referred to as electromagnetic waves. There are many different types of electromagnetic waves. The waves have different amounts of energy based on how fast they vibrate up and down. Fast-vibrating waves have more energy than slow-vibrating waves.



Radiation is the transfer of heat through electromagnetic waves. All objects radiate some amount of heat as electromagnetic waves. Humans radiate energy as infrared light, which is too low-energy for us to see. However, we still feel it as heat – in fact, infrared radiation is commonly referred to as "heat rays." Hotter objects, like light bulbs and campfires, radiate higher-energy light that we can see.

Radiation can even transfer heat through space. The sun radiates heat through millions of miles of empty space down to Earth. Since the sun has a lot of thermal energy, it radiates many kinds of electromagnetic waves, including infrared light, visible light, ultraviolet light and X-rays. Ultraviolet light and X-rays are high-energy forms of light that we cannot see.

Quiz

1 What is MOST likely the reason the author included the description of the spoon in the hot coffee cup?

(A) to indicate that heat transfer always requires a liquid and a solid to work together

(B) to explain the process of heat transfer by conduction through an everyday situation

(C) to provide advice about using conduction to quickly cool down a hot beverage

(D) to compare the effectiveness of heat transfer in liquid with heat transfer in air

2 How does the author build understanding of convection?

(A) The author quotes the observations of scientists and teachers.

(B) The author lists the types of liquids that can become gases.

(C) The author describes the way currents develop in a pot of water.

(D) The author compares the materials that make the best conductors.

3 Which selection from the article is BEST illustrated by Image 1?

(A) The sun can transfer some of its thermal energy to ice, and this is what causes an ice cube to melt on a warm, sunny day. The movement of thermal energy from a hotter object to a colder object is called heat transfer.

(B) Materials that do not conduct heat well, like wood and plastic, are called insulators. This is why people choose wooden or plastic-handled spoons when cooking – they do not get as hot as metal spoons.

(C) Radiation is the transfer of heat through electromagnetic waves. All objects radiate some amount of heat as electromagnetic waves. Humans radiate energy as infrared light, which is too low-energy for us to see.

(D) However, we still feel it as heat – in fact, infrared radiation is commonly referred to as "heat rays." Hotter objects, like light bulbs and campfires, radiate higher-energy light that we can see.

4 How do Image 3 and the text in the section "Radiation” help the reader develop an understanding of light?

(A) by indicating the differences between light acting as a particle and light acting as a wave

(B) by indicating that fast-vibrating waves of light have more energy than slow-vibrating waves

(C) by illustrating the distance that UV light and X-rays must travel from the sun down to Earth

(D) by illustrating the range of colors that are within the spectrum of light visible to humans

Make It Yourself: Sun s'mores

By NASA.gov, adapted by Newsela staff on 05.26.17
Word Count **606**
Level **MAX**

With a solar oven, you can make a delicious s'more using the heat of the sun. Photo from: Wikimedia Commons. Illustrations: NASA Climate Kids, climatekids.nasa.gov

A solar oven is a box that traps some of the sun's energy to make the air inside the box hotter than the air outside the box. In other words, the solar oven is like a super greenhouse.

Using a solar oven, you can harness the energy of the sun to make a delicious treat: s'mores!

What You Will Need To Make The Solar Oven

A cardboard box with an attached lid. The lid should have flaps so that the box can be closed securely. The box should be at least 3 inches deep and big enough to set a pie tin inside.

Aluminum foil

Clear plastic wrap

Glue stick

Tape; transparent tape, duct tape or masking tape would all work

Stick (about 1 foot long) to prop open reflector flap (you can use a skewer, knitting needle or ruler as any stick-like object will work)

Ruler or straight edge

Box cutter or X-Acto knife (Only use these with adult assistance, please!)

What You Will Need To Make The S'mores

Graham crackers

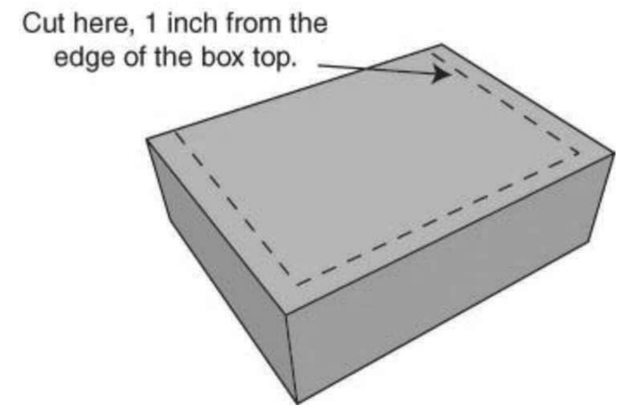
Large marshmallows

Plain chocolate bars (thin)

Aluminum pie pan

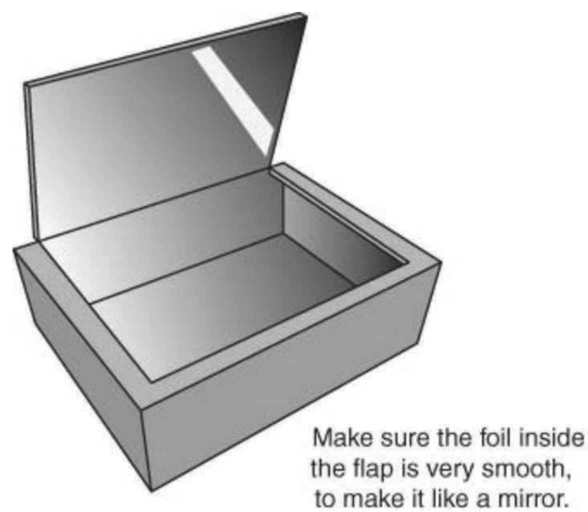
Napkins!

How To Make It



1. Ask an adult to assist you with this step. Using the straight edge as a guide, cut a three-sided flap out of the top of the box, leaving at least a 1-inch border around the three sides.

2. Cover the bottom (inside) of the flap with aluminum foil, spreading a coat of glue from the glue stick onto the cardboard first, and making the foil as smooth as possible.



3. Line the inside of the box with aluminum foil, again gluing it down, and making it as smooth as possible.

4. Tape two layers of plastic wrap across the opening you cut in the lid — one layer on the top and one layer on the bottom side of the lid.

5. Test the stick you will use to prop the lid up. You may have to use tape or figure out another way to make the stick stay put.

6. Set the oven in the direct sun, with the flap propped to reflect the light into the box. You will probably have to tape the prop in place. Pre-heat the oven for at least 30 minutes.

7. Break graham crackers in half to make squares. Place four squares in the pie pan. Place a marshmallow on each.

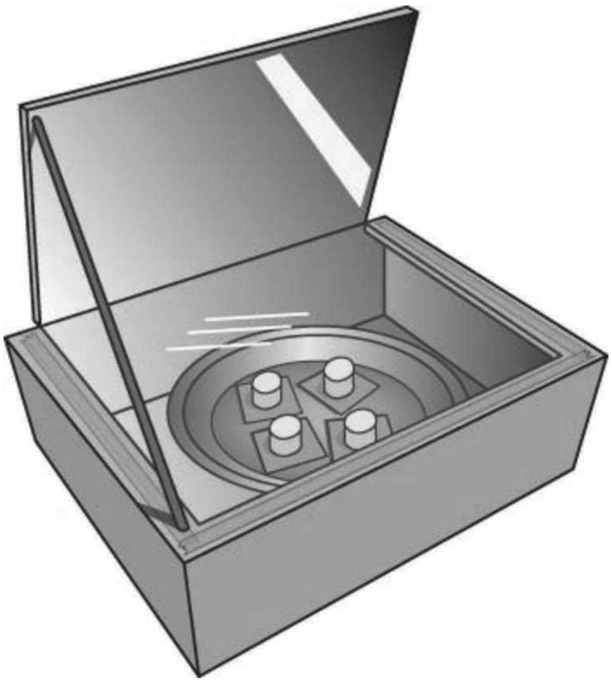
8. Place the pan in the pre-heated solar oven.

9. Close the oven lid (the part with the plastic wrap on it) tightly, and prop up the flap to reflect the sunlight into the box. Depending on how hot the day is, and how directly the sunlight shines on the oven, the marshmallows will take 30 to 60 minutes to get squishy when you poke them.

Two layers of plastic wrap over the opening will help keep heat in, while still letting all the light shine through.

10. Then, open the oven lid and place a piece of chocolate (about half the size of the graham cracker square) on top of each marshmallow. Place another graham cracker square on top of the chocolate and press down gently to squash the marshmallow.

11. Close the lid of the solar oven and let the sun heat it up for a few minutes more, just to melt the chocolate slightly.



12. Finally, take out your s'mores and enjoy!

Quiz

1 Read the section "How To Make It." Select the paragraph that suggests the temperature outside affects the length of time it takes to cook food in a solar oven.

2 Which section of the article suggests that the project might have messy ingredients?

(A) Introduction [paragraphs 1-2]

(B) "What You Will Need To Make The Solar Oven"

(C) "What You Will Need To Make The S'mores"

(D) "How To Make It"

3 Fill in the blank in the sentence below. In the opening paragraphs, the author ________________________________.

(A) explains how the solar oven affects the air around the box

(B) gives background information on how solar ovens function

(C) describes in detail how to make s'mores with a solar oven

(D) shows the difference between solar ovens and greenhouses

4 How does the section "What You Will Need To Make The Solar Oven" relate to the section "How To Make It"?

(A) Both sections explain how to cut the box with an X-Acto knife.

(B) Both sections name three types of tape that can be used.

(C) Both sections list the ingredients required to make s'mores.

(D) Both sections mention the project requires the help of a grown-up.

Underwater volcanoes and the ecosystems they create

By National Geographic Society, adapted by Newsela staff on 03.04.20

Word Count **871**

Level **820L**

Image 1. A volcanic eruption in the South Pacific Ocean created a new island in Tonga. This unnamed land mass is the newest island on Earth and is already home to a small number of plants and animals. Photo: Edwina Pickles/The Sydney Morning Herald/Fairfax Media via Getty Images

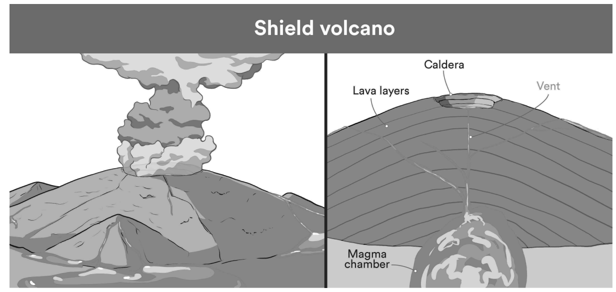
From Hawaii to Indonesia to Iceland, hundreds of islands have been formed by submarine volcanoes. These volcanoes are exactly what they sound like. They are volcanoes located beneath the surface of the ocean.

Submarine volcanoes erupt into water instead of air. For this reason, they behave quite differently than volcanoes on land. For example, it is uncommon for submarine volcanoes to have explosive eruptions. The weight of the water above them creates very high pressure. Instead of explosive eruptions, the volcanoes usually produce passive lava flows. The lava leaks out along the seafloor. Most submarine eruptions do not disturb the ocean surface.

Studying Submarine Volcanoes

Charles Mandeville is a scientist. He works for the Volcano Hazards Program of the United States Geological Survey (USGS). He and his fellow scientists monitor all 169 active volcanoes in the United States. Before he joined USGS, Mandeville studied submarine volcanoes. He became an expert on the famous 1883 eruption of the island of Krakatoa in Indonesia.

Mandeville says there are two main factors that contribute to submarine volcanoes forming islands. One is the supply of magma, or melted rock beneath Earth's crust. The other is tectonic activity. Earth's top layers are the crust and the mantle. They are divided into 15 major tectonic "plates" that cover the planet's surface. These plates are always moving very slowly. Magma sometimes rises up through the gaps between them.



Most volcanic islands are created by passive lava flows on the seafloor. These flows cool and harden into rock. Over millions of years, they build up the height of underwater mountains. Some of these underwater mountains eventually form islands.

Volcanic Island Ecosystems

Formed from nothing but rock, volcanic islands have surprisingly lively ecosystems.

These ecosystems evolve over millions of years, along with the island itself. Life on volcanic islands starts with tiny organisms called bacteria. They are the most basic forms of life.

Species from nearby landforms also contribute to the developing ecosystem. Passing birds might stop to nest on the new island. They might bring seeds from the mainland or other islands. Plant life can float through the ocean to end up on the island's shores.

Since they evolve in such an isolated environment, many organisms are considered to be endemic species. That means they are native to a particular area. The finches endemic to the Galapagos Islands are one famous example of this. These birds are found only in the isolated Galapagos. The Hawaiian Islands are even more isolated. They have more than 1,000 endemic plant species.

World's Youngest Island

One of the world's newest volcanic islands is part of the island nation of Tonga. Tonga is a collection of 170 volcanic islands. They are located in the South Pacific Ocean. After an explosive eruption in 2009, a new landmass formed. The eruption covered the nearby island of Hunga Ha'apai in black, volcanic ash.

Days later, there was a second, smaller eruption between Hunga Ha'apai and the new landmass. It combined with rock from the first eruption to fill the space between the two. The result was a single landmass. It was nearly double the original size of Hunga Ha'apai.

Before the eruption, Hunga Ha'apai had rich plant and animal life. The ash devastated its ecosystem. It is unclear whether larger life forms will return to the newly expanded island.

It is also unclear if the island itself will remain. "The wind and the waves are constantly trying to erode that island back below sea level," Mandeville says. New lava flows will be needed to restore the land.

Increasing the height of the island above sea level is critical. It will allow birds from nearby islands to "seed the new island with life," Mandeville says.

In the years since the eruption, the young island has maintained itself above sea level. However, it has not grown significantly. The island is still attached to Hunga Ha'apai and is in the very early stages of developing an ecosystem. Other submarine volcanoes near Tonga remain active.

Fast Facts:

Heat Wave

Autotrophic bacteria are tiny organisms that produce their own food. A large number of them live near submarine volcanoes. These bacteria are considered chemosynthetic. That means they produce food from chemical reactions usually involving carbon dioxide, oxygen or hydrogen. Scientists have identified some bacteria that can survive in extreme temperatures.

Survival Mode

Charles Mandeville of the USGS Volcano Hazards Program says: "The wind and the waves are constantly trying to erode that island back below sea level." Only one thing can stop the island from disappearing. New lava flows must restore the land that has been worn away.

URL: https://www.nationalgeographic.org/news/geology-deep/

Quiz

1 How do submarine volcanoes form? How do you know?

(A) Submarine volcanoes are produced by lava flows deep in the ocean. “Most volcanic islands are created by passive lava flows on the seafloor.”

(B) Submarine volcanoes develop after big explosions destroy another nearby island. “After an explosive eruption in 2009, a new landmass formed.”

(C) Submarine volcanoes form from islands that have been worn away. “New lava flows must restore the land that has been worn away.”

(D) Submarine volcanoes begin to grow from tiny organisms. “Life on volcanic islands starts with tiny organisms called bacteria.”

2 Read the section "Studying Submarine Volcanoes."

Which sentence from the section shows WHY volcanic activity occurs along tectonic plates?

(A) Earth's top layers are the crust and the mantle.

(B) They are divided into 15 major tectonic "plates" that cover the planet's surface.

(C) Magma sometimes rises up through the gaps between them.

(D) These flows cool and harden into rock.

3 What effect did the volcanic eruption in Tonga have on Hunga Ha'apai?

(A) It eroded the island all the way down to sea level.

(B) It increased the island's height and it is now the tallest island.

(C) It destroyed all life forms and only large animals will return.

(D) It caused major damage to the island’s ecosystem.

4 According to the section “Volcanic Island Ecosystems,” how do nearby landforms HELP the development of new volcanic islands?

(A) Nearby landforms do not have an effect on new volcanic islands because life will not grow there for millions of years.

(B) Tiny organisms from nearby landforms jump to the new volcanic islands and begin to grow ecosystems rapidly.

(C) Animals from nearby landforms can bring seeds and their plants can float over to the new island.

(D) Nearby landforms send their endemic species but they have trouble surviving on the new volcanic island.

Breaking up is hard to do: Africa may eventually split into two continents

By Doyle Rice, USA Today, adapted by Newsela staff on 05.03.18

Word Count **464**

Level **MAX**

Image 1. Vehicles drive next to a deep split on a repaired road that had been washed away during a heavy downpour at Maai-Mahiu, Kenya, on March 15, 2018. Photo by: Tony Karumba, AFP/Getty Images

Africa is breaking up. It isn't happening soon though. It will take tens of millions of years. But, the continent may eventually split into two parts.

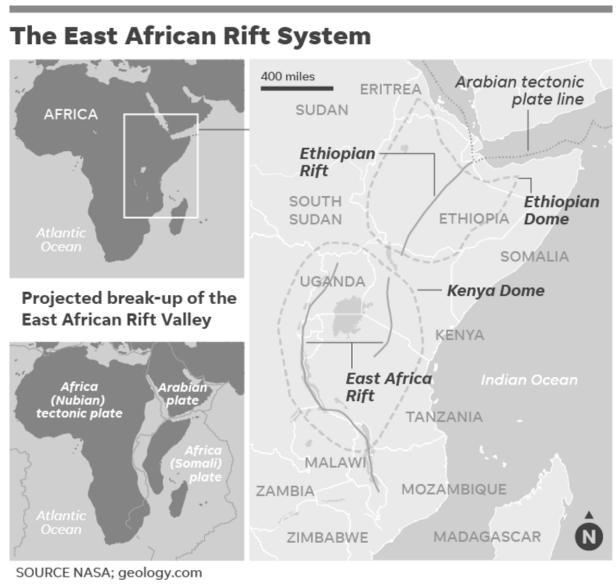
Geologists have known about this possibility for a while. It became news recently. A large crack stretching several miles in length made a sudden appearance in southwestern Kenya following heavy rain.

The tear continues to grow. It collapsed part of a highway. Lucia Perez Diaz is a postdoctoral researcher on tectonic plates. She works at the Royal Holloway, University of London. The crack "was accompanied by seismic activity in the area," said Lucia Perez Diaz.

The crack is located in a region known as the East African Rift Valley. It measures more than 50 feet in depth and 65 feet across, according to National Geographic. A rift valley refers to a lowland region. This is where tectonic plates rift, or move apart.

Stretching from the Gulf of Aden in northern Africa down to the country of Zimbabwe in the south, the East African Rift Valley is over 1,800 miles long. The rift splits the plate into two unequal parts. There is the smaller Somali plate and the much larger Nubian plate, Perez Diaz noted.

Eventually, the rift should expand and break Africa into two continents. The smaller continent will include the present-day eastern Africa countries of Somalia and parts of Kenya, Ethiopia and Tanzania. The bigger one will include the rest of Africa



"A rift like this once eventually separated the African and South American continents to form the Atlantic Ocean, and the rift in east Africa may be the very early stages of this," said Christy Till. She is a geologist at Arizona State University. "The process just occurs very slowly and takes millions of years."

In the United States, the southwest is sliced by the Rio Grande Rift Valley, which stretches from Chihuahua, Mexico, to Colorado, according to National Geographic. Its formation, roughly 30 million years ago, is responsible for the Rio Grande River bordering the southern United States.

Rifting can be dramatic at times, causing "sudden motorway-splitting faults or large catastrophic earthquakes that may give continental rifting a sense of urgency," says Perez Diaz. But most of the time, "it goes about splitting Africa without anybody even noticing."

Quiz

1 The sentence below helps prove the claim that the rifting process is usually a gradual process.

> *"The process just occurs very slowly and takes millions of years."*

Which sentence from the section provides further support for the claim?

(A) A large crack stretching several miles in length made a sudden appearance in southwestern Kenya following heavy rain.

(B) It measures more than 50 feet in depth and 65 feet across, according to National Geographic.

(C) Its formation, roughly 30 million years ago, is responsible for the Rio Grande River bordering the southern United States.

(D) But most of the time, "it goes about splitting Africa without anybody even noticing."

2 Which sentence in the article supports the conclusion that rifts can occur quickly and without warning?

(A) Stretching from the Gulf of Aden in northern Africa down to the country of Zimbabwe in the south, the East African Rift Valley is over 1,800 miles long.

(B) "A rift like this once eventually separated the African and South American continents to form the Atlantic Ocean, and the rift in east Africa may be the very early stages of this," said Christy Till.

(C) In the United States, the southwest is sliced by the Rio Grande Rift Valley, which stretches from Chihuahua, Mexico, to Colorado, according to National Geographic.

(D) Rifting can be dramatic at times, causing "sudden motorway-splitting faults or large catastrophic earthquakes that may give continental rifting a sense of urgency," says Perez Diaz.

3 What is MOST likely the reason the author included the information about the rift between South America and Africa?

(A) to describe one of the worst earthquakes that Earth has ever seen

(B) to highlight the idea that rifts can have enormous long-term consequences

(C) to explain why so many people were confused about how quickly the rift formed

(D) to teach readers more about South America and why it is similar to Africa

4 Read the selection below.

> *Eventually, the rift should expand and break Africa into two continents. The smaller continent will include the present-day eastern Africa countries of Somalia and parts of Kenya, Ethiopia and Tanzania. The bigger one will include the rest of Africa.*

Why did the author include this selection?

(A) to demonstrate that the rift is breaking apart more swiftly than geologists predicted

(B) to describe how dangerous the rift in Africa is for the people who live near it

(C) to elaborate on what will eventually happen to Africa as a result of the growing rift

(D) to explain that the rift in Africa will create two different continents in the near future

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Experiment: Exploring the erosive energy of waves

By Scientific American on 03.14.20
Word Count **523**
Level **MAX**

Use these items to learn about erosion, which is the gradual wearing away or loss of land.

A day at the beach is a wonderful way to spend time with your family and friends. You can swim, play games and build sand castles. But have you ever wondered how the beach you are standing on came to be? How, for example, did all of that sand get there? Beaches are formed and continually changed by the ocean's waves moving rock particles onshore, offshore and along the shore. In this activity, you can investigate how beach formations are made by some parts of a beach that can resist erosion from the waves more than other parts.

Materials

Paint-roller pan

Measuring cup

Sand

Water

Timer

Digital camera

Plastic 500-milliliter water bottle (empty)

Adult volunteer to help take pictures

Small gravel, such as aquarium gravel

Preparation

1. Cover the bottom of the paint-roller pan with five cups of sand. Build up a beach with most, but not all, of the sand at the shallow end of the pan.

2. Slowly pour six cups of water into the deep end of the pan. Let the water and sand settle for five minutes. How has the beach changed during this time?

Procedure

1. Take a picture of your beach so that you have a record of how it looked in its original state. Where is the shoreline (the area where beach and water meet)?

2. Lay a plastic bottle horizontally so it is floating in the water in the deep end of the pan.

3. For two minutes bob the water bottle up and down with your fingertips to create waves. If the waves get so big that water splashes out of the pan, make them smaller. How does the water swirl? How does the shoreline change after one minute? What about after two minutes?

4. After two minutes of bobbing the bottle, take a picture of the beach. How does it look compared with the first picture?

5. Empty, clean and dry the paint-roller pan. Prepare a "beach" again, as you did for the preparation. When the beach is complete, make a "headland" by creating a mound out of two cups of small gravel in the middle of the shoreline. The headland should be partly in the water and partly on the beach. Take a picture of the beach with the headland.

5. Again, lay the plastic bottle horizontally so it is floating in the water. For two minutes, bob the water bottle up and down with your fingertips. Again, if the waves are so big that water splashes out, make them smaller. How does the water swirl? How does the shoreline change after one minute? What about after two minutes?

6. After two minutes, take a picture of the beach. How does it look compared with the previous picture?

How does the headland affect where the water goes? How does it affect how much the shoreline erodes?

Observations And Results

Did the shoreline erode, or recede from the water, after you bobbed the water bottle up and down for two minutes? Did most of the shoreline erode less when there was a headland, especially the shoreline closest to it?

Quiz

1) Did the shoreline erode, or recede from the water, after you bobbed the water bottle up and down for two minutes?

2) Did most of the shoreline erode less when there was a headland, especially the shoreline closest to it?

3) Based on your observations, explain how beach formations in some parts of a beach can resist erosion from the waves more than other parts.

newsela

Ecosystem superheroes: Sea otters help keep coastal waters in check

By The Guardian, adapted by Newsela staff on 11.14.19

Word Count **896**

Level **810L**

Image 1. A sea otter family. Photo by: Verlisia via Getty Images

James Estes is an American marine biologist. He has studied wildlife in the North Pacific Ocean for the past 45 years. During that time, he has showed how predators can change their environments.

Ecosystems are made up of many organisms. They have complex relationships with each other. A trophic cascade is when a top predator is added or removed from an ecosystem. This changes the population of its prey and other organisms.

Trophic cascades are a powerful and important force. They shape the natural history of our planet. Yet human activity is continuing to impact wildlife populations. We are creating trophic cascades with unexpected consequences. Estes knows this first hand after studying sea otter populations in the north Pacific.

Sea Otters Were Once Hunted For Their Fur

Estes has spent most of his working life in the isolated Aleutian Islands. They stretch across the North Pacific Ocean from Alaska to the coast of eastern Russia.

The islands might seem isolated. But humans have had an influence. Beginning about 200 years ago, hunters moved into the Aleutians looking for sea otters pelts. The animals once thrived there. Back then, there were hundreds of thousands of otters.

The sea otter (Enhydra lutris) is a member of the weasel family. It stays warm in the water because it has the densest fur in the animal kingdom. There are about 850,000 to a million hairs per square inch. This keeps otters insulated from the cold.

However, the sea otter's thick, rich pelt also made it a major target for fur hunters. By the 1900s, hunters had brought the animal close to extinction. Only about a dozen colonies survived. Then, came an international ban on sea otter hunting. This saved the animal from extinction.

Studying Sea Otter Habitat

Sea otters have a massive appetite. An adult animal needs to consume vast amounts of food to survive. It needs to eat about a quarter of its own body weight every day. This could be up to 11 kilograms (24 pounds) of food.

Sea otters mainly eat sea urchins. They also eat crabs and other shellfish. Otters open these sea creatures with flat stones.

Estes wanted to know what happened to the ecosystem after sea otter populations declined. So he began studying the sea floors around islands where sea otters had survived. He also studied areas where they had disappeared.

Islands without sea otters had huge urchins that littered the barren seafloor. The underwater forests of kelp that once grew there had disappeared. The urchins consumed every kelp plant in sight. "Our results were eye-opening," he says.

By contrast, kelp flourished on nearby islands where sea otters survived or had been reintroduced. Estes found similar results elsewhere. Islands with sea otters had healthy kelp forests. Islands without otters had barren sea floors littered with sea urchins and no kelp.

In removing sea otters from the north Pacific, humans had endangered the species. They also disrupted a large chunk of the Pacific marine environment.

The Keepers Of Kelp Forests

Sea otters are a keystone species. These are important species that ecosystems depend on. Sea otters keep the kelp forest ecosystem healthy. This helps local species, as kelp forests support fish, mussels and microorganisms.

Kelp forests also help the global environment. Human activity is leading to more carbon dioxide in the atmosphere. This cause an increase in global temperatures. Carbon dioxide is also absorbed by the ocean, making it more acidic. This harms many species. Yet kelp forests use carbon dioxide to make their own food in a process called photosynthesis. Estes has calculated that healthy kelp forests have the capacity to absorb billions of kilograms of carbon.

Sea Otter Numbers And Threat Of Killer Whales

Fortunately sea otters were saved from extinction. Or at least it seemed that way in the 1980s and 1990s. Then Estes made a second disturbing discovery. He returned to the Aleutian islands of Adak and Amchitka. There, sea otter numbers had been steadily rising. But now he found their populations were dwindling.

Estes looked elsewhere in the same chain of islands. He found that some sites still had healthy populations. They included the islands of Clam Lagoon on Adak. However, most others showed population declines. He calculated that about 40,000 sea otters had disappeared in a few years. And when sea otter numbers dropped, urchins reappeared. Kelp forests began to disappear again.

Estes and another scientist, Tim Tinker, determined that killer whales were eating sea otters. Estes looked at the history of other species in the region. He discovered that when killer whale populations targeted an animal species, the population dropped. This happened with sea otters in the 1990s. It happened with seals and sea lions in the 1970s and 1980s. Why?

Estes determined that commercial whaling after the second world war was the cause. Before commercial whaling, killer whales fed on great whales of the North Pacific and southern Bering Sea, says Estes. By the time commercial whaling stopped, there were virtually no great whales left for killer whales to eat. So, they expanded their diet first to seals, sea lions and sea otters.

With the addition of killer whales, it seems a new top predator has appeared in the ecosystem. This shows how viewing the food web from the top to the bottom allows us to better understand nature and its complex relationships.

Quiz

1 Which is an example of a trophic cascade?

(A) Kudzu is a plant that was brought to the U.S. to help with erosion. It crowds out other plants. Fewer types of plants and animals live in an area overrun with kudzu.

(B) Wolves were returned to Yellowstone National Park. The wolves mainly preyed on deer, which then avoided open areas around streams. More willow trees started to grow on stream banks.

(C) Eastern elk were hunted to extinction. Western Rocky Mountain elk have been moved to places where Eastern elk lived. The western elk populations are growing.

(D) The chestnut blight is a fungus that came on lumber from China. The fungus attacked American chestnut trees. There were fewer chestnuts available to wildlife.

2 Read the following paragraph from the section "Studying Sea Otter Habitat."

> *Islands without sea otters had huge urchins that littered the barren seafloor. The underwater forests of kelp that once grew there had disappeared. The urchins consumed every kelp plant in sight. "Our results were eye-opening," he says.*

Which word from the paragraph helps the reader to understand the meaning of "barren"?

(A) huge

(B) littered

(C) disappeared

(D) eye-opening

3 What is the order of these events in the Pacific?

1. *Kelp populations declined.*
2. *Sea otter populations declined*
3. *Sea urchin populations increased.*
4. *Sea otters were hunted for their pelts.*

(A) 1, 3, 2 then 4

(B) 2, 1, 4 then 3

(C) 4, 2, 3 then 1

(D) 4, 3, 1 then 2

4 Read the following paragraph from the section "Sea Otter Numbers And Threat Of Killer Whales."

> *Fortunately sea otters were saved from extinction. Or at least it seemed that way in the 1980s and 1990s. Then Estes made a second disturbing discovery. He returned to the Aleutian islands of Adak and Amchitka. There, sea otter numbers had been steadily rising. But now he found their populations were dwindling.*

What is the meaning of the word "dwindling" as it is used in the paragraph above?

(A) separating

(B) changing

(C) developing

(D) shrinking

5 Which statement from the article provides an explanation of how sea otters can affect the atmosphere?

(A) Sea otters keep kelp forests healthy. Kelp forests use carbon dioxide to make their own food in a process called photosynthesis.

(B) Human activity is leading to more carbon dioxide in the atmosphere. This causes an increase in global temperatures.

(C) Commercial whaling caused a decrease in great whales and caused killer whales to change their diet and eat sea otters.

(D) Human activity is continuing to impact wildlife. Humans are creating trophic cascades with unexpected consequences.

6 Read the article's introduction [paragraphs 1-3] and the final three paragraphs of the article.

What is one connection between these two selections?

(A) They both explain how gaining or losing top predators changes ecosystems.

(B) They both describe ways in which sea otter populations and their ecosystems have changed over time.

(C) They both outline specific human activity that has had negative consequences on ecosystems.

(D) They both define the term "trophic cascade" and provide examples that illustrate its impact on ecosystems.

7 A sea urchin weighs an average of 1 pound.

How many sea urchins would an adult otter consume in two days?

(A) 20

(B) 24

(C) 40

(D) 48

8 If the section "Studying Sea Otter Habitat" was organized as cause and effect, which paragraph would come FIRST?

(A) Estes wanted to know what happened to the ecosystem after sea otter populations declined. So he began studying the sea floors around islands where sea otters had survived. He also studied areas where they had disappeared.

(B) Islands without sea otters had huge urchins that littered the barren seafloor. The underwater forests of kelp that once grew there had disappeared. The urchins consumed every kelp plant in sight. "Our results were eye-opening," he says.

(C) By contrast, kelp flourished on nearby islands where sea otters survived or had been reintroduced. Estes found similar results elsewhere. Islands with sea otters had healthy kelp forests. Islands without otters had barren sea floors littered with sea urchins and no kelp.

(D) In removing sea otters from the North Pacific, humans had endangered the species. They also disrupted a large chunk of the Pacific marine environment.

10 interesting things about ecosystems

By NASA.gov, adapted by Newsela staff on 02.09.17
Word Count **968**
Level **MAX**

A school of fish swims by staghorn coral on the Great Barrier Reef in Australia. Photo from: Rick Loomis/Los Angeles Times via Getty Images.

An ecosystem is a community that includes all of the living organisms in a certain area and the environment in which they live. Ecosystems are made up of plants, animals, microorganisms, soil, rocks, minerals and water sources. Some are small, like a vegetable garden on a farm or in your backyard. Others are vast, like an entire desert or rainforest. All of the plants and animals that live in the ecosystem together rely on each other for their survival.

Here are 10 fascinating facts about different types of ecosystems.

Coral Reefs Are Beautiful And Fragile

Coral reefs are busy underwater ecosystems. Some people call them the "rain forests of the sea." The corals look like rocks but actually are animals. They have hard calcium carbonate skeletons like clams. They form a base for lots of other organisms to live. You'll find crabs, sea stars, worms, clams, sponges, jellies, sea turtles and lots of fish. Coral reefs are complicated and very fragile. They are easily affected by pollution.

Half The World's Species Live In Tropical Rain Fo ts

Tropical rain forests are near the equator where it's almost always warm and wet. These are the key ingredients for making lots of lush plants and trees. Half of the whole world's species — types of living things — live in tropical rain forests. It's a very complex ecosystem with many kinds of plants, animals, fungi and microscopic organisms. Many of them live here and nowhere else. The plants in tropical rainforests produce 40 percent of Earth's oxygen.

To Live In The Desert, You Have To Save Water

In the world's many deserts, there is very little rain. The land is very, very dry. Here, living things have creative ways of finding and saving water. Cactuses are very good at storing water. They can live without rain for months. The kangaroo mouse lives in the Nevada desert. It never needs to drink water. It can get all its water from the seeds it eats.

Grasslands Are All Around

Every continent except Antarctica has grasslands. These are areas with medium rainfall. You'll find many different types of tall grasses, herbs and flowers all mixed together. From the savannas of Africa to the prairies of Kansas, grasslands are home to lots of different species that live in the soil, feed on the grass or eat the animals that eat the grass. In the United States, that could be buffalos and cows. In Africa, it's gazelles, lions and elephants.

Freshwater Ecosystems Have Rare Species

Ponds, lakes, streams and rivers are home to lots of different species that can't inhabit salty ocean water. There are freshwater ecosystems all over the world. They are home to some amazing creatures. There are many kinds of frogs, fish, insects and microscopic organisms like amoebas. And there are rare species like river dolphins in Asia and South America, otters in North America, beavers in North America and Europe and platypuses in Australia.

In The Tundra, Life Is Tough

In the tundra, it feels like winter all the time. Tundra occurs near the north and south poles of our planet. We call them the Arctic and Antarctic tundras. There is also tundra at the top of the world's tallest mountains. It's a brutal place to live. There are short but hardy shrubs, mosses and lichens. In the Arctic tundra, there are polar bears, foxes and reindeer. In the Antarctic tundra, there are seals and penguins resting on the shores between swims in the ocean.

The Bottom Of The Ocean Has Thriving Communities

At the bottom of the ocean, there are small underwater volcanoes spewing scalding hot water, gases and chemicals like methane and ammonia hey're called hydrothermal vents. It's a dark place to live, but some animals love it there. Giant tube worms over 6 feet (1.8 meters) long, clams and shrimp call these vents home. The tube worms have bacteria inside them that make food out of the methane and ammonia from the vents.

Wetlands Are Home To Baby Fish

Swamps, marshes and bogs are types of wetlands. Wetlands can have freshwater, salt water, or a mixture of both. They are home to lots of different aquatic plants and animals. Wetlands can serve as nurseries for lots of animals. Fish, frogs, alligators and crocodiles lay eggs here. It's a great place for the babies to hatch and grow. They are also home to many different kinds of insects like dragonflies.

Boreal Forests Are Home To Lots Of Trees

Much of North America, Europe and Asia is in a temperate region, between the Arctic and subtropics. Here, the weather is generally not too hot, not too cold, with distinct seasons. There are many big forests. The trees here are usually pine, spruce and larch. They are green all year around and have needles instead of leaves. Animals like bears, porcupines and eagles make homes in these vast forests.

There Are Ecosystems Even In Big Cities

Big cities around the world have interesting ecosystems, too. There are many animals that share living spaces with people near roads, houses and buildings. In many cities, raccoons, coyotes, opossums, skunks, foxes, birds and all sorts of insects are common neighbors. And in some places, people build wildlife crossings. These are special bridges over roads that animals can use. It lets them move between places without getting hurt by cars.

Quiz

1 Read the summary below. Choose the answer that BEST fits into the blank to complete the summary.

An ecosystem is an environmental community that includes all of the plants, animals and terrain in the area.

__________________ __________________

Some ecosystems are land-based, like a rainforest or even a garden, and others are water-based, like an ocean or river.

(A) There are ten different ecosystems that animals call home.

(B) Large cities are even considered to be busy ecosystems.

(C) There are many different types of ecosystems around the world.

(D) Most ecosystems have a wide variety of plants and animals.

2 The author MAINLY explains the importance of each one of the ecosystems by:

(A) explaining how humans have affected each ecosystem

(B) describing how living things are able to survive in each ecosystem

(C) providing a vivid description of the plant life in each ecosystem

(D) comparing and contrasting the challenges of each ecosystem

3 Read the section "Half The World’s Species Live In Tropical Rain Forests." Select the sentence that MOST suggests that people need rainforests.

(A) Tropical rainforests are near the equator where it’s almost always warm and wet.

(B) Half of the whole world’s species — types of living things — live in tropical rainforests.

(C) It’s a very busy ecosystem with many kinds of plants, animals, fungi and microscopic organisms.

(D) The plants in tropical rainforests produce 40 percent of Earth’s oxygen.

4 Read the section "Coral Reefs Are Beautiful And Fragile." Which sentence helps the reader understand that human activities can hurt coral reefs?

(A) Some people call them the “rainforests of the sea.”

(B) They have hard calcium carbonate skeletons like clams.

(C) Coral reefs are complicated and very fragile.

(D) They are easily affected by pollution.

Caught On Camera: The lesser long-nosed bat

By bioGraphic, adapted by Newsela staff on 10.19.17
Word Count **437**
Level **MAX**

As they follow — and mentally map — flowering agaves from Arizona to Mexico, lesser long-nosed bats also pollinate these plants. Photo by: Alexander Badyaev.

Every autumn, hundreds of thousands of lesser long-nosed bats embark on an impressive journey. They begin a 2,000-mile migration between southern Arizona and Mexico. Their migration schedule and route— known as the "nectar corridor"—are dictated by the flowering season and distribution of agave plants. These plants depend on the nectar-feeding bats for pollination.

"Mapping" Flowering Agaves

Flowering agaves are also known as century plants due to their notoriously infrequent blooming. They are a patchy food source. So the bats typically spend several hours each evening flying high over hundreds of kilometers of Sonoran desert. They mentally "map" the distribution and status of emerging flower stalks.

Once their work surveying the stalks is done, the bats dedicate the rest of the night to feeding. Each bat makes as many as a hundred descents to the blooming agaves over the course of the night.

Often, the bats hover over the flowers in pairs, as seen in the photo above. They quickly lap nectar and pollen from this rich but fleeting food source. About half of the calories consumed during these feeding visits are required simply to replenish energy burned during high-altitude mapping flights.

Often Mistaken For Vampire Bats

The bats were once widely feared. They were often mistaken for vampire bats in the rural communities where they roost. But today, lesser long-nosed bats are attaining something of a hero-like status. That is thanks to their critical role in pollinating—and maintaining genetic diversity among—agave plants. These plants are used to make alcohol products such as tequila and mezcal.

Even so, according to The International Union for Conservation of Nature (IUCN), the species still faces numerous threats. These include the disturbance of roosts, hunting and especially "loss of food sources through land clearing and human exploitation." The bats have a wide distribution throughout much of Mexico. Still, the U.S. Fish and Wildlife Service has listed the lesser long-nosed bat as endangered.

Scientists Working To Protect The Bats

The scientist Alex Badyaev captured the photo above in Arizona's Sonoran Desert. Scientists like Badyaev are working to ensure the bats' continued survival. They are mapping the bats' migration routes and identifying the most important areas to protect. The accuracy of this work is almost as important to the scientists as it is to the bats. Quality data about the location and status of blooming agaves can mean the difference between observing a nectar-drinking bonanza and spending a lonely night in the pitch-dark desert.

Quiz

1. Which paragraph in the section "Mapping Flowering Agaves" supports the conclusion that the food-finding process for bats is difficult?

2. Which sentence from the article BEST supports the idea that lesser long-nosed bats help protect the desert environment?

   (A) Their migration schedule and route— known as the “nectar corridor”—are dictated by the flowering season and distribution of agave plants.

   (B) But today, lesser long-nosed bats are attaining something of a hero-like status.

   (C) That is thanks to their critical role in pollinating—and maintaining genetic diversity among—agave plants.

   (D) They are mapping the bats' migration routes and identifying the most important areas to protect.

3. Which sentence from the article would be MOST important to include in a summary of the article?

   (A) These plants are used to make alcohol products such as tequila and mezcal.

   (B) Even so, according to The International Union for Conservation of Nature (IUCN), the species still faces numerous threats.

   (C) The scientist Alex Badyaev captured the photo above in Arizona’s Sonoran Desert.

   (D) The accuracy of this work is almost as important to the scientists as it is to the bats.

4. Read the following detail from the article.

   They quickly lap nectar and pollen from this rich but fleeting food source. About half of the calories consumed during these feeding visits are required simply to replenish energy burned during high-altitude mapping flights.

   HOW does this detail develop the central idea of the article?

   (A) by showing the difficulties that lesser long-nosed bats face when trying to eat a healthy and nutritious diet

   (B) by arguing that lesser long-nosed bats would survive better with a more plentiful food source

   (C) by demonstrating why it is so important to protect known habitats of agave plants

   (D) by giving an example of why lesser long-nosed bats are becoming endangered through human activity

The pyramid of life

By Regina Bailey, ThoughtCo.com, adapted by Newsela staff on 08.06.19
Word Count **807**
Level **MAX**

Ecosystems such as the one pictured here involve relationships between living organisms and their environment. The ecosystems represent one level of the pyramid of life. Photo by: Bill Dickinson/Getty Images

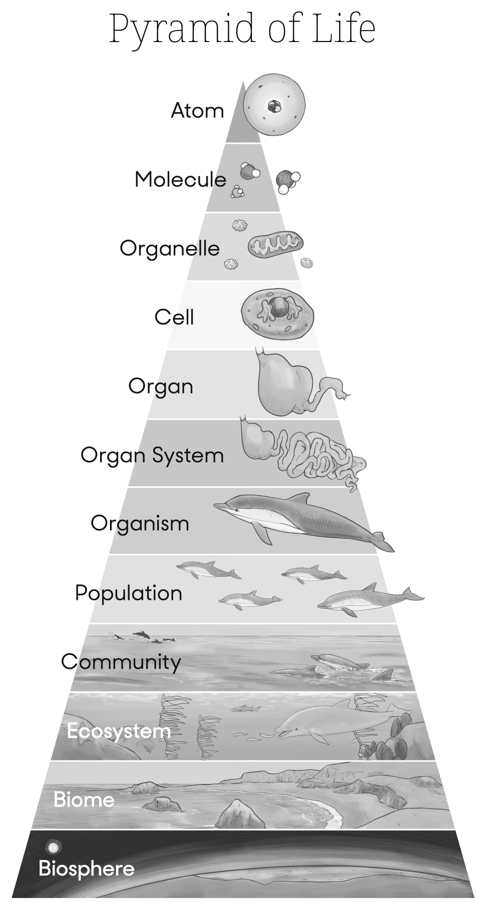
When you look at a pyramid, you'll notice that its broad base gradually narrows as it extends upward. The same holds true for the organization of life on Earth. At the base of this hierarchical structure is the most inclusive level of organization, the biosphere. As you climb the pyramid, the levels become less encompassing and more specific. Let's take a look at this hierarchical structure for the organization of life, starting with the biosphere at the base and culminating with the atom at the peak.

Hierarchical Structure Of Life

Biosphere: The biosphere includes all of the Earth's biomes and all living organisms within. This includes areas on the Earth's surface, below the Earth's surface and in the atmosphere.

Biome: Biomes encompass all of the Earth's ecosystems. They can be divided into regions of similar climate, plant life and animal life. Biomes consist of both land biomes and aquatic biomes. The organisms in each biome have acquired special adaptations for living in their specific environment.

Ecosystem: Ecosystems involve interactions between living organisms and their environment. This includes both living and nonliving material in an environment. An ecosystem contains many different types of communities. Extremophiles, for example, are organisms that thrive in extreme ecosystems such as salt lakes, hydrothermal vents and in the stomachs of other organisms.



Community: Communities consist of different populations (groups of organisms of the same species) in a given geographic area. From people and plants to bacteria and fungi, communities include the living organisms in an environment. The different populations interact with and influence one another in a given community. Energy flow is guided by the food webs and food chains in a community.

Population: Populations are groups of organisms of the same species living in a specific community. Populations may increase in size or shrink depending on a number of environmental factors. A population is limited to a specific species. A population could be a species of plant, species of animal or a bacterial colony.

Organism: A living organism is a single individual of a species that exhibits the basic characteristics of life. Living organisms are highly ordered and have the ability to grow, develop and reproduce. Complex organisms, including humans, rely on the cooperation between organ systems to exist.

Organ System: Organ systems are groups of organs within an organism. Some examples are the circulatory, digestive, nervous, skeletal and reproductive systems, which work together to keep the body functioning normally. For instance, nutrients obtained by the digestive system are distributed throughout the body by the circulatory system. Likewise, the circulatory system distributes oxygen that is taken in by the respiratory system.

Organ: An organ is an independent part of the body of an organism that carries out specific functions. Organs include the heart, lungs, kidneys, skin and ears. Organs are composed of different types of tissue arranged together to perform specific tasks. For example, the brain is composed of several different types including nervous and connective tissues.

Tissue: Tissues are groups of cells with both a shared structure and function. Animal tissue can be grouped into four subunits: epithelial tissue, connective tissues, muscle tissue and nervous tissue. Tissues are grouped together to form organs.

Cell: Cells are the simplest form of living units. Processes that occur within the body are carried out on a cellular level. For example, when you move your leg, it is the responsibility of nerve cells to transmit these signals from your brain to the muscle cells in your leg. There are a number of different types of cells within the body including blood cells, fat cells and stem cells. Cells of different categories of organisms include plant cells, animal cells and bacterial cells.

Organelle: Cells contain tiny structures called organelles, which are responsible for everything from housing the cell's DNA to producing energy. Unlike organelles in prokaryotic cells, organelles in eukaryotic cells are often enclosed by a membrane. Examples of organelles include the nucleus, mitochondria, ribosomes and chloroplasts.

Molecule: Molecules are composed of atoms and are the smallest units of a compound. Molecules can be arranged into large molecular structures such as chromosomes, proteins and lipids. Some of these large biological molecules may be grouped together to become the organelles that compose your cells.

Atom: Finally, there is the ever-so-tiny atom. It takes extremely powerful microscopes to view these units of matter (anything that has mass and takes up space). Elements such as carbon, oxygen and hydrogen are composed of atoms. Atoms bonded together to make molecules. For example, a water molecule consists of two hydrogen atoms bonded to an oxygen atom. Atoms represent the smallest and most specific unit of this hierarchical structure.

What is biodiversity?

By Gale, Cengage Learning, adapted by Newsela staff on 11.14.17

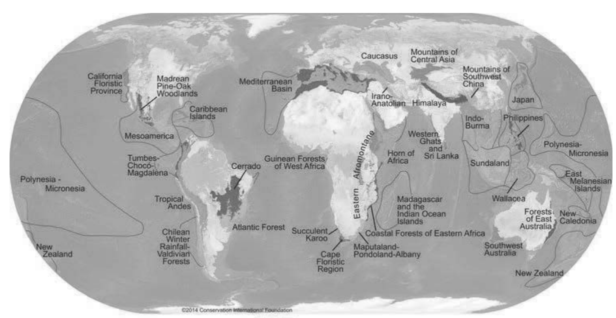
Word Count **975**

Level **820L**

A toucan in Guanacasta, Costa Rica. Costa Rica is one of the world's most biodiverse countries. Photo by: Flickr

Biodiversity or biological diversity means all the different kinds of plants, animals and other living things that live in an area.

Scientists think about biodiversity in three ways. First, it is all the plants and animals living in an area.



Conservation International (conservation.org) defines 35 biodiversity hotspots — extraordinary places that harbor vast numbers of plant and animal species found nowhere else. All are heavily threatened by habitat loss and degradation, making their conservation crucial to protecting nature for the benefit of all life on Earth.

The second way scientists think about biodiversity is genetic diversity. All living things have genes. Genes are responsible for different characteristics, like eye color and whether our hair is curly or straight. Genetic diversity in a species means that there are many different traits individuals in that species can have. Genetic diversity is important to biodiversity. That's because more genetic diversity gives a species a greater chance of surviving.

The third way scientists think about biodiversity is the number of different ecosystems in a region. An ecosystem is all the living and nonliving things in an environment. An area with high biodiversity includes many different species and makes an ecosystem stronger. When the number of species decreases, it means the area is in danger.

Some areas are more biodiverse than others. Tropical areas have more types of plants and animals than polar regions and deserts.

The Rise Of Conservation Biology

Conservation biologists are scientists who study life on Earth. Their goal is to protect living things and their habitats. In the 1980s, they began thinking about biodiversity. At the time, plants and animals were going extinct at high rates because of human actions. People were cutting down rain forests, polluting the air and waterways. Many species that lived within these environments died out.

Edward O. Wilson is an American scientist. In 1988, he came out with an important book, called "Bioversity." He said that biodiversity was important. The more species an ecosystem has, the more likely it can survive different threats. In 2011 scientists estimated that 8.7 million species lived on Earth. Of these, about 9 out of 10 species have not been discovered yet.

Threats To Biodiversity

The planet is experiencing a die-off, which is a mass extinction. About 65 million years ago, three-quarters of the species on Earth suddenly went extinct, including the dinosaurs. Today, scientists think many species are quickly going extinct because of human actions. Plants and animals are disappearing at an alarming rate. It is happening about 1,000 to 10,000 times faster than normal. There are five major reasons.

The first is habitat destruction. When a habitat is destroyed, plants and animals are not able to survive. Humans cut down trees to clear land for houses and farming. Some of those areas have great biodiversity, like the Amazon rain forest. Much of the Amazon rain forest has been destroyed to make room for farming.

Another reason for the loss of biodiversity is climate change. Climate change is the warming of the Earth. Up to 1 in 4 land species could die out by 2050. Many species can only survive in certain temperatures. If the temperature in their habitat changes, they could die out. Climate change is also causing the ocean levels to rise. Scientists predict the ocean water will causing flooding to land along the coasts.

The third reason for lower biodiversity is invasive species. These are plants and animals that have been brought to an area on purpose or by accident. They have no natural predators and they may be stronger than local species. In the 1800s, settlers brought many animals to Australia, like cane toads, camels, goats, water buffalo and pigs. Many native plants and animals were wiped out.

Overexploitation is the fourth reason. This is when a resource is overused. For instance, the Maori people of New Zealand hunted so many moa, a large flightless bird, that it died out. A type of eagle also became extinct, because the moa was its main source of food. When one resource is used too much, an entire food chain can be hurt.

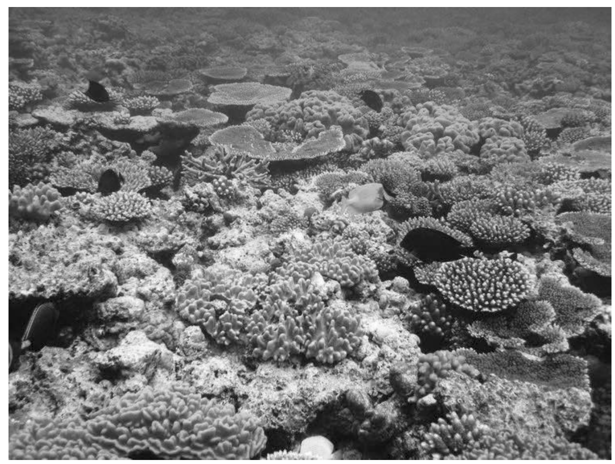
Pollution is the fifth reason. Exhaust from automobiles is a kind of pollution. So are chemicals that factories dump into rivers. Even fertilizers, pesticides and manures from farms can pollute the soil and water.

The Convention On Biological Diversity

The Convention on Biological Diversity is an international treaty. It is an agreement between countries designed to conserve biodiversity. It calls on countries to make plans that protect ecosystems.

The convention was opened for signature at the Earth Summit in Rio de Janeiro in 1992. Since then, every nation in the world except the United States has signed and ratified it. It took effect in 1993.

Conserving Biodiversity By Giving It Economic Value



Many conservation biologists think the best way to preserve biodiversity is to show that people can make money from it. Protecting ecosystems helps us meet our own needs. Water powers some electricity plants. A variety of plants and animals give us more options of foods to eat.

Biodiversity can be valuable in other ways, too. One example is the opportunity to enjoy amazing places in nature.

According to one study, the benefits of biodiversity are worth many trillions of dollars. In fact, preserving biodiversity is far less expensive than having to adjust to a less biodiverse world.

You can help protect biodiversity by supporting conservation organizations. You can also learn more about conservation and what your government is doing to maintain biodiversity. Finally, you can support companies that protect the environment.

Quiz

1 Why are scientists concerned about the current rate of extinction?

(A) It has been increasing and threatens to increase biodiversity on Earth.

(B) It has been increasing and threatens to reduce biodiversity on Earth.

(C) It has been decreasing and threatens to increase biodiversity on Earth.

(D) It has been decreasing but will not affect biodiversity on Earth.

2 The word "conservation" is essential to understanding the need for biodiversity.

Which sentence from the article BEST explains what "conservation" means?

(A) That's because more genetic diversity gives a species a greater chance of surviving.

(B) Some areas are more biodiverse than others.

(C) Their goal is to protect living things and their habitats.

(D) According to one study, the benefits of biodiversity are worth many trillions of dollars.

3 How could a greenhouse best help promote biodiversity?

(A) The greenhouse could sell only plant species that outcompete other plants and spread over large areas.

(B) The greenhouse could sell only plants that can survive with very little water.

(C) The greenhouse could increase the amount of greenhouse gases they release into the air.

(D) The greenhouse could sell only unique, native species to increase the number of different plants in the area.

4 Read the paragraph from the section "Threats To Biodiversity."

> *The first is habitat destruction. When a habitat is destroyed, plants and animals are not able to survive. Humans cut down trees to clear land for houses and farming. Some of those areas have great biodiversity, like the Amazon rain forest. Much of the Amazon rain forest has been destroyed to make room for farming.*

What is the BEST definition of "habitat" as it is used in this paragraph?

(A) a farm where many plants are grown and animals are raised

(B) a place where certain plants and animals usually live

(C) an animal that can only survive with a lot of land

(D) a plant that grows in the Amazon rain forest

5 How would a volunteer program to clean up trash from local parks help increase biodiversity?

(A) It would increase pollution, hurting the organisms that live there.

(B) It would reduce pollution, helping a variety of of plants and animals survive.

(C) It would introduce more new predators to the area.

(D) It would allowing volunteers to enjoy nature without paying park fees.

6 Which option BEST describes the structure of the section "Threats To Biodiversity"?

(A) compare and contrast

(B) problem and solution

(C) cause and effect

(D) before and after

7 Every nation in the world but the United States agreed to the Convention on Biological Diversity. What did these nations agree to do?

(A) meet every year to discuss biodiversity

(B) attend the Earth Summit

(C) make money from biodiversity

(D) make plans to protect ecosystems

8 Read the introduction [paragraphs 1-5] and the final section, "Conserving Biodiversity By Giving It Economic Value."

What is the connection between these two sections?

(A) Both sections compare differences in biodiversity in different areas of the world.

(B) Both sections compare the biodiversity of plants with the biodiversity of animals.

(C) The introduction describes the problems caused by lack of biodiversity, and the final section describes how they are being solved.

(D) The introduction describes the benefits of biodiversity for ecosystems, and the final section describes its benefits for people.

Experiment: Gardens under glass

By Gail A Wolfson, Cricket Media on 01.06.20
Word Count **686**
Level **MAX**

Image 1. A terrarium is a sealed, clear container in which plants are grown. In this activity, you will learn to make your own terrarium. Photo by: Shaiith/Getty Images

If you lived in Victorian London, you'd carry a black umbrella and have a house with dark furniture and wallpaper. Why? London was a city of smoky factories. Your black umbrella would protect you from soot-filled rain and wouldn't show the dirt. Your house's dark furnishings and walls would camouflage the dust from coal-fueled stoves. Like other Victorians, you'd love gardening and houseplants, but your plants couldn't thrive in the dirty city air--that is, until London surgeon Dr. Nathaniel Ward made an amazing discovery.

Ward, who loved plants and nature, decided to put a sphinx moth cocoon and some soil into a bottle and close the lid. Somehow, he misplaced the bottle, and found it only months later. To his surprise, a fern had sprouted in it, a fern that looked healthier than those growing in his London yard.

While experimenting with other bottle gardens, Ward built a large glass case, filled it with English ferns, sealed it, and sent it on a six-month voyage to Australia. The ferns flourished. In 1842, Ward published a book describing these gardens under glass. Soon, Wardian Cases, as they were called, became a fixture in drawing rooms. The cases pr ected plants from coal dust and from the frigid nighttime temperatures in Victorian homes. Ward designed an elaborate garden under glass for his house with ferns, fish, a lizard, and a toad all living in it.

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Wardian Cases were also used to ship exotic plants, such as orchids, to Britain. Victorians were enchanted with orchids, which have unique petals and colors and come in thousands of varieties. Queen Victoria created the position of royal orchid grower. Wealthy Victorians often collected these flowers, and some hired hunters to find and ship them from tropical locations. Before Wardian Cases were invented, most orchids died from the salt spray and varying temperatures on the long sea voyage.

Terraria (plural of terrarium), as Wardian Cases were later called, are still popular. Although houseplants today don't need protection from coal dust or cold household temperatures, terrariums are perfect, low-maintenance, indoor gardens. Here's how you can make one.

You need:

Clear glass jar (not plastic) with a lid and an opening wide enough for your hand

Small plants (see list)

Pebbles or gravel (for drainage)

Powdered charcoal (to absorb odors)

Sterile potting soil

Small stones (not pebbles or gravel), a small mirror, small ceramic animals (optional)

Most supplies are available at garden centers. If you can't find a large glass jar at home, look in the houseware department at a discount store or as a delicatessen if they have an empty one.

Plant selection:

Select small, slow-growing, nonflowering plants that grow in medium light and fit the size of your jar. Consider these:

Aluminum plant (Pilea)

Small ivies

Small ferns

Ficus

Peperomia

Prayer Plant (Mimosa)

If your jar can hold several plants, an odd number is best, artistically speaking. Look for variety in the shapes and colors of leaves to add interest. Place the tallest plant in the middle.

Directions

Wash your jar. Rinse it several times with plain water. Dry it completely.

Wash and drain the pebbles. Pour pebbles into the jar to a depth of 1/2 inch.

Use a funnel (or make one from paper) to add a thin layer of powdered charcoal on top of the pebbles.

Use a funnel to add 2 to 3 inches of sterile potting soil on top of the charcoal. Make an indentation for each plant in the soil. Unpot the plants and place them in the container. Pat the soil around them.

Add accessories, if desired.

Lightly water or mist the terrarium until the soil is moist, but not soggy. Close the lid. Place the terrarium in a room with medium, not direct, sunlight. Water only when the soil feels dry. Many terraria need watering only once a month.

Don't be surprised if your terrarium steams up in the morning. it'll clear by itself when the temperature inside and outside the jar becomes the same.

Quiz

1 Read the following sentence from the article.

> *Like other Victorians, you'd love gardening and houseplants, but your plants couldn't thrive in the dirty city air--that is, until London surgeon Dr. Nathaniel Ward made an amazing discovery.*

Which answer choice BEST supports this idea?

(A) Ward, who loved plants and nature, decided to put a sphinx moth cocoon and some soil into a bottle and close the lid.

(B) The ferns flourished in 1842, Ward published a book describing these gardens under glass.

(C) The cases protected plants from coal dust and from the frigid nighttime temperatures in Victorian homes.

(D) Ward designed an elaborate garden under glass for his house with ferns, fish, a lizard, and a toad all living in it.

2 Read the following sentences from the article.

1. *Although houseplants today don't need protection from coal dust or cold household temperatures, terrariums are perfect, low-maintenance, indoor gardens.*
2. *If you can't find a large glass jar at home, look in the housewares department at a discount store or as a delicatessen if they have an empty one.*
3. *Select small, slow-growing, nonflowering plants that grow in medium light and fit the size of your jar.*
4. *Water only when the soil feels dry. Many terraria need watering only once a month.*

Which two details taken together provide the BEST evidence to support the idea that it requires minimal work to sustain a terrarium?

(A) 1 and 3

(B) 1 and 4

(C) 2 and 3

(D) 2 and 4

3 How are plants grown in a terrarium different from plants grown outdoors?

(A) Plants grown in terrariums require more care than plants grown outdoors.

(B) Plants grown in terrariums require more water than plants grown outdoors.

(C) Plants grown outdoors are better protected against poor air quality than plants grown in terrariums.

(D) Plants grown in terrariums are better protected against extreme temperatures than plants grown outdoors.

4 Which answer choice would BEST describe the Victorians' reactions to Ward's invention?

(A) They hesitantly placed terrariums in the kitchens despite their coal-fueled stoves.

(B) They skeptically put plants in their drawing rooms with no expectation for survival.

(C) They eagerly purchased the product to fulfill their desire to grow plants in their homes.

(D) They excitedly sent the cases to tropical islands to transport a variety of new plants for profit.

Cells and the versatile functions of their parts

By National Geographic Society, adapted by Newsela staff on 04.01.19

Word Count **1,017**

Level **870L**

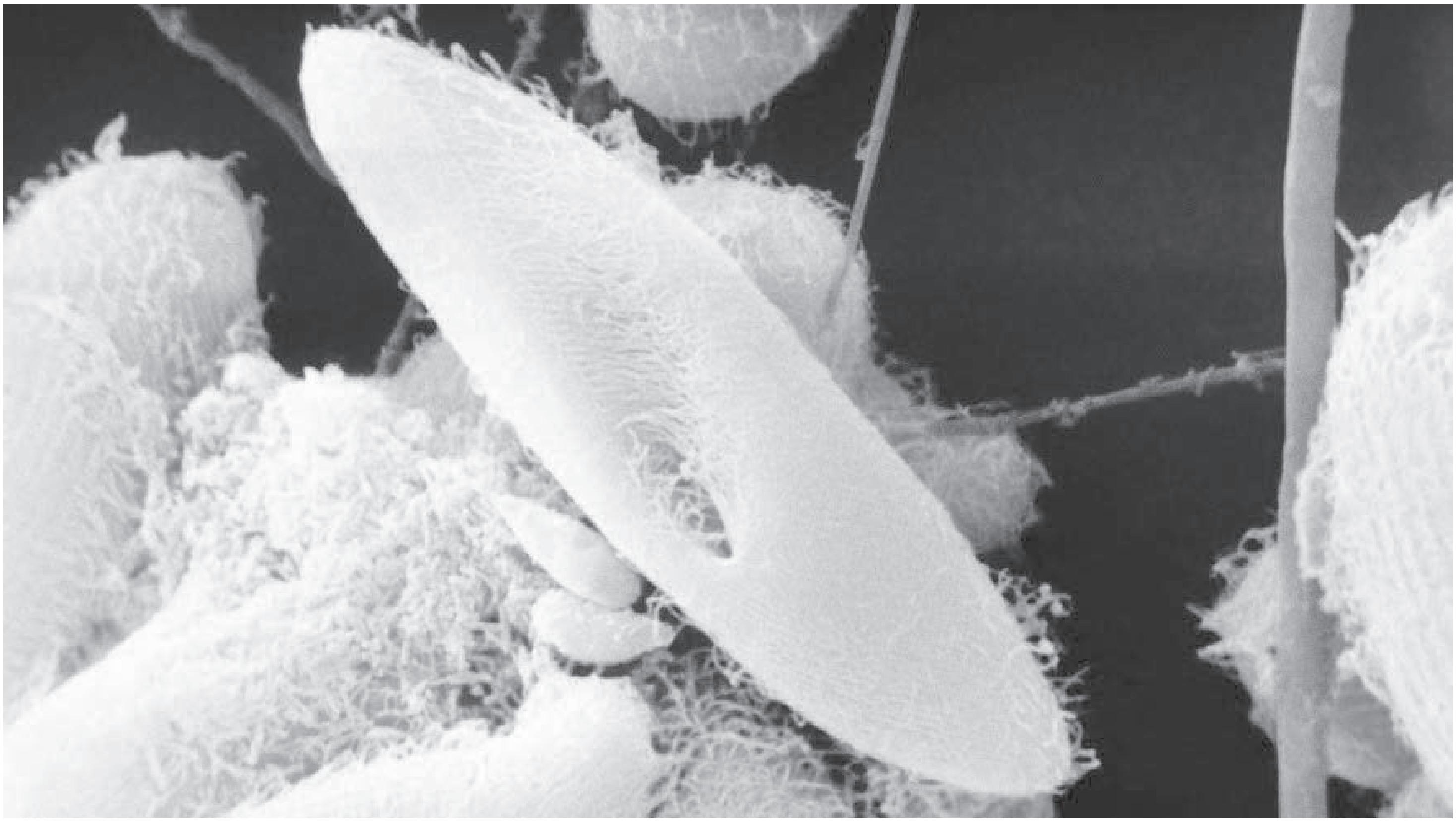


Image 1. Microscopic view of paramecia, single-celled organisms often found in ponds. Paramecia feed on other small organisms, such as bacteria. Each component of these tiny creatures, from the genetic material in its nucleus to the cilia it uses to swim, performs special functions that allow it to survive. Photo by: BSIP/UIG Via Getty Images

Cells are the basic building blocks of all life. These impressive, tiny structures can perform many tasks. This is true from the tiniest bacteria up to a human being. We're made up of trillions of cells.

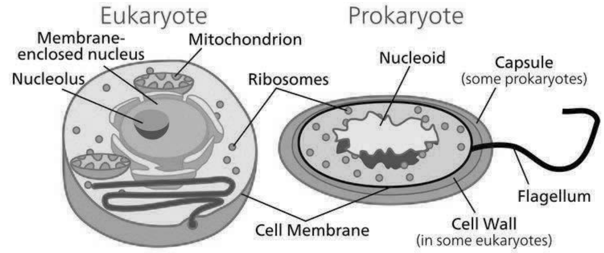
Cells get rid of waste. They help repair tissues. They generate the energy that keeps us alive. These are just some of the many tasks that cells carry out.

Bacteria: Basic Cells

Some organisms consist of a single cell. They have just the most basic cell parts: genetic material (DNA), ribosomes, cytoplasm and a cell membrane.

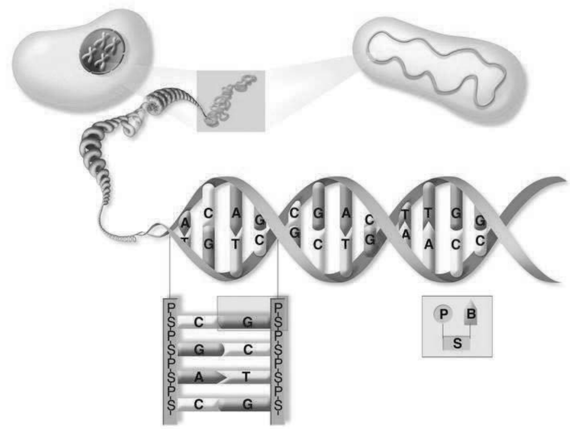
Bacteria mainly consist of these most basic parts of a cell. They may be small, but bacteria can cause human illnesses, from mild food poisoning to deadly tuberculosis. Other bacteria help keep us healthy. Many bacteria live in the human gut. hey help us digest and absorb nutrients.

Gene Transfer



DNA contains the instructions for how our bodies grow and work. It is passed on from parents to children. A gene is a section of DNA that tells a specific part of the body how to work.

Genetic material can exist in movable sections. This allows bacteria to exchange portions of DNA through a process called horizontal gene transfer.



In vertical gene transfer, a parent passes on DNA to children. Meanwhile, horizontal gene transfer involves genetic material moving from one living organism to another. It doesn't matter how these organisms are related.

This ability allows many bacteria to quickly resist antibiotics. Humans use antibiotics to fight unwanted bacteria. Some bacteria have genes that let them survive, though. Thanks to horizontal gene transfer, they can pass these genes to others.

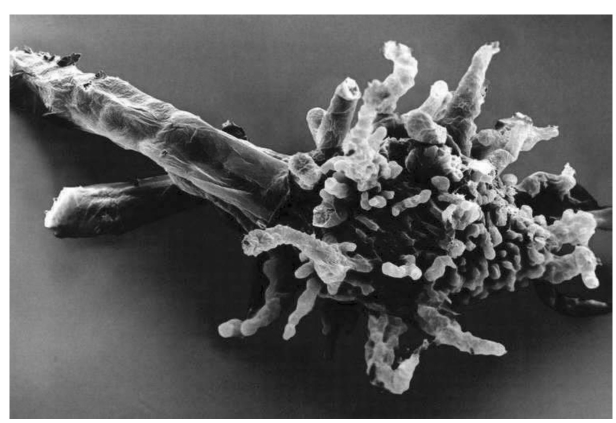
Horizontal gene transfer is more common in single-celled organisms. These organisms are called prokaryotic. They don't have a nuclear membrane, which would protect the organism's DNA from outside DNA.

Yeast, Organelles And Fermentation

More complex single-celled organisms, such as yeast, are eukaryotes. Eukaryotic cells contain a nucleus — a kind of central control station — and other organelles. Organelles are like the cell's organs. They are parts of the cell that are in charge of special tasks.

For example, the organelles in yeast allow it to perform fermentation. Humans have long used fermentation to make bread, wine, and beer. Fermentation is possible because of certain enzymes within yeast that allow it to convert sugars into alcohol. Enzymes are proteins. Like all proteins, they are produced by ribosomes within a cell.

Cellular Slime Molds



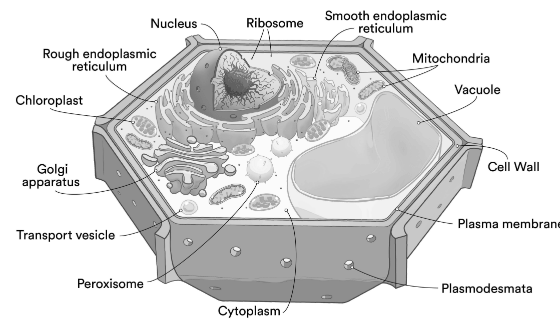
Other single-celled organisms can combine to form a multicellular structure. One example is the cellular slime mold, a type of amoeba. When there aren't many nutrients in the environment, these cells band together in a slug-like form. Together, they migrate to find food. The cellular communication between amoebae during this coming together involves many cell parts.

At some point, the amoeba usually splits into stalk cells and spore cells. A large vacuole, or space, forms within stalk cells as they go through cell death and form a column. In this process, spore cells are lifted and then scattered to a new location.

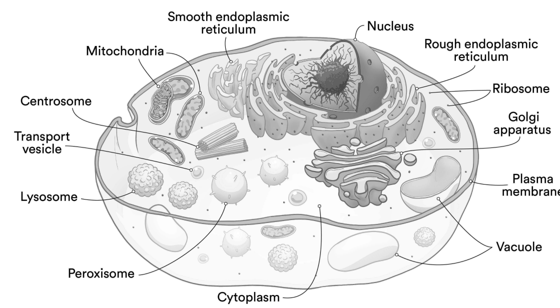
Many cell parts play a role in this complex behavior of social amoebae. One example is the mitochondria. These are critical to cell movement and organizing the cells within the slug.

Plants, Animals And Specialized Cells

In true multicellular organisms, a variety of organelles allow equally incredible feats. Chloroplasts in plant cells allow the organism to grab the sun's energy and produce food. In a growing animal, for example, the cytoskeleton sorts critical parts and chemicals within the cell. It defines which end of the cell is which. In this way it helps enable specific functions as the tiny animal embryo, at first a tiny bundle of cells, grows and develops.



After development, specialized cells perform specific tasks to support the body. For example, mature red blood cells in mammals are cells with no nucleus. This helps clear out as much space as possible for a protein called hemoglobin. This protein allows the cell to carry oxygen from the lungs to the rest of the body.



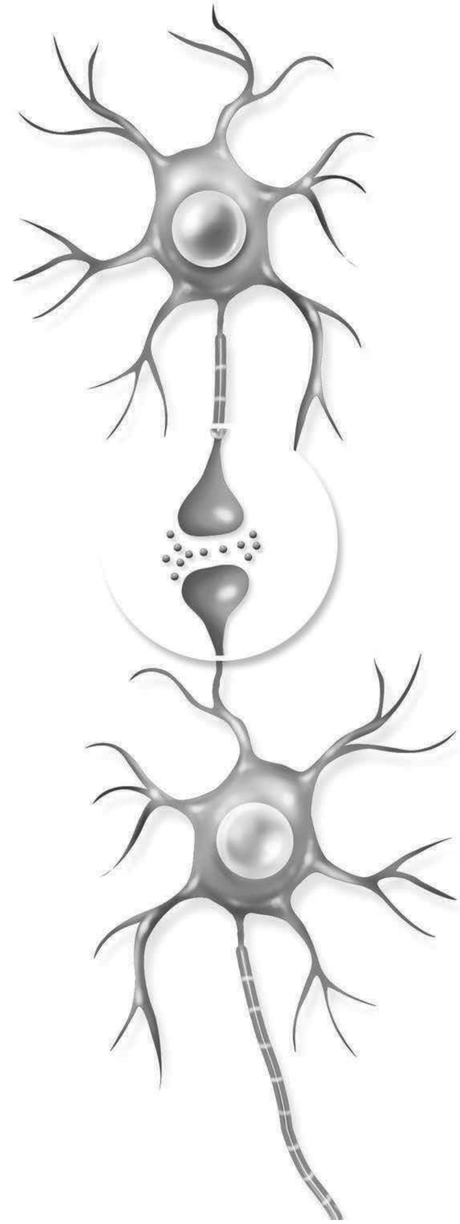
White blood cells are part of the body's immune system. The immune system is a group of cells and organs that fight to protect the body. White blood cells use lysosomes to smother and destroy bacteria. This helps prevent infection and disease.

Neurons And The Brain

Neurons are cells in the human brain that allow problem solving, memory, and emotion. A neuron's cell parts are critical to these functions.

Neurons respond to something in the environment — say, a feeling of pain. They then release neurotransmitters. Organelles called Golgi bodies control when neurotransmitters are released. They can make special vesicles, or sacs, to transport neurotransmitters outside the neuron.

Neurons have a long axon fiber, which extends from the cell. Neurons send their chemical signals out through their axons. They also receive signals from neighboring cells. They receive signals through finger-like catches called dendrites.



Quiz

1 Read the paragraph from the section "Gene Transfer."

> *This ability allows many bacteria to quickly resist antibiotics. Humans use antibiotics to fight unwanted bacteria. Some bacteria have genes that let them survive, though. Thanks to horizontal gene transfer, they can pass these genes to others.*

Which word from the paragraph helps the reader understand the meaning of "resist"?

(A) unwanted

(B) survive

(C) horizontal

(D) transfer

2 Read the following selection from the section "Cellular Slime Molds."

> *When there aren't many nutrients in the environment, these cells band together in a slug-like form. Together, they migrate to find food. The cellular communication between amoebae during this coming together involves many cell parts.*

What is the meaning of the word "migrate" as it is used in the selection above?

(A) flee from danger

(B) become very hungry

(C) wander without a goal

(D) go to another spot

3 Look at Image 5 in the section "Neurons And The Brain" and read the selection below.

> *Neurons have a long axon fiber, which extends from the cell. Neurons send their chemical signals out through their axons. They also receive signals from neighboring cells. They receive signals through finger-like catches called dendrites.*

How does the image support the information in the selection above?

(A) It shows why neurons' finger-like axons send signals instead of touching.

(B) It illustrates how neurons send chemical signals through the axons.

(C) It shows how neurons make special sacs inside of their organelles.

(D) It highlights how neurons help the brain to solve a problem or remember something.

4 Use the images and information from the article to select the TRUE statement.

(A) Eukaryotic cells and prokaryotic cells both have ribosomes and a cell membrane.

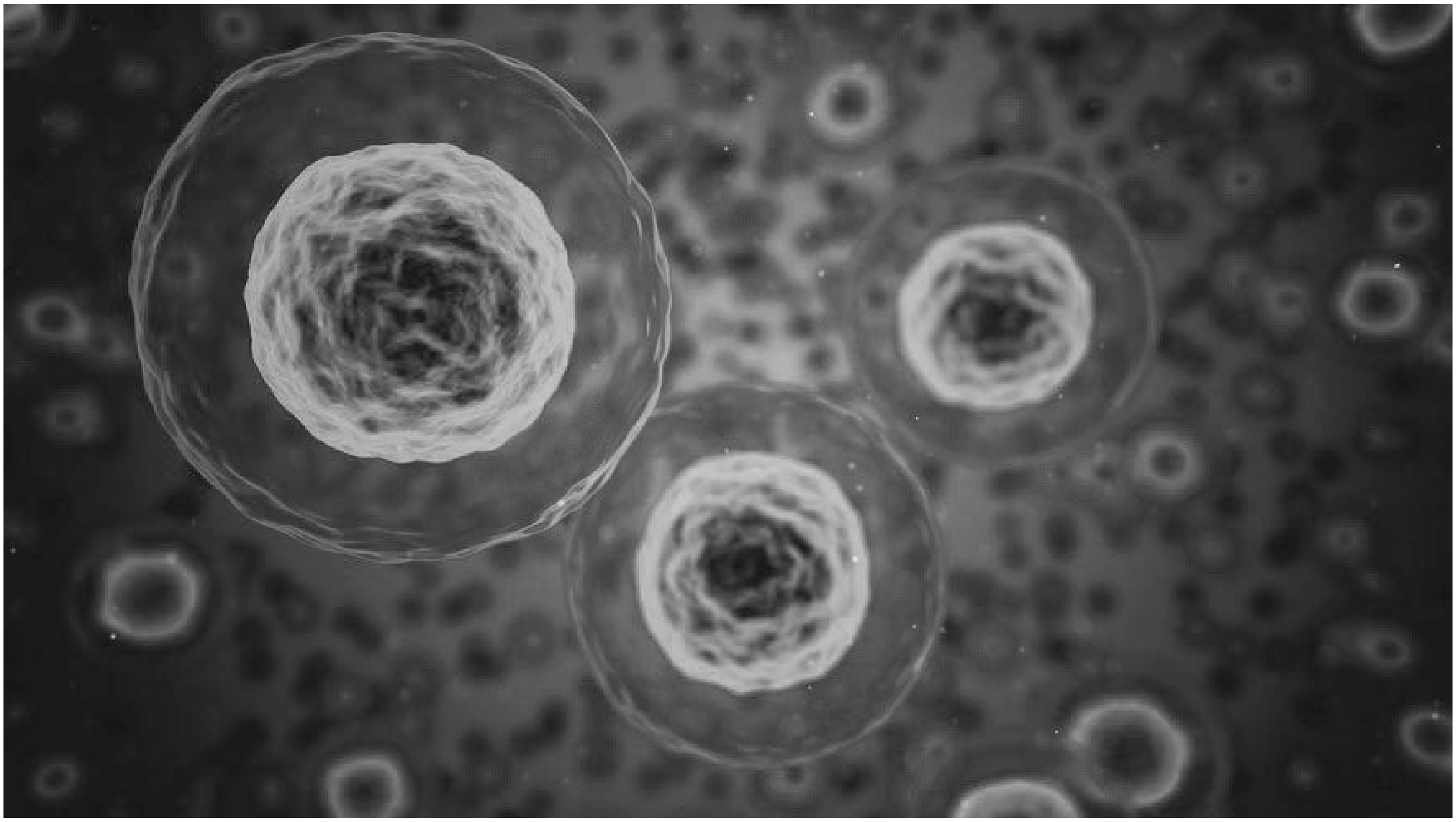
(B) Paramecia is an organism that contains multiple cells and lives in ponds.

(C) Single-celled organisms are incapable of doing a horizontal gene transfer.

(D) Red blood cells keep the body healthy by destroying bacteria using lysosomes.

The facts about cells

By ThoughtCo.com, adapted by Newsela staff on 10.18.17
Word Count **917**
Level **930L**



An illustration of cells. Photo from Pixabay.

Cells are the basic building blocks of life. Some life forms, or organisms, are made out of a single cell, whereas others are made of millions.

Scientists estimate that our bodies contain anywhere from 75 to 100 trillion cells, which come in hundreds of different types. Cells do everything from providing energy to allowing animals to reproduce.

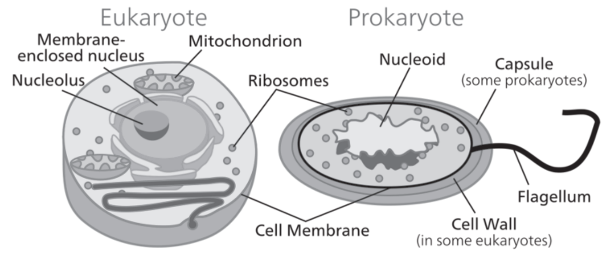
Below are 10 facts about cells, some of which are well-known while others may surprise you.

1. Cells are too small to be seen without magnification.

Cells come in a variety of sizes, ranging from 1 to 100 micrometers across. A micrometer is a millionth of a meter, and there are more than 25,000 micrometers in a single inch.

The study of cells is called cell biology. Because cells are so small, it would have been impossible to study them without the invention of the microscope. Thanks to this technology, cell biologists can study detailed images of even the smallest of cells.

2. There are two main types of cells.



Cells are divided into eukaryotic and prokaryotic cells. Eukaryotic cells have nuclei that are surrounded by membranes. A nucleus is a structure that stores genetic information such as DNA. Animals, plants and fungi are called eukaryotes because they are organisms that are made of eukaryotic cells.

Prokaryotes are creatures that are made of a single prokaryotic cell. Examples include bacteria and archaeans. Unlike a eukaryotic cell, the nucleus of a prokaryotic cell is not surrounded by a membrane. This region in the cell is called nucleoid.

3. Prokaryotic single-celled organisms were the earliest and most basic forms of life on Earth.

Prokaryotes can live in environments that would be deadly to most other organisms. Some archaeans are even able to live inside animal intestines. Others live in extreme environments such as hot springs, swamps and wetlands.

4. There are more bacterial cells in the body than human cells.

Some scientists have calculated that about 95 percent of all the cells in the body are bacteria. These bacteria help humans digest their food. In fact, most bacteria in humans can be found in the digestive tract, which are the organs that take in food and let out waste. Billions of bacteria also live on the skin.

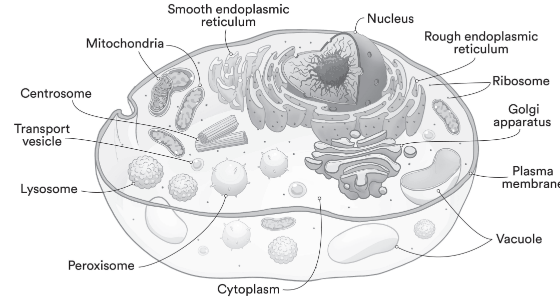
5. Cells contain genetic material.

Cells contain DNA and RNA, which hold the information needed to tell the cells how to work. DNA, or deoxyribonucleic acid, and RNA, or ribonucleic acid, are known as nucleic acids.

In prokaryotic cells, the DNA is not contained inside a membrane but it is coiled in a region called nucleoid. In eukaryotic cells, DNA is found in the cell's nucleus, protected by the membrane.

Strands of DNA form structures called chromosomes. Human cells have 23 pairs of chromosomes, for a total of 46. These chromosomes contain information about how a person's body will look and develop, with one pair determining the person's sex.

6. Cells contain structures called organelles which carry out specific roles.



Organelles are units in a cell that have specific responsibilities. Eukaryotic cells contain several types of organelles, while prokaryotic cells contain a few organelles called ribosomes. In prokaryotic cells, the organelles are not surrounded by a membrane.

Here are a few examples of organelles in eukaryotic cells:

• The nucleus controls the cell's growth and how it reproduces.

• Mitochondria provide energy for the cell.

• The endoplasmic reticulum creates carbohydrates, like sugar, and fats.

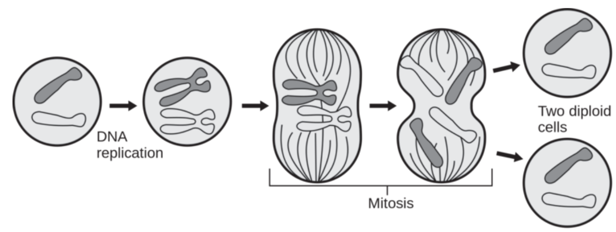
• Ribosomes help create proteins.

• The Golgi complex packages and ships the proteins and fats produced by the cell.

• Lysosomes help with digesting substances inside the cell.

7. Different types of cells reproduce through different methods.

Most prokaryotic cells reproduce through binary fission. In binary fission, a single cell splits into two new copies of itself.



Eukaryotic organisms can reproduce in two ways. Single eukaryotic cells can split into two through a process called mitosis. Larger eukaryotic organisms, such as animals, reproduce by combining special cells called gametes. These gametes are made through a process called meiosis.

8. Groups of similar cells form tissues.

Tissues are groups of cells that have the same structure and behavior. In animal tissue, cells are sometimes woven or stuck together.

Different types of tissues can also be arranged together to form organs, which can, in turn, form organ systems. An example is the circulatory system, which includes the heart, lungs and veins. It allows animals to breathe and spread oxygen throughout their bodies.

9. Cells have varying life spans.

Different cells have different life spans. They can live anywhere from a few days to a year. Certain cells in the digestive tract live for only a few days, while some of the cells in the immune system can live up to six weeks. The immune system is the group of cells and organs that defend the body from small organisms that can harm it. Brain cells can live for a whole lifetime.

10. Cells commit suicide.

When a cell becomes damaged or infected, it will self-destruct by using a process called apoptosis. Apoptosis is a way of keeping the process of mitosis in check. Cells with cancer are not able to go through apoptosis, which is why they reproduce and spread uncontrollably.

Quiz

1 Which organelle provides energy for the cell?

(A) mitochondria

(B) endoplasmic reticulum

(C) ribosomes

(D) Golgi complex

2 Read the sentence from the section "5. Cells contain genetic material."

> *In prokaryotic cells, the DNA is not contained inside a membrane but it is coiled in a region called nucleoid.*

Which of the following words, if it replaced the word "contained" in the sentence above, would CHANGE the meaning of the sentence?

(A) encased

(B) released

(C) enclosed

(D) held

3 What is the importance of gametes?

(A) They engage in binary fission.

(B) They allow eukaryotes to reproduce.

(C) They help to produce proteins for the cell.

(D) They are created when a cell splits into two copies of itself.

4 Read the following sentence from the introduction [paragraphs 1-3]. Then, fill in the blank.

> *Scientists estimate that our bodies contain anywhere from 75 to 100 trillion cells, which come in hundreds of different types. Cells do everything from providing energy to allowing animals to reproduce.*

The word "estimate" in the sentence above tells the reader that ____.

(A) a human body has many different types of cells

(B) each type of cell lives for a different period of time

(C) cells are so small and numerous that they would be impossible to count

(D) you can only see cells with a microscope

5 How are cells and organs related?

(A) Cells go through binary fission to make new organs.

(B) Cells are made from tissues found in organ systems.

(C) Cells reproduce with tissues to made organ systems.

(D) Cells join together to form tissues, which form organs.

6 Which selection from the article is BEST explained by the diagram in the section "7. Different types of cells reproduce through different methods"?

(A) Eukaryotic organisms can reproduce in two ways.

(B) Single eukaryotic cells can split into two through a process called mitosis.

(C) Larger eukaryotic organisms, such as animals, reproduce by combining special cells called gametes.

(D) These gametes are made through a process called meiosis.

7 What is the immune system?

(A) The group of cells and organs that protect the body from disease.

(B) A group of cells that undergoes apoptosis to protect the body.

(C) A group of organelles that digest particles that invade the cells.

(D) The group of cells and organs that turn food into energy for the body.

8 How does the image and information in the section "2. There are two main types of cells" develop a coherent understanding of the differences between prokaryotic and eukaryotic cells?

(A) by defining and demonstrating structural differences between the two types of cells

(B) by contrasting how the structure of each cell influences how the cell reproduces

(C) by highlighting the major differences in how a cell is protected from the environment around it

(D) by showing different organelles that perform similar functions in both types of cells

Social Studies

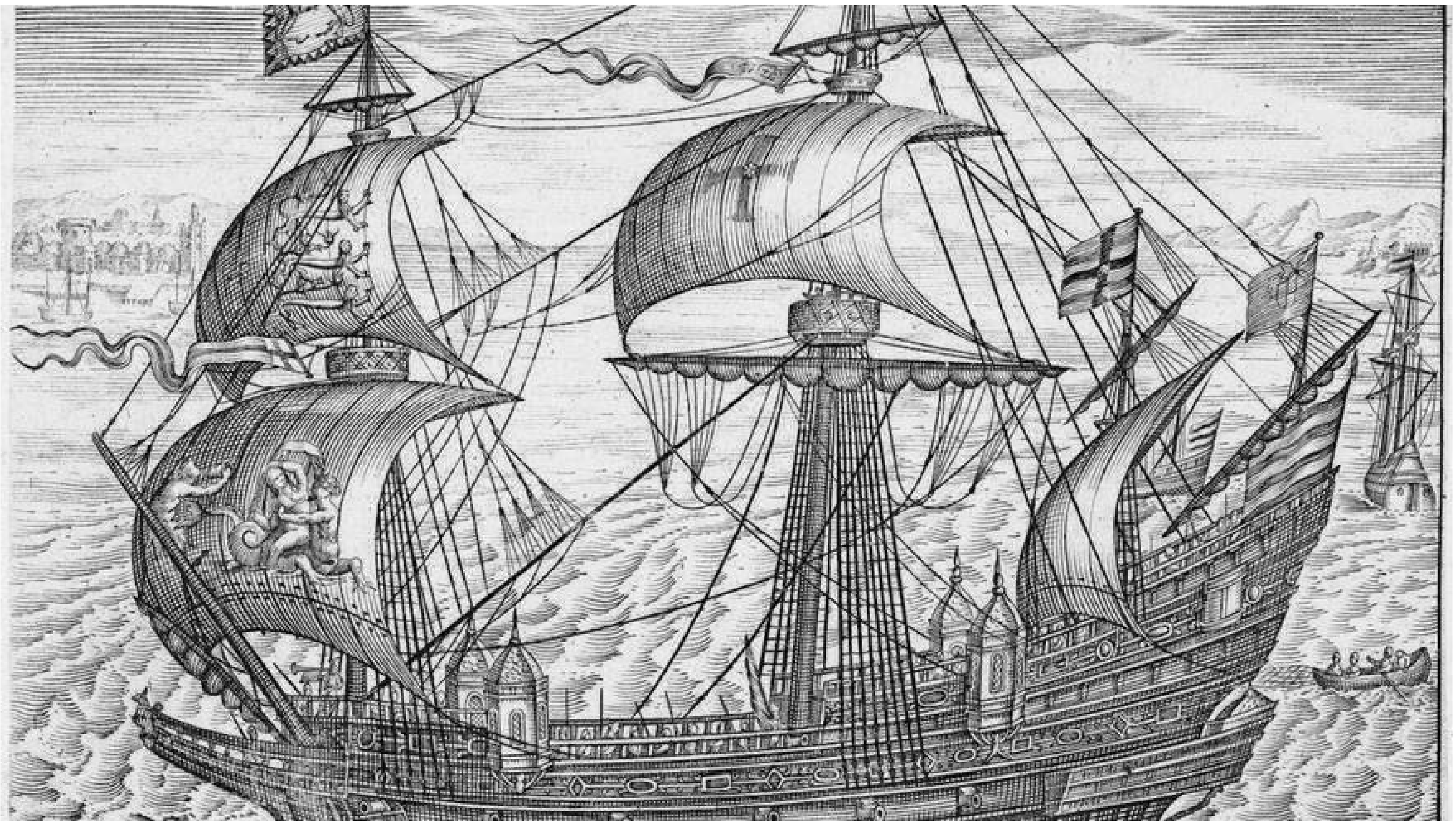
newsela

Atlantic Crossings During the Age of Exploration

By National Park Service, adapted by Newsela staff on 06.23.17

Word Count **688**

Level **1040L**



An engraving of Ark Royal, an English galleon originally ordered for Sir Walter Raleigh and later purchased by the crown for service in the Tudor navy. The vessel was 100 feet long on the keel, had a beam of 37 feet and carried 44 guns. It was used as the English flagship in a number of engagements, including the battles that resulted in the defeat of the Spanish Armada, and had a career spanning more than 50 years. Source: National Maritime Museum, London, England

Europeans explored the world by sea. But because of poor maps, imprecise navigational equipment and small ships, their progress was slow. Irish monks, such as the semi-legendary St. Brendan, evidently explored and lived on several North Atlantic islands in the 500s. The Vikings colonized the Faroe Islands beginning in the 700s, Iceland in the 800s, Greenland in the 900s and North America in the 1000s. In the 1200s, European traders reached the Canary Islands, near Morocco. In the 1300s, mariners from Genoa landed at the Madeiras and established regular routes between Italy and the Baltic.

Early sailing vessels

Most important in sea travel was an appropriate and reliable ship. From the beginning, European mariners used coastal trading and raiding vessels. They were small and clumsy, but generally sturdy enough to withstand the open seas. By th 900s, the lateen sail, which enabled a ship to sail closer to the wind, reached Europe from the Middle East. The sternpost rudder made ships more maneuverable. Around 1000, Europeans began using the magnetic compass, and within 200 years it was common. By 1280, Mediterranean mariners were using crude navigational charts. As design and construction improved, ships grew larger — first in order to accommodate guns and powder, later to carry goods for trade and the provisions needed for long voyages. Advances in building and sailing ships expanded horizons.

In the 1400s, many different factors came together, and the result was explosive. Beginning around 1400, Spain conquered the Canary Islands and slaughtered the native peoples. In 1418, Prince Henry the Navigator of Portugal began sending expeditions farther and farther down the west coast of Africa. By 1432, the Portuguese colonized the Azores. Within thirty years they had reached Guinea and begun settling on the Cape Verde Islands. In the 1480s, Portuguese explorer Bartolomeu Dias rounded the Cape of Good Hope in Africa. Beginning in 1492, Christopher Columbus began making his transoceanic voyages for Spain. In 1498, Portuguese Vasco Da Gama sailed around Africa to India.

Spain once ruled the seas

By the early 1600s, oceanic travel was flourishing. Spain was stripping the New World of its immense wealth, and Portugal traded actively with India, the Spice Islands and its New World colony, Brazil. France developed its mining and other interests in west Africa.

Spain became the richest trading power in Europe. Large flotillas of ships regularly crossed the Atlantic bearing gold, silver, jewels, cochineal, cacao, tobacco, and other valuable commodities back to Spain. Superior navigational knowledge and skill developed by long experience made Spain ruler of the seas.

The rich traffic between the New World and Spain were huge temptations for other European countries. But when England decided at last to compete for a piece of the New World and its trade, she had few mariners with deep-water experience and little knowledge of the Atlantic or the Western Hemisphere. Worse, the English government was unwilling and often unable to pay for exploration and colonization.

English mariners improve seamanship

English mariners were highly skilled navigating along the coast. However, they had little experience with ocean sailing, and were aware of their shortcomings. They began hiring Portuguese and Spanish pilots and instructors to show them how to navigate in the ocean.

They English decided to advance the science of ocean travel. They wrote textbooks on piloting and navigation, invented instruments and charts, and built oceangoing ships. Sails, armaments, and seamanship also improved.

The interest in overseas trade and expansion grew.

The British set up a colony in Virginia

The British began its first colony in the Americas, in Roanoke Virginia, in 1584. By that time, Englishmen had already circled the globe explored the barren Arctic.

By the last half of the 1500s, English ships were crisscrossing the Atlantic. Their navigational skill increased and the design of their ships had improved. England emerged as a sea power to rival Spain. Largely through their own initiative, the English raised the art of navigation to a science. A new age of discovery, exploration and expansion — one that would change the world and man's understanding of the world — was about to begin.

Quiz

1 Read the sentence from the section "The British set up a colony in Virginia."

> *Largely through their own initiative, the English raised the art of navigation to a science.*

Which sentence from the section "English mariners improve seamanship" provides the BEST support for this conclusion?

(A) However, they had little experience with ocean sailing, and were aware of their shortcomings.

(B) They began hiring Portuguese and Spanish pilots and instructors to show them how to navigate in the ocean.

(C) They wrote textbooks on piloting and navigation, invented instruments and charts, and built oceangoing ships.

(D) The interest in overseas trade and expansion grew.

2 Which section of the article highlights the idea that exploration was driven by competition for riches?

(A) Introduction [paragraph 1]

(B) "Early sailing vessels"

(C) "Spain once ruled the seas"

(D) "English mariners improve seamanship"

3 Read the sentence from the section "Early sailing vessels."

> *As design and construction improved, ships grew larger — first in order to accommodate guns and powder, later to carry goods for trade and the provisions needed for long voyages.*

Which two words or phrases could BEST replace "accommodate" and "provisions" in the sentence above?

(A) get used to; furnishings

(B) make room for; supplies

(C) receive; good conditions

(D) assist; large donations

4 Read the selection from the section "Early sailing vessels."

> *In the 1400s, many different factors came together, and the result was explosive. Beginning around 1400, Spain conquered the Canary Islands and slaughtered the native peoples. In 1418, Prince Henry the Navigator of Portugal began sending expeditions farther and farther down the west coast of Africa. By 1432, the Portuguese colonized the Azores. Within thirty years they had reached Guinea and begun settling on the Cape Verde Islands.*

Why did the author use the word "explosive" in the first sentence?

(A) to suggest that explorers faced many dangers during their journeys

(B) to convey the widespread violence of the explorers

(C) to suggest that ships carried a lot of gunpowder

(D) to convey the numerous and far-reaching consequences of exploration

The thrill of time travel

By Ellen Seiden, Dig Magazine, adapted by Newsela staff on 12.12.17
Word Count **904**
Level **MAX**

Image 1: People are fascinated by the idea of traveling through time. Many movies, books and TV shows have explored what it might be like to do so. This poster was made for a movie that came out in 1960 based on the book "The Time Machine" by H.G. Wells which was published in 1895. Photo from: Movie Poster Image Art/Getty Images

What if, instead of moving from the past to the present to the future, we could manipulate time, so that we could jump, loop and travel through it in a machine, wherever and whenever we pleased?

What if we could witness historic wonders, change decisions and see people from our past? What if we could right wrongs, stop wars and bring back future cures for illnesses?

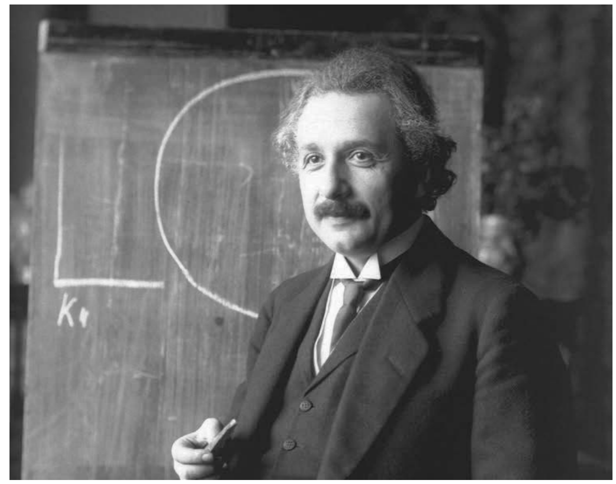
The mysterious puzzle about time's boundaries has kept philosophers debating its nature for centuries. Science fiction writers such as H.G. Wells, who wrote the 1895 novel "The Time Machine," have plotted it backwards and forwards into wildly imaginative stories. And some physicists have even attempted mathematical equations to make the dream of time travel a reality.

Time Travel Speculation

The 20th-century physicist Albert Einstein said that time and space are one. He called it "spacetime." According to Einstein, there are three dimensions in space — height, depth and breadth. A fellow scientist, Hermann Minkowski added time as a fourth.

Einstein introduced two ideas upon which speculation about the possibility of the theory of time travel is based. The first involves relativity. Here, travel, aided by gravity, involves curved space, which causes time to twist. The second focuses on special relativity. Gravity is not involved in this theory. Rather, a traveler goes super-fast through flat spacetime into the future. A clock is onboard while the traveler is in motion, and it slows time down. Einstein considered time "relative" because, as it passes, it is measured mathematically according to wherever we are positioned on Earth or in space.

What You Can And Can't Do With Time Travel



American science fiction writer Ray Cummings wrote in his 1921 novel titled "The Time Professor" that "time is nature's way of keeping everything from happening at once." Other science-fiction writers have addressed the concept of time, and there appears to be a consensus among them about the following:

No known rules of physics prevent time travel.

You cannot change or alter the past; you can only discuss it.

You cannot go faster than the speed of light (186,000 miles per second) and survive.

A rocket ship or time machine (mass) with a human inside would take tons of energy (force) to plunge through time.

You cannot travel back to a time before the time machine was created.

To time travel, you must change your position in time and space or the machine will run into itself.

Every rule has exceptions!

The Paradoxes

According to renowned English physicist Stephen Hawking, a time machine will never be built. He affirms his belief with the statement: If such a creation were possible, then "why haven't we been invaded by hordes of travelers from the future?"

Just think: If you could go back in time, your presence in the past could cause events to go out of whack, creating questions and chaos. Suppose that while traveling back, you accidentally kill an ancestor. Does that mean you will not be born? According to people who believe in "multi-dimensional worlds," this and other time travel-related paradoxes can be avoided. These people say that when a person travels to the past, the universe immediately splits into other worlds, which are similar, but not exactly the same. They argue that nothing will change for those who travel back to the past and do not touch or alter anything.

With Science Fiction, No Limits

The first known science fiction story with this theme, "The Clock That Went Backward," by Edward P. Mitchell, was published in 1881. Sinc hen, thousands of tales, books, films, comic strips, television shows, songs and commercials have delighted the imaginations of countless readers and viewers with their depictions of time travel. Since the concept is portrayed as tricky and unpredictable, the consequences often involve mad scientists, monsters, faulty time machines and people stuck in the wrong time period.

Other mechanisms take travelers backward and forward. Devices include phones, gadgets, watches, photographs, willpower and an old book. Time machine devices include a police telephone booth in the British science fiction television program "Doctor Who." It allows the main character to move through time to stop evil. In the 1985 movie "Back to the Future," the lead character, a teenager named Marty McFly, travels from the 1980s to 1955 in a car rigged as a time machine. Marty's hope is to change his family's past in order to create a better future. In the television episodes of "Star Trek," crew members reach other ages with a built-in, warp-speed drive that breaks the time-light barrier. In one episode of "Superman," a comic book, TV and film character created in the 1930s, the hero flies backward around Earth as a human time machine. This reverses events and brings his friend Lois Lane back to life.

Will time travel ever happen? Who knows? Most important is to keep an open mind and a sense of wonder.

Quiz

1 Which selection from the article shows the MAIN problem with the idea that time travel could happen?

(A) And some physicists have even attempted mathematical equations to make the dream of time travel a reality.

(B) Einstein introduced two ideas upon which speculation about the possibility of the theory of time travel is based.

(C) A rocket ship or time machine (mass) with a human inside would take tons of energy (force) to plunge through time.

(D) If such a creation were possible, then “why haven’t we been invaded by hordes of travelers from the future?”

2 Read the section "With Science Fiction, No Limits."

Select the sentence from the article that suggests people are interested in the idea of time travel.

(A) Since then, thousands of tales, books, films, comic strips, television shows, songs and commercials have delighted the imaginations of countless readers and viewers with their depictions of time travel.

(B) Since the concept is portrayed as tricky and unpredictable, the consequences often involve mad scientists, monsters, faulty time machines and people stuck in the wrong time period.

(C) In the 1985 movie "Back to the Future," the lead character, a teenager named Marty McFly, travels from the 1980s to 1955 in a car rigged as a time machine.

(D) In one episode of "Superman," a comic book, TV and film character created in the 1930s, the hero flies backward around Earth as a human time machine.

3 Read the section "The Paradoxes."

What does this section show that other sections do not?

(A) It shows the problems that could be caused if time travel happened.

(B) It shows the opinions of people who do not believe time travel is possible.

(C) It shows information about how scientists have studied time travel.

(D) It shows ideas about how people could travel between different times.

4 Read the introduction of the article [paragraphs 1-3].

How does the introduction develop the main idea?

(A) It draws readers in with a series of questions that will later be answered in the article.

(B) It explains why many people believe that time travel is something that is not possible.

(C) It shows that both writers and scientists have been interested in the idea of time travel.

(D) It highlights the opinions of many scientists who believe that time travel could happen.

The Nez Perce and their technology

By U.S. Department of Agriculture, adapted by Newsela staff on 06.30.17

Word Count **1,472**
Level **950L**

A Nez Perce woman and her son are pictured in front of their tipi with two horses in 1909. Photo from Library of Congress

Native American communities have traditions that go back many centuries. Even long ago, however, their everyday lives were not very different than our own. Native Americans built homes and kept them neat. They carefully stored treasures, tools and toys. They spent time each day preparing food for a meal or storage, and had to find time to make and repair their clothes.

Communities found different ways to do these things, depending on their backgrounds. The Nez Perce people lived in the Blue Mountains region of what is now eastern Washington state and eastern Oregon. For them, hunting, fishing, and gathering were important traditional activities.

Some 3,500 years ago, the climate in this region was more moist and cool. The Nez Perce lived among Wallowa Lake and the Wallowa Mountains, which had been carved over a long period of time by glaciers.

Flooding and erosion over the years changed the environment over time. Much of the hunting and food gathering activity of the Nez Perce and other tribes moved to the upland country. Communities crowded into the Blue Mountains. From 2,500 to 4,200 years ago, more Native Americans lived there than at any other time.

Then, about 2,500 years ago, environmental conditions changed again. The regional climate shifted and became more it is today. The waters once again became rich with salmon, which took on a central role for local communities.

Villages grew up along the rivers, and small family groups made seasonal foraging trips throughout the Blue Mountains and the Wallowas. They hunted game and gathered food like huckleberries and roots.

Europeans Discover New Foods

When Europeans came to the New World, they found Native Americans eating unusual foods. The Europeans had never seen or tasted corn, potatoes, tomatoes or melons, all of which were grown in Native American gardens. Native Americans also showed them how to grow beans, squash and pumpkins.

Native American farming was quite advanced and corn was at its center. When Columbus landed in the Americas, he discovered people tending cornfields 18 miles long.

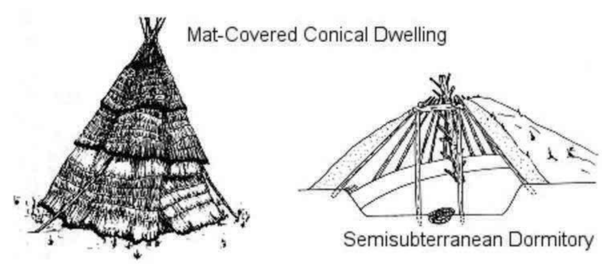
The Nez Perce diet also included wild berries. Huckleberries, cousins of the blueberry, grew low to the ground in the mountains. They were used in jams, jellies and pies. Along with a few other local berries, they were often also used by the Nez Perce to make a dish called pemmican.

Pemmican is made of meat, berries and fat. The meat is sliced very thin, then dried and pounded or ground with stones into a powder. Chopped dried berries are added to the powdered meat, and then melted fat (such as deer fat or buffalo fat) is mixed in. This mixture, when finished, was tasty, healthy, and could be stored to eat later without going bad.

The Portable Tipi

The Native Americans on the Plains hunted the huge herds of buffalo that roamed the grasslands. They used the meat, the hides, the bones and virtually all parts of the buffalo to make almost everything they needed. The buffalo did not stay in one place, but roamed across the prairies in search of plentiful grass. The people followed them because they went where the food went. So they needed portable homes that could be moved quickly and easily.

The Nez Perce and other tribes called their portable homes "tipis." You will often see the word spelled tepees or teepees. The correct spelling, however, is tipi. It means "living place."



Tipis were made from buffalo skins held up by poles. Each one had between 10 and 40 hides, depending on how big the buffalo were and how big the tipi was. New tipis were made in the spring to replace old ones that had worn out.

The inside and outside of a tipi was often decorated with natural dyes and colors. The front of the tipi was laced together with sticks. On top, they had "smoke flaps" that could be held open with poles to let smoke out, or folded shut to keep out snow and rain. In the heat of summer, the bottom could be rolled up to let a cool breeze pass through.

The big difference between a tent and a tipi is the tipi's liner. This is a short wall of hides that are strung around the poles on the inside of the tipi cover. Cold air from outside is channeled through the tipi cover and liner and enters the tipi already pre-warmed. It creates a ventilation system that ensures that the tipi is cool in summer, warm in winter, and not nearly so smoky or wet as a tent. It is an engineering marvel.

Oftentimes in the spring, all the members of a tribe gathered at one great camp. A council tipi or "lodge" was built in the center. The different bands or family groups put their tipis in a circle around it. Each band had reserved space, so people could find each other easily. You could always find an old friend because their tipi would be in the same place each spring.

When women gathered together to work on a new tipi, they enjoyed a special feast. It took about a day for them to make a new tipi.

When it was time to move the tipis, the women did the work, too. Generally, two people can put up or "pitch" a large tipi in about 20 minutes. In contests, though, two women could put up a tipi in less than three minutes!

Parfleche

The Nez Perce made large bags, like suitcases, to store and carry their food and clothing. They were called parfleche (pronounced "parflesh"). They were made from hides and were often beautifully decorated. They were easy to store inside the tipis and could be hung from the tipi poles.

Travois Carried Belongings

The Native Americans who lived on the Plains traveled a lot, following the herds of buffalo and moving seasonally to areas with good supplies of other foods. They did not use carts or wagons. Instead they used something called a travois to carry their belongings. Two long poles were tied together, and a person could hold the ends of the poles over their shoulders. The other ends of the poles would drag on the ground. Tipis, clothing and other items were packed and tied onto the poles. Parfleches full of food and tools were tied on top.

For many years, Native Americans used dogs to pull travois poles fastened to a harness made of strips of rawhide. After the Spanish ships brought horses to the New World, the horses took the place of dogs.

Children could ride on top of the load. Some tribes made small pole carriages on top of the travois for young children to ride in, so they would not fall off and get hurt during travel.

Canoes

People living near rivers or lakes built small boats from whatever was available. They used reeds, sewn skins, hollowed-out tree trunks, or tree bark. The Iroquois made canoes from elm or spruce bark fastened to a wooden frame. Their canoes were very lightweight and easy to carry. The Paiute tribes in southeast Oregon and northern Nevada collected armloads of tule reeds (pronounced too-lee), which are like cattails only thinner, and bound them together for rafts and canoes. They could slip quietly over a lake or marshy area for hunting birds and fishing.

Most canoes were steered with wooden paddles. On rivers where the water was too fast or too shallow, the canoe could be carried across land.

Fishing Lures

Fish were an important food for Native American families. Fish were caught in many different ways.

Some tribes made hand-knotted nets, both large and small. Some of the tribes in the Pacific Northwest still fish with large dipnets, from a platform built up above the edge of the riverbank. Others use a seine net (pronounced "sayn") to catch many fish at once.

Some tribes made a fish trap from sticks. Others built dams with rocks, dirt and fallen trees; they would then scoop the fish from the water with baskets.

Some tribes in the Southwest used special plants to catch fish. They ground up parts of these medicinal plants and tossed the powder into the water of a small pool or pond. The poison stunned the fish so that they floated to the top of the water and the people could pick them up easily.

Some fishermen tied a lure made of feathers to a line and dangled it in the water. When a fish came up to it, the fish was speared. Others used a technique similar to fly-fishing.

Quiz

1 Read the section "Europeans Discover New Foods."

What does this section show that other sections do not?

(A) when the Nez Perce settled in the Blue Mountains

(B) what the Europeans brought to the Native Americans after Columbus landed

(C) how Native Americans affected the people who came to the New World

(D) what types of foods the Nez Perce enjoyed

2 How do the last two paragraphs of the section "The Tipi" contribute to the entire article?

(A) They describe women's role in making and moving the tribe's tipis.

(B) They explain why competitions were held to see how quickly tipis could be built.

(C) They outline the steps for pitching and moving a large tipi.

(D) They give details about the feast women have when making tipis.

3 Read the following conclusion.

The Nez Perce were a technologically advanced people.

Which selection from the article provides the BEST support to this conclusion?

(A) Pemmican is made of meat, berries and fat. The meat is sliced very thin, then dried and pounded or ground with stones into a powder.

(B) The buffalo did not stay in one place, but roamed across the prairies in search of plentiful grass. The people followed them because they went where the food went.

(C) Each band had reserved space, so people could find each other easily. You could always find an old friend because their tipi would be in the same place each spring.

(D) It creates a ventilation system that ensures that the tipi is cool in summer, warm in winter, and not nearly so smoky or wet as a tent. It is an engineering marvel.

4 Select the paragraph from the section "Travois Carried Belongings" that suggests Native Americans changed the way their travois were moved.

Groceries in Arizona are being delivered by robotic vehicles

By Washington Post, adapted by Newsela staff on 01.07.19
Word Count **600**
Level **830L**

Kroger, the nation's largest grocery chain, announced a partnership with Nuro, a Silicon Valley startup that produces a driverless car called the R1, for grocery deliveries. Photo by: Kroger

If you live in the Phoenix, Arizona, area, you may have already seen self-driving vehicles. They deliver passengers from one location to another.

Scottsdale, Arizona, is just outside of Phoenix. Now, residents there can have their groceries delivered by driverless vehicles as well.

Kroger is the largest grocery chain in the nation. In mid-December, it announced a new partnership with Nuro, a technology company. Nuro produces a self-driving vehicle known as the R1. As of December 18, customers have been able to have their groceries delivered by Nuro.

Yael Cosset is the chief digital officer for Kroger. Customers are looking for "new, convenient ways" to order food, he said. The delivery service with Nuro has shown that driverless vehicles are a "flexible and reliable technology."

Online Grocery Business Could Take Off

How does it work?

After making grocery purchases online, customers schedule a delivery time. They can have their food sent to them the same day they order or the next. Each order is delivered by one of Nuro's self-driving vehicles. The R1 uses public roads and can reach 25 miles an hour. It does not have a human backup driver.

Nuro was founded by two scientists from Google's self-driving car project. The company believes its service is the first of its kind. Nuro will compete with a growing number of big companies in the grocery delivery space. One of them is Amazon, the most popular online seller.

In 2017, scientists asked Americans about their grocery shopping habits. They found that just 4 percent reported shopping for groceries online at least once a week. Those numbers may sound discouraging. However, scientists said they actually show potential for big changes.

There could be huge growth in the online grocery business, they said.

The report pointed to Amazon's purchase of the grocer Whole Foods. Some experts think the online giant wants to expand its operations into food delivery. It could use Whole Foods to do this.

More Than Just Groceries

Ford is one of the largest vehicle makers in the world. In Miami, Florida, Ford has teamed up with Walmart and delivery company Postmates. Together, they have created a delivery service using self-driving vehicles. The company Udelv has begun making grocery deliveries in the San Francisco Bay area. It is also delivering groceries in Oklahoma City. This week the company announced plans to begin delivering vehicle parts to businesses in Houston, Texas.

In August, the company AutoX launched a pilot program in San Jose, California. It uses driverless vehicles to deliver "fresh produce and other goods." The company's service comes with a twist, though.

"You can order goods from an app and get them delivered by a self-driving vehicle," the company said. Or, you can have a self-driving car bring a shelf of goods to you. That way, you can make your order "onsite in front of your house."

Packages Will Be Next

Robotic delivery is not just limited to food, either.

Last year, a new service came to Washington, D.C., and Redwood City, California. Residents were able to have food delivered from local restaurants by a small robot. It was created by a company called Starship Technologies.

The company recently revealed plans to broaden its delivery service. It is going to begin delivering packages as well as food. The company has declared itself "the world's first robot package delivery service."

The service is not available to everyone just yet. The company said it's rolling out the service in Milton Keynes, England, first. After that, it will expand to the San Francisco Bay area in the next few months.

Quiz

1 Read the following paragraphs from the section "Online Grocery Business Could Take Off."

> *In 2017, scientists asked Americans about their grocery shopping habits. They found that just 4 percent reported shopping for groceries online at least once a week. Those numbers may sound discouraging. However, scientists said they actually show potential for big changes.*
>
> *There could be huge growth in the online grocery business, they said.*
>
> *The report pointed to Amazon's purchase of the grocer Whole Foods. Some experts think the online giant wants to expand its operations into food delivery. It could use Whole Foods to do this.*

Which phrase from the section helps the reader to understand the meaning of "potential"?

(A) first of its kind

(B) purchases online

(C) huge growth

(D) food delivery

2 Read the following sentence from the section ”More Than Just Groceries."

> *In August, the company AutoX launched a pilot program in San Jose, California.*

What is the meaning of the phrase "pilot program" as it is used in the sentence above?

(A) a planned schedule

(B) a small experiment

(C) a new company

(D) a driverless car

3 Read the following paragraph from the introduction [paragraphs 1-4.]

> *Yael Cosset is the chief digital officer for Kroger. Customers are looking for "new, convenient ways" to order food, he said. The delivery service with Nuro has shown that driverless vehicles are a "flexible and reliable technology."*

What does this paragraph do in this section?

(A) It shows where the new delivery service is operating.

(B) It describes how the new delivery service came about.

(C) It explains how the new delivery service fills a need.

(D) It illustrates how the new service delivers groceries.

4 Read the article's introduction [paragraphs 1 - 4] and the final section “Packages Will Be Next.” What is one connection between these two sections?

(A) They both focus on places that have driverless food delivery businesses.

(B) They both mention American cities that first introduced driverless vehicles.

(C) They both show how there is a global trend in robotic delivery services.

(D) They both highlight the demand for new robotic technologies.

newsela

Ecosystem superheroes: Sea otters help keep coastal waters in check

By The Guardian, adapted by Newsela staff on 11.14.19

Word Count **896**

Level **810L**

Image 1. A sea otter family. Photo by: Verlisia via Getty Images

James Estes is an American marine biologist. He has studied wildlife in the North Pacific Ocean for the past 45 years. During that time, he has showed how predators can change their environments.

Ecosystems are made up of many organisms. They have complex relationships with each other. A trophic cascade is when a top predator is added or removed from an ecosystem. This changes the population of its prey and other organisms.

Trophic cascades are a powerful and important force. They shape the natural history of our planet. Yet human activity is continuing to impact wildlife populations. We are creating trophic cascades with unexpected consequences. Estes knows this first hand after studying sea otter populations in the north Pacific.

Sea Otters Were Once Hunted For Their Fur

Estes has spent most of his working life in the isolated Aleutian Islands. They stretch across the North Pacific Ocean from Alaska to the coast of eastern Russia.

The islands might seem isolated. But humans have had an influence. Beginning about 200 years ago, hunters moved into the Aleutians looking for sea otters pelts. The animals once thrived there. Back then, there were hundreds of thousands of otters.

The sea otter (Enhydra lutris) is a member of the weasel family. It stays warm in the water because it has the densest fur in the animal kingdom. There are about 850,000 to a million hairs per square inch. This keeps otters insulated from the cold.

However, the sea otter's thick, rich pelt also made it a major target for fur hunters. By the 1900s, hunters had brought the animal close to extinction. Only about a dozen colonies survived. Then, came an international ban on sea otter hunting. This saved the animal from extinction.

Studying Sea Otter Habitat

Sea otters have a massive appetite. An adult animal needs to consume vast amounts of food to survive. It needs to eat about a quarter of its own body weight every day. This could be up to 11 kilograms (24 pounds) of food.

Sea otters mainly eat sea urchins. They also eat crabs and other shellfish. Otters open these sea creatures with flat stones.

Estes wanted to know what happened to the ecosystem after sea otter populations declined. So he began studying the sea floors around islands where sea otters had survived. He also studied areas where they had disappeared.

Islands without sea otters had huge urchins that littered the barren seafloor. The underwater forests of kelp that once grew there had disappeared. The urchins consumed every kelp plant in sight. "Our results were eye-opening," he says.

By contrast, kelp flourished on nearby islands where sea otters survived or had been reintroduced. Estes found similar results elsewhere. Islands with sea otters had healthy kelp forests. Islands without otters had barren sea floors littered with sea urchins and no kelp.

In removing sea otters from the north Pacific, humans had endangered the species. They also disrupted a large chunk of the Pacific marine environment.

The Keepers Of Kelp Forests

Sea otters are a keystone species. These are important species that ecosystems depend on. Sea otters keep the kelp forest ecosystem healthy. This helps local species, as kelp forests support fish, mussels and microorganisms.

Kelp forests also help the global environment. Human activity is leading to more carbon dioxide in the atmosphere. This cause an increase in global temperatures. Carbon dioxide is also absorbed by the ocean, making it more acidic. This harms many species. Yet kelp forests use carbon dioxide to make their own food in a process called photosynthesis. Estes has calculated that healthy kelp forests have the capacity to absorb billions of kilograms of carbon.

Sea Otter Numbers And Threat Of Killer Whales

Fortunately sea otters were saved from extinction. Or at least it seemed that way in the 1980s and 1990s. Then Estes made a second disturbing discovery. He returned to the Aleutian islands of Adak and Amchitka. There, sea otter numbers had been steadily rising. But now he found their populations were dwindling.

Estes looked elsewhere in the same chain of islands. He found that some sites still had healthy populations. They included the islands of Clam Lagoon on Adak. However, most others showed population declines. He calculated that about 40,000 sea otters had disappeared in a few years. And when sea otter numbers dropped, urchins reappeared. Kelp forests began to disappear again.

Estes and another scientist, Tim Tinker, determined that killer whales were eating sea otters. Estes looked at the history of other species in the region. He discovered that when killer whale populations targeted an animal species, the population dropped. This happened with sea otters in the 1990s. It happened with seals and sea lions in the 1970s and 1980s. Why?

Estes determined that commercial whaling after the second world war was the cause. Before commercial whaling, killer whales fed on great whales of the North Pacific and southern Bering Sea, says Estes. By the time commercial whaling stopped, there were virtually no great whales left for killer whales to eat. So, they expanded their diet first to seals, sea lions and sea otters.

With the addition of killer whales, it seems a new top predator has appeared in the ecosystem. This shows how viewing the food web from the top to the bottom allows us to better understand nature and its complex relationships.

Quiz

1 Which is an example of a trophic cascade?

(A) Kudzu is a plant that was brought to the U.S. to help with erosion. It crowds out other plants. Fewer types of plants and animals live in an area overrun with kudzu.

(B) Wolves were returned to Yellowstone National Park. The wolves mainly preyed on deer, which then avoided open areas around streams. More willow trees started to grow on stream banks.

(C) Eastern elk were hunted to extinction. Western Rocky Mountain elk have been moved to places where Eastern elk lived. The western elk populations are growing.

(D) The chestnut blight is a fungus that came on lumber from China. The fungus attacked American chestnut trees. There were fewer chestnuts available to wildlife.

2 Read the following paragraph from the section "Studying Sea Otter Habitat."

> *Islands without sea otters had huge urchins that littered the barren seafloor. The underwater forests of kelp that once grew there had disappeared. The urchins consumed every kelp plant in sight. "Our results were eye-opening," he says.*

Which word from the paragraph helps the reader to understand the meaning of "barren"?

(A) huge

(B) littered

(C) disappeared

(D) eye-opening

3 What is the order of these events in the Pacific?

1. *Kelp populations declined.*
2. *Sea otter populations declined*
3. *Sea urchin populations increased.*
4. *Sea otters were hunted for their pelts.*

(A) 1, 3, 2 then 4

(B) 2, 1, 4 then 3

(C) 4, 2, 3 then 1

(D) 4, 3, 1 then 2

4 Read the following paragraph from the section "Sea Otter Numbers And Threat Of Killer Whales."

> *Fortunately sea otters were saved from extinction. Or at least it seemed that way in the 1980s and 1990s. Then Estes made a second disturbing discovery. He returned to the Aleutian islands of Adak and Amchitka. There, sea otter numbers had been steadily rising. But now he found their populations were dwindling.*

What is the meaning of the word "dwindling" as it is used in the paragraph above?

(A) separating

(B) changing

(C) developing

(D) shrinking

5 Which statement from the article provides an explanation of how sea otters can affect the atmosphere?

(A) Sea otters keep kelp forests healthy. Kelp forests use carbon dioxide to make their own food in a process called photosynthesis.

(B) Human activity is leading to more carbon dioxide in the atmosphere. This causes an increase in global temperatures.

(C) Commercial whaling caused a decrease in great whales and caused killer whales to change their diet and eat sea otters.

(D) Human activity is continuing to impact wildlife. Humans are creating trophic cascades with unexpected consequences.

6 Read the article's introduction [paragraphs 1-3] and the final three paragraphs of the article.

What is one connection between these two selections?

(A) They both explain how gaining or losing top predators changes ecosystems.

(B) They both describe ways in which sea otter populations and their ecosystems have changed over time.

(C) They both outline specific human activity that has had negative consequences on ecosystems.

(D) They both define the term "trophic cascade" and provide examples that illustrate its impact on ecosystems.

7 A sea urchin weighs an average of 1 pound.

How many sea urchins would an adult otter consume in two days?

(A) 20

(B) 24

(C) 40

(D) 48

8 If the section "Studying Sea Otter Habitat" was organized as cause and effect, which paragraph would come FIRST?

(A) Estes wanted to know what happened to the ecosystem after sea otter populations declined. So he began studying the sea floors around islands where sea otters had survived. He also studied areas where they had disappeared.

(B) Islands without sea otters had huge urchins that littered the barren seafloor. The underwater forests of kelp that once grew there had disappeared. The urchins consumed every kelp plant in sight. "Our results were eye-opening," he says.

(C) By contrast, kelp flourished on nearby islands where sea otters survived or had been reintroduced. Estes found similar results elsewhere. Islands with sea otters had healthy kelp forests. Islands without otters had barren sea floors littered with sea urchins and no kelp.

(D) In removing sea otters from the North Pacific, humans had endangered the species. They also disrupted a large chunk of the Pacific marine environment.

newsela

Are Humans to Blame for the Disappearance of Earth's Fantastic Beasts?

By Smithsonian.com, adapted by Newsela staff on 09.05.17

Word Count **944**

Level **830L**

A life-size statue of a woolly mammoth in Trafalgar Square, London, England. Photo by: Steve Parsons/PA Images via Getty Images.

Imagine driving along the highway and seeing a sloth the size of your car. Or 7-foot-tall bird that couldn't fly. Or the woolly mammoth, a kind a of hairy elephant.

It might seem strange, but 1.8 million years ago, these fantastic beasts were all over. Scientists call these large animals megafauna.

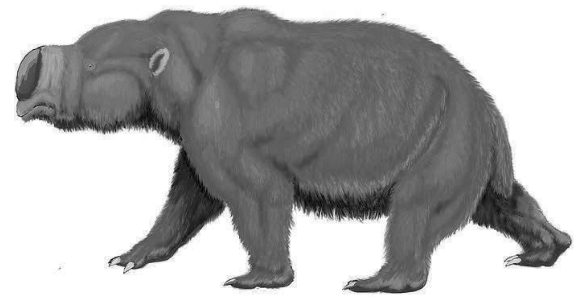
Officially, megafauna are animals that weigh at least 97 pounds when fully grown.

Mysteriously, many of them died off.

We have some huge beasts like this in Africa. However, less than half of these species exist elsewhere.

Where did these giants all go?

Did humans kill off the huge animals?



In the past 50 years, archaeologists have come to a conclusion: Megafauna might still be here if humans hadn't arrived. Archaeologists study ancient objects to learn about the past.

This idea was first proposed in 1966 by scientist Paul Martin. It says that each time modern humans arrived in a new part of the world, most of the huge animals went extinct, or died off, soon after. Either the humans hunted these beasts, or they took their food.

Martin's theory makes humans look like destructive creatures. Many people disagreed with it. But over time more and more archaeologists believed it.

Some believe humans are not to blame

Yet, some archaeologists still don't agree with it. For many of these extinctions, humans probably aren't to blame, says archaeologist Ben Marwick. The key to his argument is to look at the timing: Marwick and other scientists recently found human artifacts in northern Australia. These may show that humans came to Australia 65,000 years ago. Before, it was believed that humans came there 55,000 years ago.

Australian megafauna didn't start going extinct until sometime between 60,000 and 40,000 years ago.

There's two sides to every story

In other words, people were in Australia well before megafauna showed signs of extinction, Marwick says. This news makes humans look less responsible for the large animals dying off, he says.

But, scientists can look at the same information and see completely different stories. Gifford Miller is a scientist in Colorado. He still thinks humans helped cause the megafauna to die off. It's just that it may have taken a little longer than we thought before.

Even if humans first appeared in Australia earlier than believed, it took time for their population to grow. Once the populations were large enough, that means it could have caused more animals to go extinct.

Humans may have hunted animals

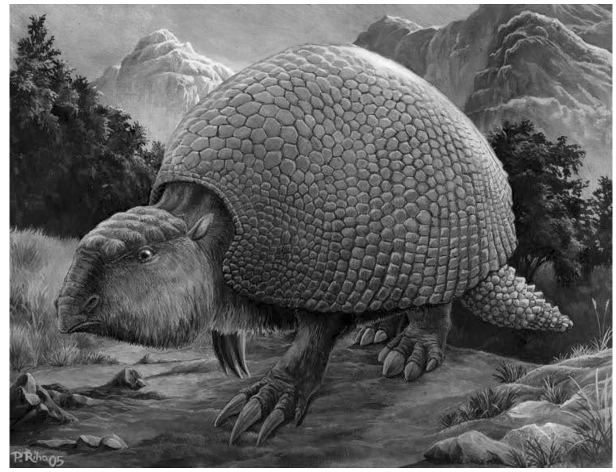
Before, we thought the megafauna died off almost immediately after humans arrived. Now, it might be that humans first spread out across Australia. They ate whatever they came across and transformed the environment. "It's undeniable that humans are preying on some of these large animals," says Miller.

Some scientists have wondered if ancient climate change killed off all those huge beasts, not humans. Miller doesn't see evidence of this.

Archaeologist Todd Surovell didn't agree with Miller's ideas at first. Then he started looking closer at the extinctions of megafauna throughout the world. The patterns he saw amazed him.

Still hunting for the truth

The history of humans settling Earth matches "perfectly" with the great death of megafauna, he says.



In Australia, there's not much evidence of humans hunting or eating megafauna.

But in North America, there are dozens of sites that show humans killing mammoths for their meat and tusks.

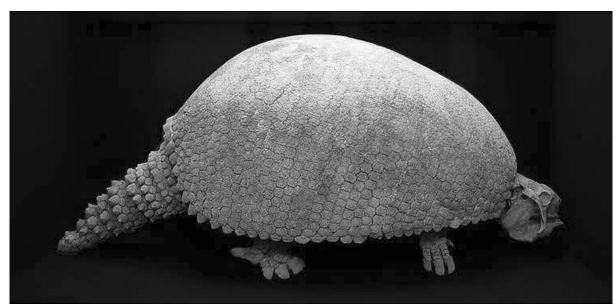
Some argue that just because a spearhead was found in the same location as a mammoth, it doesn't mean humans killed it. They could've just been scavenging its meat. And then there's the fact that plenty of other species—from short-faced bears to huge armadillos—have no evidence of humans hunting them.

That means humans didn't hunt those these particular giants to extinction, Surovell thinks.

Hunting the same food

Surovell believes that humans hunted animals that these giant animals also ate. They also changed how the giant animals got their food. Humans ate the same food as the best hunters in nature, like lions and saber-toothed cats. That made it harder for those animals to survive. We don't just hunt and eat animals, Miller says. Humans can change the environment around them. For Miller, this is proof that humans contributed to megafauna going extinct.

But that doesn't mean the debate is over.



Miller says the debate isn't just over data. It has to do with the deep beliefs and values many people have. This isn't too different from arguments about climate change or evolution.

Some people have deeply held beliefs that humans aren't dramatically changing the Earth, Surovell says. Humans often don't want to question their own deep beliefs, he says.

A battle for survival

Many people think that it's about good and bad. In other words, if humans caused these animals to die off, it makes them look bad. However, he says this is missing the point. Humans didn't set out to make these animals die off, Surovell says. They were just trying to feed their families the best they could.

Scientists agree that the debate is far from being over. People will continue hunting for evidence about whether humans caused megafauna to die off. But for 50 years, Surovell says, we haven't been able to prove the idea wrong. This is strong evidence that it may be true.

Quiz

1. Use the bottom three images and information from the article to select the true statement.

   (A) Megafauna appear to be larger relatives of animals that still exist.

   (B) Megafauna were killed off by humans for their fur and skin.

   (C) Megafauna can be looked at only in drawings done by artists.

   (D) Megafauna lived only in Australia after the existence of humans.

2. Examine the photograph at the top of the article.

   What does the photograph show about megafauna?

   (A) why half of megafauna still in existence live in Africa

   (B) what made scientists believe that humans killed megafauna

   (C) the fantastic size of megafauna in relation to humans

   (D) the way that most megafauna are displayed in cities

3. This article is organized using a compare and contrast structure.

   Why did the author choose to organize the information this way?

   (A) to explain different scientists' ideas about humans causing large animals to die off

   (B) to describe the different types of large animals that died off because of humans

   (C) to outline how the environment changed before and after large animals died off

   (D) to show that large animals died off in Australia for different reasons than in other places

4. Read the article's introduction [paragraphs 1-6] and the final section, "A battle for survival."

   What is the connection between these two sections?

   (A) Both sections explore how ideas about megafauna extinction changed over time.

   (B) Both sections explore the effects of human beings on the extinction of megafauna.

   (C) The introduction describes the size and weight of megafauna, and the final section shows how these factors caused them to die off.

   (D) The introduction asks a question about megafauna, and the final section explains that the question is still being answered.

A Year Redacted

By Alexei Collier, Cricket Media on 10.29.19

Word Count **873**
Level **MAX**

"Physics teaches us that you can’t observe the universe without interacting with it, changing it." Photo by: Paulius Dragunas/Unsplash

To Whom It May Concern:

I regret to inform you that the world is going to end sooner than expected. No, don't bother getting up. You don't need to duck and cover, or run around waving your arms in panic. I mean, you can if you want to, but it won't do any good. The world is going to end, and there's nothing you can do about it.

Allow me to explain. I am Dr. Eric Channing, a physicist working at the Red Sands Research Facility in Arizona. (Don't bother looking us up; as far as the public is concerned, the facility doesn't exist.) For the last four years now, I've been assisting Dr. Isaac Roper in an intensive study of the possibilities of time travel. Recently, we've had a breakthrough. I won't go into the details, not just because they're rather lengthy and technical, but because they're classified and would just get censored by our information filters. Suffice it to say that, through rigorous simulation testing, we've hit upon a stable and repeatable reaction that would effectively throw something — or someone — back in time.

This reaction releases a great deal of energy, but we didn't realize just how much. I did some calculations recently, and as it turns out, the event that throws the object (or individual) back in time would also destroy the universe. Best case scenario, the reaction would create a bubble universe that would expand rapidly, just as our universe did after the Big Bang. This new universe would wipe out the existing one, which happens to be the one we live in. Worst case scenario, the reaction would simply obliterate all of space and time. Either way, I checked over my work multiple times and I am absolutely certain that attempting to send anything into the past will result in total destruction.

Unfortunately, no one here is listening to me. I don't know if Dr. Roper believes me or not; it's clear he doesn't want to hear any more about my discovery. He won't even look at my notes. I've always been the research-focused one; Dr. Roper's the more action-oriented, ambitious side of the equation, and he obviously doesn't want the project shut down. As for the government bureaucrats who run Red Sands, I've exhausted every possible channel to try and bring the problem to their attention. All I've gotten for my efforts is an automated response saying that my concerns are important to them, that my message has been forwarded to the main office in Washington, D.C., and that I should hear back in six to eight weeks.

We're moving ahead with the initial test, and as much as I've tried, there's nothing I can do to stop it at this point. But I have been able to sneak this message aboard the test package that will be sent back in time. So I can tell you, with absolute certainty, that the world will end at exactly 2:45 pm on March 3, [Year Redacted].

Well, it appears that the internal filters are censoring the year. I've tried typing it in different ways, spelling it out or putting random spaces or symbols in it, but the algorithms are extremely robust. Apparently our employers were worried about the repercussions of someone in the past receiving correspondence dated from a time in the future. I'm not sure why that particular risk concerned them when the inevitable destruction of the universe did not.

I suppose you're thinking that this is the part where I tell you how to avert the end of the world. Sadly, you cannot. The simple fact that you have received this message proves that the project was a success, the quantum state of the future has collapsed from an infinite range of possibilities into one, and the world will end at 2:45 pm March 3, [Year Redacted].

Physics teaches us that you can't observe the universe without interacting with it, changing it. Right now, you're interacting with the future. Just think: before you read it, this message could have been anything. It could have had nothing to do with time travel at all. It could have been someone's bad poetry, or a recipe for pasta. And like Schrödinger's proverbial cat in the box, all of us here in [Year Redacted] could have been either alive or dead, until you read this message and ensured that we are, in fact, dead. In a way, by reading this, you are indirectly responsible for the destruction of the universe.

So say goodbye to your family and loved ones. Get out and cross a few more items off your bucket list. Make peace with your God, if you believe in that sort of thing. I'm not sure I do. You wouldn't believe the havoc that quantum mechanics wreaks on concepts like free will. And besides, what sort of a God would allow the cosmos He created to be swatted out by a handful of scientists misused by short-sighted government goons?

Oh, and by you. We can't overlook your involvement. That would be a serious lapse in scientific rigor, don't you think?

Have a nice day,

Eric Channing, PhD

Assistant Senior Director of Temporal Displacement

Red Sands Research Facility, Arizona

Quiz

1 Read the following sentence from the story.

> *Worst case scenario, the reaction would simply obliterate all of space and time.*

Replacing the word “obliterate” with which of the following words would CHANGE the meaning of the sentence?

(A) destroy

(B) eliminate

(C) wear down

(D) wipe out

2 Read the sentence below from the story.

> *I've always been the research-focused one; Dr. Roper's the more action-oriented, ambitious side of the equation, and he obviously doesn't want the project shut down.*

What is the definition of “equation” as used in this sentence?

(A) formula

(B) reaction

(C) process

(D) relationship

3 Read the following selection from the story.

> *Unfortunately, no one here is listening to me. I don't know if Dr. Roper believes me or not; it's clear he doesn't want to hear any more about my discovery. He won't even look at my notes. I've always been the research-focused one; Dr. Roper's the more action-oriented, ambitious side of the equation, and he obviously doesn't want the project shut down. As for the government bureaucrats who run Red Sands, I've exhausted every possible channel to try and bring the problem to their attention. All I've gotten for my efforts is an automated response saying that my concerns are important to them, that my message has been forwarded to the main office in Washington, D.C., and that I should hear back in six to eight weeks.*

What does this selection show about the narrator’s point of view?

(A) The narrator is afraid of the end of the world.

(B) The narrator wants credit for his discovery.

(C) The narrator thinks people are not taking the risk seriously.

(D) The narrator is worried about being able to keep his job.

4 Which statement BEST describes the narrator’s motivation?

(A) The narrator wants to prepare the reader for the end of the world.

(B) The narrator wants to help the reader prevent the end of the world.

(C) The narrator wants to blame the reader for causing the end of the world.

(D) The narrator wants to entertain the reader with a story about the end of the world.

Food and Agriculture in Ancient Greece

By Ancient History Encyclopedia, adapted by Newsela staff on 08.08.17

Word Count **989**

Level **870L**

Olive trees on the Greek island of Anaxos. Cereals, olives and wine were the three most produced foodstuffs in ancient Greece, suited as they are to the Mediterranean climate. Photo by: Pixabay

The ancient Greek city-states were very prosperous. They were successful largely because of the ways they produced food. Agriculture is the practice of growing crops and raising livestock such as cattle for people to eat.

The Greeks were particularly skilled at agriculture. Their farming skills allowed them to produce more food than they needed. Having extra food meant that not everyone needed to worry about producing food year-round. People were able to attempt other trades and create other goods that could be exported, or shipped out. These could be traded for other necessities.

The climate in Greece was perfect for growing grains, olives and grapes. As Greece's influence grew, its farming ideas and products spread to other places around the Mediterranean Sea.

A network of smallholdings

Most farms in Greece were private and family-owned. Anyone could grow crops and own livestock on their own land.

Farms in Athens ranged in size from 5 hectares to 20 hectares. A hectare is about the size of a football field. In Sparta, farms were a little bigger on average, as large as 44 hectares for the richest citizens. The poorest citizens had no land at all. They may have worked on the land of others, or would rent land and farmed it themselves.

It is not clear if farmers lived on their farms or lived in the city and traveled to their farms each day. What they did probably depended on how close they lived to the city. Rich farmers may have bought slaves to work the land.

Crops

Greece is surrounded by the Mediterranean Sea. This part of the world has a very particular climate. The Mediterranean climate has dry hot summers with warm winters. It usually rains in the winter. However, rain is not easy to predict and sometimes it didn't come. Crops often failed.

Wheat crops may have failed once every four years, and barley crops once every 10 years. Only one-fifth of Greece had farmable land, so there was a lot of pressure to use that land for farming.

The four most popular crops in Greece were wheat, barley, olives and grapevines.

Greeks didn't make bread from wheat, but they did make baked goods called barley cakes. They usually made gruel, a sort of cereal made from barley. Broad beans, chickpeas and lentils were grown. Many private households tended fruit such as figs, apples and pears, and vegetables such as cucumbers, onions, garlic and salads. Nuts like almonds and walnuts were popular, too.

Crop management

In October, November and December, farmers plowed their soil and planted seeds. This was an important and busy period. Athens did not hold any festivals or government meetings during this time. Grain was harvested in May and June. In June and July, grain was stored. Grapes were gathered and made into wine in September. In the autumn, olives were harvested and pressed into oil.

It appears that ancient Greeks rotated their crops, moving them to different parts of their land each year. This helped keep the soil fresh and keeps bugs away from the crops. Trenches, or ditches, were sometimes dug around trees. This would hold rainwater for when it was most needed. These trenches were an early kind of irrigation system, providing water for the crops.

Digging, weeding and plowing usually done by hand using wooden or iron-tipped plows and hoes. They used these to turn the soil up and down in order to keep it fresh. Wealthier farmers had oxen to help pull plows through their fields. Sickles, a kind of sharp blade, were used to harvest crops.

The crops were then winnowed, or cut down, using a flat shovel. This would separate the grain from its outer shell, called the chaff. Grains were then trampled on by livestock. This would further separate the wheat from the chaff. Grapes were crushed underfoot in containers. Olives were crushed in stone presses.

Animal husbandry

The ancient Greeks did not have large herds of livestock. Some households kept animals, perhaps no more than 50 in a herd. These included sheep, goats, pigs, chickens and some cattle. They were useful for their meat, milk to make cheese, eggs, wool or leather.

More animals were raised in areas where land wasn't fit for farming. These animals were often fed straw, stalks of vegetable plants, damaged fruit and leftover bits of grapes and olives. Horses, mules and donkeys were also raised. They were used to transport people and things.

Trade of foodstuffs

Most farmers would have only produced enough food for their own family. They would have traded extra food for things they did not produce themselves, like cheese, honey and fish.

About 2,500 years ago, Athens' port of Piraeus became the most important trading center in the Mediterranean. You could find almost anything you wanted at the market in Piraeus.

Greek merchant ships sailed the Mediterranean. They shipped wine, olives and olive oil to such places as Egypt and Asia Minor, which is now the country Turkey.

Many Greek city-states were trade centers for hundreds of years. The ports of Athens, Delos and Rhodes were especially important.

State intervention

The government didn't get too involved in trade and the sale of agricultural products. However, they did want to make sure Greece had plenty of grain. This was to make sure there was enough food in case Greece did not get enough rain during the year.

Grain was imported from other places, such as Egypt.

Government officials walked through food markets to make sure that the food being sold was of good quality. Other officials made sure that prices for grain were fair.

City-states often put a tax on goods that were traded at ports. Goods that were sent outside Greece, or came from other places, were more likely to be taxed. The government wanted people in Greece to pay less for food and wanted to make money from foreign farmers.

Quiz

1 Read the section titled "State intervention."

Which paragraph BEST explains how the government controlled the price of goods in Greece?

2 Read the paragraph from the section "Animal husbandry."

> *More animals were raised in areas where land wasn't fit for farming. These animals were often fed straw, stalks of vegetable plants, damaged fruit and leftover bits of grapes and olives. Horses, mules and donkeys were also raised. They were used to transport people and things.*

What is the MOST accurate explanation of this paragraph?

(A) The ancient Greeks fed their animals garbage in order to give them more energy.

(B) The ancient Greeks used resources they could not use otherwise to raise and feed animals.

(C) The ancient Greeks had a hard time finding food for animals in areas they could not farm.

(D) The ancient Greeks used animals to travel to places where the land was better for farming.

3 One MAIN idea of the article is that trade was a very important part of agriculture in ancient Greece.

What is another MAIN idea of the article?

(A) Ancient Greeks used their grain to make baked goods called barley cakes.

(B) Farms in Ancient Greece could range in size from 5 to 20 hectares.

(C) Skilled Greek farmers used the Mediterranean climate to grow a variety of crops.

(D) Agriculture allowed skilled Greeks to work other kinds of jobs instead of farming.

4 Read the paragraph from the section "Crop management."

> *It appears that ancient Greeks rotated their crops, moving them to different parts of their land each year. This helped keep the soil fresh and keeps bugs away from the crops. Trenches, or ditches, were sometimes dug around trees. This would hold rainwater for when it was most needed. These trenches were an early kind of irrigation system, providing water for the crops.*

How does this paragraph support the MAIN idea of the article?

(A) by showing the ancient Greeks were organized farmers

(B) by showing trade was an important part of farming in Greece

(C) by explaining how Greek farmers were able to keep their soil fresh

(D) by explaining the ancient Greeks invented irrigation

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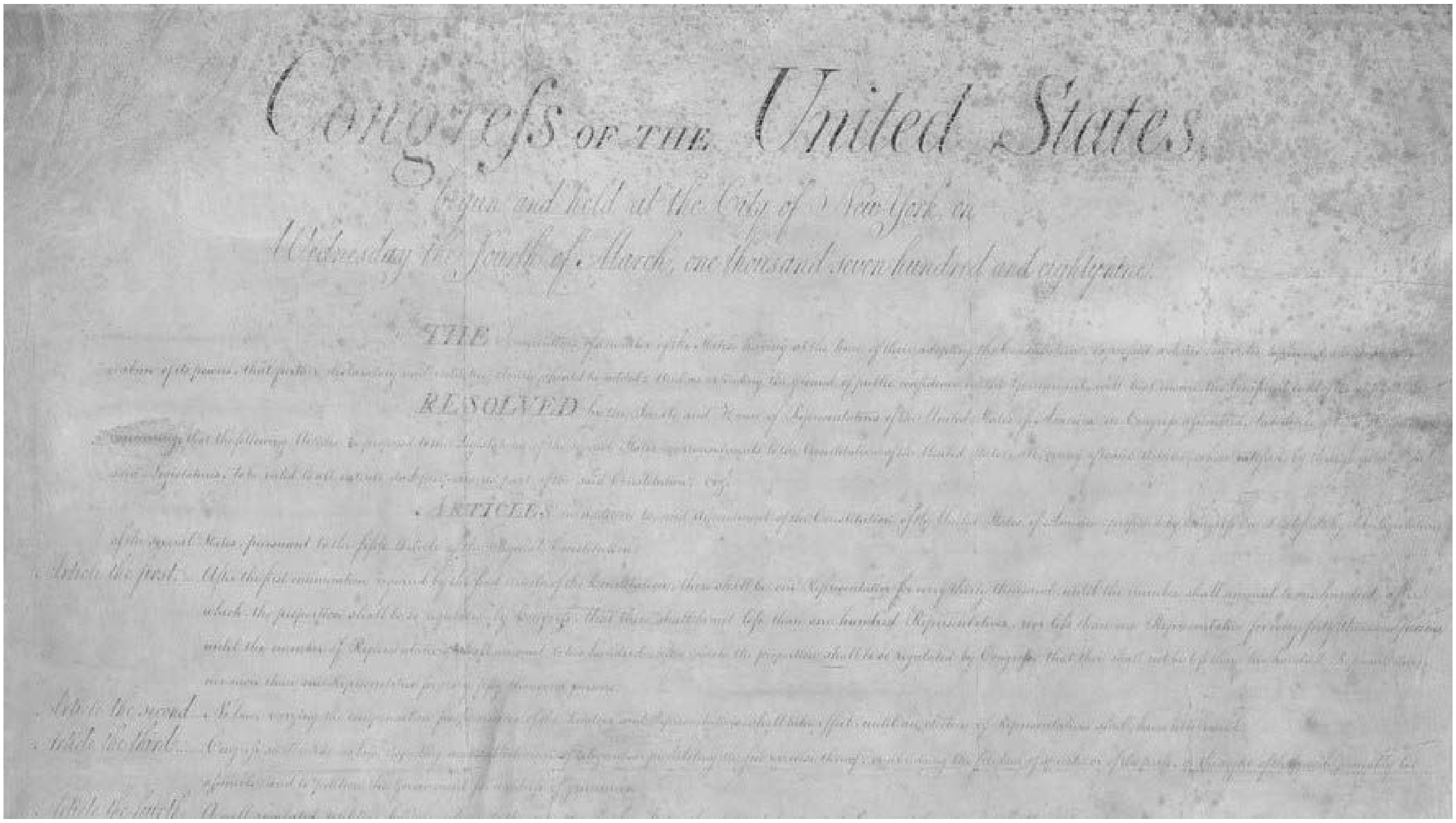
Primary Sources: The Bill of Rights

By Original document from the public domain, adapted by Newsela staff on 06.22.16
Word Count **675**
Level **750L**



The Bill of Rights, 12 articles of amendment to the U.S. Constitution proposed in 1789, 10 of which became part of the Constitution in 1791. National Archives, Wikimedia Commons

Congress of the United States met in New York City on Wednesday, March 4, 1789.

They wanted to make the Constitution easier to understand. Clearer words needed to be added. They wanted the people to trust the government.

The lawmakers in the Senate and the House of Representatives worked on the changes. They voted. Two-thirds of both Houses agreed on new parts to be sent to the States. Three-fourths of the States needed to approve the new parts. If they did, they would become amendments and part of the Constitution.

Amendment I

Congress shall not set up one national or state religion. It cannot stop anyone from joining a religion. No law can stop freedom of speech. No law can stop freedom of the press. No law can stop people from meeting and talking. The people can complain to the government.

Amendment II

A small army can be set up for the safety of a State. People have the right to own a gun, and weapons can't be taken away.

Amendment III

Soldiers have no right to eat or sleep in someone's home without permission. They are allowed if the owner says they can. In a war, this law can change.

Amendment IV

The people have the right to protect themselves. They can protect their houses and things from unfair searches. Good reasons for searches must be in writing. The permission is given to search only a certain place. Only certain, named people or things can be taken.

Amendment V

No person shall be put in jail unless given a written copy of what the crime was. There must be evidence and reasons for the arrest. This process may change during a war. This may also change when the United States is in danger. No person can be arrested more than once for the same crime. No person can go to trial more than once for the same crime and never shall the person on trial be forced to speak or be a witness. A person on trial has the right to have a judge or jury decide the result. Land and things owned by a person cannot be taken and used by the public. If land and things are taken, fair payment of money must be given to the owner.

Amendment VI

In all criminal trials, the person on trial shall have the right to a speedy and public trial. The person has a right to have a fair jury of the State and place where the crime happened. The person has to be told the reasons for being on trial. The person can face and listen to the witnesses against him. The person can have his own witnesses to help him and witnesses to explain the facts and have a lawyer to help him defend himself.

Amendment VII

In civil court, when a person is sued for more than 20 dollars, the right of trial by jury is still the person's right. A trial with a jury can happen only one time and there is no way to change the final result unless by the rules of common law.

Amendment VIII

People have a right to pay a fair amount of money to stay out of jail before and at the time of the trial. If the person is found guilty, he must pay a fair amount of money for a fine. Punishments must not be too cruel.

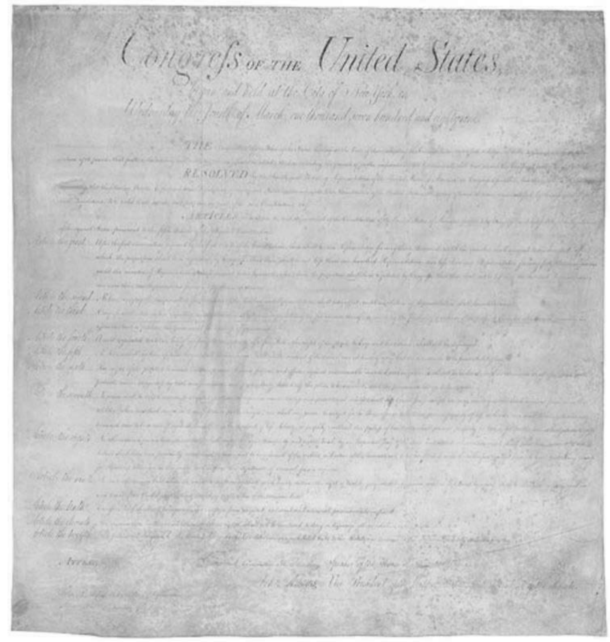
Amendment IX

Certain rights in the Constitution shall not be seen to be the only rights. There are more rights that are given to and held by the people.

Amendment X

The powers not given to the United States by the Constitution are given to each of the States and to the people.

Editor's Note: Above are the first 10 amendments to the Constitution, as adapted by Newsela. These amendments were ratified Dec. 15, 1791, and are known as the "Bill of Rights." Roman numerals were used to number the amendments.



Quiz

1 What is the purpose of the Bill of Rights?

(A) to tell which rights belong to the president

(B) to tell which rights belong to the government

(C) to tell which rights belong to the states

(D) to tell which rights belong to the people

2 Based on information in the Bill of Rights, which of these statements is TRUE?

(A) Soldiers are allowed to use someone's home for any reason at any time.

(B) The government can stop a newspaper from writing something negative about it.

(C) A president can take guns away from normal citizens if she or he thinks it is a good idea.

(D) The government can search a person’s home or papers if it has special written permission.

3 Why did Congress add the Bill of Rights to the Constitution?

(A) to help people better understand the Constitution and the government

(B) to replace the rights that were listed in the Constitution

(C) to ask people about which rights they would like to have

(D) to list all of the rights given to people in the United States

4 Which amendment suggests that the states can make their own laws about things that are not in the Constitution?

(A) Amendment VII

(B) Amendment VIII

(C) Amendment IX

(D) Amendment X

5 The Revolutionary War ended in 1783, five years before the Bill of Rights was written. Which two Amendments were likely written because of people's experiences during the war?

(A) Amendments II and III

(B) Amendments II and IV

(C) Amendments III and VI

(D) Amendments V and VII

6 Read the sentence from Amendment IV.

The people have the right to protect themselves.

Which sentence uses the word “right” in the same way as the sentence above?

(A) Cars are supposed to drive on the right side of the street.

(B) It is important to make the right decision for your future.

(C) Every student in this country has the right to a good education.

(D) Children must be taught the difference between right and wrong.

7 Members of Congress are elected by the people in their states and districts. People vote for senators and representatives they think have the same values that they do. What question did Congress members likely ask themselves when they were writing the Bill of Rights?

(A) What rights will be most important to the people in my state?

(B) What special rights should members of Congress have?

(C) What rights should people have when they leave the United States?

(D) What rights should the government have that the people do not?

8 Read the "Editor's Note" under "Amendment X."

Based on the information in this paragraph, what is the BEST replacement for the word "ratified"?

(A) rejected

(B) approved

(C) purchased

(D) understood

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Teens learn there is a freedom in telling their stories

By PBS NewsHour, adapted by Newsela staff on 01.16.19

Word Count **862**

Level **940L**

Participants in Narrative 4's empathy program met in Limerick, Ireland, in June 2017, to discuss their experiences. Photo: Larisa Epatko/PBS NewsHour

Malak Lahham was pulled aside by security guards at Israel's international airport. The guards said she would have to answer some questions.

"I was creeped out," 16-year-old Malak, an Arab, later admitted. "Have I done anything wrong?" She was traveling with no family members, only her teacher.

All of her belongings were unpacked and checked. The guards even looked through her phone. Where was she going?

Malak was heading to an annual summit of Narrative 4 in Limerick, Ireland. It is an organization that aims to build empathy in people through storytelling. Empathy is the ability to put yourself in someone else's shoes.

During the previous year, Malak's school had partnered with a Jewish-Israeli school in Narrative 4's program. They hoped to help foster a better understanding of each other. Conflict between

Arab-Israelis and Jewish Israelis has been ongoing. The conflict has largely been over land that both groups believe belongs to them.

"I was searched only because of my identity as an Arab," she thought.

(It is worth noting that Arab refers to speakers of Arabic, not a particular religion. While there are many Arab Christians and Arab Jews, the majority of Arabs in the Middle East are Muslim, meaning they practice the religion of Islam.)

Sharing A Powerful Story

Instead of responding to the situation with hatred, Malak decided to "fight it with love and kindness." She wanted to show the guards she was human, "simply by saying, 'Thank you, have a nice day.'"

"You can't judge a whole group because of a small part of it," she said.

"They said, 'Thank you, enjoy your flight.'"

Malak told her story at the meeting, which Lee Keylock, programs director for Narrative 4, called "very powerful." He commended her for being "generous," trying to "hear the stories of the security guards."

Narrative 4 Gains Supporters And Schools

Narrative 4 formed in 2012 by a group of writers and activists. They recognized that learning each other's stories and retelling them in the first-person is a powerful way to gain understanding. The program evolved from Lisa Consiglio, Narrative 4's executive director. She ran a literature organization in Colorado, including a story-swap program in English classes there.

In the process, she met novelist Colum McCann. He became a strong supporter and later president of Narrative 4.

A major donor to the program asked if they wanted to make Narrative 4 international and pair people around the world. Soon, kids in New Orleans were connected through video chat with Haitian children. This was just after a major earthquake had hit Haiti.

Their next stop was the Middle East, where they paired Arab-Israeli and Jewish-Israeli students. "These kids were 20 minutes apart and natural born enemies," Consiglio said. Through telling each other's stories, they were able to see each other with new eyes.

"We change the world when we walk in one another's shoes," McCann said. "People understand one another by walking inside the language and inside the story of somebody else's experience." McCann calls this "radical empathy."

Listen To And Caring About Others' Stories

The practice of learning someone else's story well enough to retell it as your own builds a special connection between the participants. By caring about others' stories, it might even spark a desire to do something more within the community.

The organization has authors and artists visit the schools help with the program. Schools around the world can connect with each other through a growing network on the group's page on social-media site Facebook.

Maru Castaneda is a Spanish teacher in Tampico, Mexico. Through the network, she connected with English teacher Faisal Mohyuddin in a suburb of Chicago.

Tampico, a port city on the Gulf of Mexico, suffers from gang violence. This makes residents afraid to be out at night, Castaneda said. "The American kids don't know this is happening, they think it is a normal city. It's not a normal city," she said.

Her high school kids told their stories, and the students in Illinois talked about their personal troubles such as their parents' divorce. Learning about the problems of others helped put their own lives in perspective, she said. "It doesn't matter if you're in the United States or Mexico, we are human and we are here to be better."

Teens Find A Freedom In Storytelling

Likhaya Rooi is a 19-year-old from South Africa's Port Elizabeth. He has participated in Narrative 4's programs for four years. He had painful stories to share about his family.

Before he told his stories, Likhaya said that he "thought maybe people would make fun of me.

'But when you share your story, it's more like you become free."

The program also helped to unite members of the community ordinarily set apart. Sheri Parks is co-program director of Baltimore Stories. In one Narrative 4-supported project, she brought high school students and Baltimore, Maryland, police officers together in a room.

"These are groups that actively shoot at each other," she said. They swapped stories about their teenage years and let down their guard.

"In one day, we went from fear and hatred to taking selfies and exchanging names and addresses," she said.

Quiz

1 Which sentence from the article would be MOST important to include in a summary of the article?

(A) A major donor to the program asked if they wanted to make Narrative 4 international and pair people around the world.

(B) The practice of learning someone else's story well enough to retell it as your own builds a special connection between the participants.

(C) Through the network, she connected with English teacher Faisal Mohyuddin in a suburb of Chicago.

(D) Her high school kids told their stories, and the students in Illinois talked about their personal troubles such as their parents' divorce.

2 Read the following sentence from the article.

> *"In one day, we went from fear and hatred to taking selfies and exchanging names and addresses," she said.*

How does this detail develop the author's central idea?

(A) It gives one example of a Narrative 4-supported project quickly bringing people together.

(B) It explains one way that Narrative 4-supported projects decide which groups to work with.

(C) It highlights a successful Narrative 4 meeting that was done internationally.

(D) It describes how people from different religions come together in Narrative 4.

3 What is MOST likely the reason the author included the experience Malak Lahham had at an Israeli airport?

(A) to highlight the reason why Malak Lahham finally decided to join the Narrative 4 program at her school and share her story

(B) to show how one Narrative 4 participant implemented the lessons she learned from the program in a bad situation

(C) to describe how the Narrative 4 program brought together Israeli security guards from airports with students who are Arab

(D) to explain how people who live in the same neighborhood can overcome violence and help their communities

4 How does the author largely build understanding of the Narrative 4 program?

(A) by providing different examples of groups around the world that have done the Narrative 4 program

(B) by highlighting the opinions of the writers and activists who formed the Narrative 4 program

(C) by contrasting successful Narrative 4 meetings with ones that struggled more

(D) by explaining how Facebook has been the main reason for the Narrative 4 program's popularity

How Government Works: What is citizenship?

By Encyclopaedia Britannica, adapted by Newsela staff on 02.24.17

Word Count **662**

Level **MAX**

Citizens in California vote during the 2008 presidential election. Choosing a leader of the government, like the president, is a right citizens have. Photo from: Associated Press.

Citizenship is everything that has to do with being a citizen, or full member, of a country. Citizens have rights that are given by the country's government. For example, citizens have the right to be protected by a country's laws. In return, citizens have duties that they owe to the country. One of the most important duties is being loyal to the country.

Citizenship is different than nationality. A person's nationality tells which country that person (called a national) is from. But nationals from a certain country are not always citizens of that country. They may have gained citizenship in another country, or they may have lost their citizenship. People who live in a country but are not citizens or nationals of that country are called aliens.

Becoming A Citizen

Every country has its own rules about who is a citizen and how to become one. Many countries have set up four basic ways to become a citizen. First, anyone who is born in the country is a citizen of that country. Second, anyone whose mother or father is a citizen of the country is also a citizen. Third, anyone who is married to a citizen becomes a citizen. Fourth, a person who goes through a process called naturalization becomes a citizen.

Naturalization is a method for people who are born in one country to become citizens of another country. Laws on naturalization are different from country to country. Usually, people who want to be naturalized must have lived in the new country for several years and must speak the country's language. They may have to pass a test about the country's laws and history and often they must take an oath, or swear to be loyal to the country.

Rights And Responsibilities

Citizens have certain rights, and some countries give their citizens more or different rights than other countries. Citizens usually have the right to vote and the right to be elected to government jobs, as well. Other rights of citizens may include the right to follow any religion and the right to speak freely.

Citizens also have duties, or responsibilities. Voting is a responsibility as well as a right. Citizens must vote to make sure that their government works for the good of its citizens. Citizens also may have the duty to serve on a jury during a trial in court. Some countries make serving in the military a duty of all citizens.

Aliens may have some of the same rights as citizens but they usually cannot vote or serve in the government. Aliens also have some of the same responsibilities as citizens. They must obey the country's laws and they often must pay taxes as well.

Losing Citizenship

People cannot lose their citizenship except in very special cases. A government may take away the citizenship of someone who becomes a naturalized citizen of another country. A government also may take away the citizenship of people who show allegiance to another country. Examples of this include voting in a foreign election and serving in a foreign military. Trying to overthrow the government by force is a serious crime that can result in loss of citizenship. Naturalized citizens who commit serious crimes may lose their citizenship as well.

People who have lost their citizenship can end up as citizens of no country, in which case they are called stateless persons.

Quiz

1 Read the summary below. Choose the answer that BEST fits into the blank to complete the summary.

Citizenship refers to being a full member of a country. _______________. They also have duties, like serving on a jury or serving in the military. Every country has different rules for who is considered a citizen, how to become a citizen and how to stay a citizen.

(A) Citizens have rights that are protected by the government, such as freedom of religion and speech.

(B) Citizens have responsibilities to their countries, like paying taxes and voting in elections.

(C) Naturalization is a process that people can go through to become citizens of a different country.

(D) Sometimes people's nationality (where they are from) is different from their citizenship (where they are citizens).

2 What is the MOST likely reason the author included the example about voting in a foreign election?

(A) The author wanted to give information on how naturalized citizens are different from other citizens.

(B) The author wanted to show that it is possible for people to have their rights as citizens taken away.

(C) The author wanted to explain part of the process for becoming a citizen in a foreign country.

(D) The author wanted to highlight the rare cases in which aliens become stateless persons instead of citizens.

3 Read the sentence from the introduction [paragraphs 1-2].

One of the most important duties is being loyal to the country.

Which selection from the article describes a consequence for not following through with this duty?

(A) They may have to pass a test about the country’s laws and history and often they must take an oath, or swear to be loyal to the country.

(B) Citizens also may have the duty to serve on a jury during a trial in court. Some countries make serving in the military a duty of all citizens.

(C) Aliens may have some of the same rights as citizens but they usually cannot vote or serve in the government.

(D) Trying to overthrow the government by force is a serious crime that can result in loss of citizenship.

4 Which piece of evidence from the article BEST shows how becoming a citizen of another country is a complex process?

(A) But nationals from a certain country are not always citizens of that country. They may have gained citizenship in another country, or they may have lost their citizenship.

(B) First, anyone who is born in the country is a citizen of that country. Second, anyone whose mother or father is a citizen of the country is also a citizen. Third, anyone who is married to a citizen becomes a citizen.

(C) Naturalization is a way for people who are born in one country to become citizens of another country. Laws on naturalization are different from country to country.

(D) Usually, people who want to be naturalized must have lived in the new country for several years and must speak the country’s language. They may have to pass a test about the country’s laws and history and often they must take an oath, or swear to be loyal to the country.

Rights and responsibilities of U.S. citizens

By U.S. Citizenship and Immigration Services on 06.01.17
Word Count **1,247**
Level **MAX**

Members of the armed services recite the pledge of allegiance during a naturalization ceremony at the USS Midway Museum, in May 2009 in San Diego, California. (U.S. Navy photo by Legalman 1st Class Jennifer L. Bailey/Released)

People in the United States have the basic freedoms and protections outlined in our founding documents, the Declaration of Independence and the Constitution. For more than 200 years, we have been bound by the ideals expressed in these documents. Because of these ideals, our society has prospered. The U.S. government, as established in the Constitution, protects the rights of each individual, without regard to background, culture, or religion. To keep our system of representative democracy and individual freedom, you should strive to become an active participant in American civic life.

Upon taking the Oath of Allegiance, you promise your loyalty and allegiance to the United States of America. U.S. citizens have important rights and responsibilities. These include the right to vote in federal elections and the ability to serve on a jury. Citizenship is a privilege that offers the extraordinary opportunity to be a part of the governing process. Former Supreme Court Justice Louis Brandeis once said, "The only title in our democracy superior to that of President [is] the title of citizen." In the United States, the power of government comes directly from the people.

Rights Of A Citizen

Freedom to express yourself. "Freedom of expression" includes several individual rights. It includes freedom of speech, freedom to peaceably assemble, and the freedom to petition the government for a redress of grievances. In a representative democracy, individual beliefs and opinions are important to our national dialogue and necessary to maintain a responsible citizenry. Americans can speak and act as they wish as long as it does not endanger others or obstruct another's freedom of expression in the process.

Freedom to worship as you wish. In the United States, the freedom to hold any religious belief, or none at all, is considered a basic, or unalienable right. The government cannot violate this right. Religious intolerance is unacceptable in a society where everyone has individual freedom. In cases where religious practices hurt the common good or endanger the health of others, the Supreme Court has imposed minor limitations of the way some religious practices are performed.

Right to a prompt, fair trial by jury. People accused of a crime have the right to a speedy and fair trial by a jury of peers. In a free society, those accused of a crime are assumed innocent until proven guilty in a court of law. The American system of justice treats all people fairly, ensuring the rights of the individual are maintained.

Right to keep and bear arms. The Constitution protects the rights of individuals to have firearms for personal defense. This privilege is subject to reasonable restrictions designed to prevent unfit persons, or those with the intent to criminally misuse guns or other firearms, from obtaining such items.

Right to vote in elections for public officials. By voting in federal, state, and local elections, citizens choose their government leaders. The right to vote is one of the most important liberties granted to American citizens. It is the foundation of a free society.

Right to apply for federal employment. Public service is a worthy endeavor and can lead to an extremely rewarding career working for the American people. Many federal government jobs require applicants to have U.S. citizenship. U.S. citizens can apply for federal employment within a government agency or department.

Right to run for elected office. U.S. citizenship is required for many elected offices in this country. Naturalized U.S. citizens can run for any elected office they choose with the exception of President and Vice President of the United States, which require candidates to be native-born citizens.

Freedom to pursue "life, liberty, and the pursuit of happiness." As a society based on individual freedom, it is the inherent right of all Americans to pursue "life, liberty and the pursuit of happiness." The United States is a land of opportunity. People are able to choose their own path in life based on personal goals and objectives. Americans can make their own decisions and pursue their own interests as long as it does not interfere with the rights of others.

Responsibilities Of A Citizen

Support and defend the Constitution against all enemies, foreign and domestic. The Constitution establishes the U.S. system of representative democracy and outlines the inherent principles of freedom, liberty and opportunity to which all citizens are entitled. The continuity of this Nation's unique freedoms depends on the support of its citizens. When the Constitution and its ideals are challenged, citizens must defend these principles against all adversaries.

Stay informed on the issues affecting your community. U.S. citizens should learn about the issues and candidates running for office before casting a vote in an election. Staying informed allows citizens the opportunity to keep the candidates and laws responsive to the needs of the local community.

Participate in the democratic process. Voting in the federal, state and local elections is the most important responsibility of any citizen. Voting ensures that our system of government is maintained and individual voices are clearly heard by officials.

Respect and obey federal, state and local laws. Laws are rules of conduct that are established by an authority and followed by the community to maintain order in a free society. Every person living in the United States must follow laws established through federal, state and local authorities.

Respect the rights, beliefs and opinions of others. Though the United States is a nation of diverse backgrounds and cultures, our common civic values united us as one nation. Tolerance, through courtesy and respect for the beliefs and opinions of others, is the hallmark of a civilized society and ensures the continuity of liberty and freedom for future generations.

Participate in your local community. Being a responsible member of one's local community is important to the success of representative democracy. Community engagement through volunteerism, participation in town hall meetings and public hearings, joining a local parent-teacher association, and running for public office are ways individuals can actively contribute to the well-being of the community.

Pay income and other taxes honestly, and on time, to federal, state, and local authorities. Taxes pay for government services for the people of the United States. Some of these services include: educating children and adults, keeping our country safe and secure, and providing medical services to the elderly and less fortunate. Paying taxes on time and in full ensures that these services continue for all Americans.

Serve on a jury when called upon. For U.S. citizens, serving on a jury is a very important service to the community. The Constitution guarantees that all persons accused of a crime have the right to a "speedy and public trial by an impartia ury." Jury service gives U.S. citizens the opportunity to participate in the vital task of achieving just, fair results in matters that come before the court.

Defend the country if the need should arise.
The Armed Forces of the United States, the military, is currently an all-volunteer force. However, should the need arise in time of war, it is important that all citizens join together and assist the Nation where they are able. This support could include defending the Nation through the military, noncombatant or civilian service.

Quiz

1. Which two sentences taken together develop the idea that citizens' rights depend on other citizens carrying out their responsibilities?

    1. *In a representative democracy, individual beliefs and opinions are important to our national dialogue and necessary to maintain a responsible citizenry.*
    2. *In a free society, those accused of a crime are assumed innocent until proven guilty in a court of law.*
    3. *Though the United States is a nation of diverse backgrounds and cultures, our common civic values unite us as one nation.*
    4. *Jury service gives U.S. citizens the opportunity to participate in the vital task of achieving just, fair results in matters that come before the court.*

    (A) 1 and 3

    (B) 1 and 4

    (C) 2 and 3

    (D) 2 and 4

2. Which of the following ideas did the author develop LEAST in this article?

    (A) Citizens must defend the Constitution.

    (B) Citizens must participate in government.

    (C) Citizens must respect one another's rights.

    (D) Citizens must volunteer in the community.

3. HOW do the images included with the article enhance your understanding of rights and responsibilities of citizens BEYOND what the article offers?

    (A) by demonstrating that there are different ways for citizens to participate in democracy

    (B) by demonstrating that many citizens do actively participate in their democracy

    (C) by demonstrating that citizens of different races and religions participate in democracy

    (D) by demonstrating that citizens can participate in democracy individually or in groups

4. Which image included with the article BEST depicts the idea that all citizens, without regard to culture or background, have both a right and a responsibility to defend and participate in government?

    (A) top image

    (B) second image

    (C) third image

    (D) bottom image

Women Leaders: Clara Barton

By Biography.com Editors and A+E Networks, adapted by Newsela staff on 12.07.16
Word Count **593**
Level **810L**

Clara Barton, founder of the American Red Cross. Photo: Library of Congress/Corbis/VCG via Getty Images.

Synopsis: Clara Barton was born in 1821 in Massachusetts. She became a teacher, worked in the U.S. Patent Office and was a nurse during the Civil War. She worked with a relief group known as the International Red Cross in Europe during a war between France and Germany. This gave her an idea. Barton worked to get an American branch when she returned to the United States. The American Red Cross began in 1881 and Barton was its first president.

Early Life

Clara Barton was born Clarissa Harlowe Barton on December 25, 1821, in Oxford, Massachusetts. Barton spent much of her life in service to others and created a group that still helps people in need today. It is called the American Red Cross.

Barton was the youngest of five children and a shy child. She discovered her natural ability to help others at a young age. She helped to care for her brother David after an accident. Barton continued being helpful to others as a teenager. She became a teacher at age 15. Later, Barton opened a free public school in New Jersey. She moved to Washington, D.C., in the mid-1850s. She worked there in the U.S. Patent Office as the first woman clerk. This office is where inventors can tell the government about their inventions and ideas to make them official.

"Angel Of The Battlefield"

Barton helped during the U.S. Civil War (1861-1865) in any way she could. First, she collected and distributed supplies for the Union Army. These were the soldiers from the North. Barton wanted to do more, so she started working as a nurse. She was not afraid of being close to war. Her first battle as a nurse was in Fredericksburg, Virginia, in 1862. She also helped soldiers wounded at the Battle of Antietam in Maryland. This battle is known as the bloodiest day of fighting in U.S. history. More than 22,000 people died that day.

Barton was nicknamed "the angel of the battlefield" for her work.

After the war ended in 1865, Clara Barton worked for the War Department. She helped to reunite missing soldiers and their families. She also helped find out more about those who were missing. Barton became a popular speaker and crowds of people would turn up to hear her talk about her war experiences.

The American Red Cross

While visiting Europe, Barton worked with a relief organization known as the International Red Cross during the Franco-Prussian War of 1870-1871. This gave her an idea. After returning home to the United States, she began working to convince others to start this organization in America.

The American Red Cross Society was founded in 1881 and Barton served as its first president. The Red Cross provides help during emergencies and disasters, such as an earthquake or a hurricane. As its leader, Barton was in charge of relief work for the victims of disasters, such as the 1889 Johnstown Flood in Pennsylvania and the 1900 Great Galveston Hurricane in Texas.

Later Years And Death

Barton resigned from the American Red Cross in 1904 during a power struggle within the organization. Barton never took a salary for her work with the Red Cross and sometimes used her own money to pay for supplies and relief efforts.

After leaving the Red Cross, Barton remained active, giving speeches and lessons. She also wrote a book titled "The Story of My Childhood," which was published in 1907. Barton died at her home in Glen Echo, Maryland, on April 12, 1912. She was 90 years old.

The Explorers: Dr. Mae C. Jemison

By Biography.com Editors and A+E Networks, adapted by Newsela staff on 07.22.16
Word Count **715**
Level **910L**

A photo of Dr. Mae Jemison, taken in 1992. NASA

Synopsis: Mae C. Jemison was the first African-American woman in space. She is also a medical doctor. Jemison was born in Decatur, Alabama, in 1956. Dr. Jemison was the first African-American woman to be admitted into the astronaut training program. Five years later, she flew into space with six other astronauts aboard the Space Shuttle Endeavour. Jemison has also earned several awards and honorary degrees.

A Girl Who Loved The Stars

Mae C. Jemison was born on October 17, 1956, in Decatur, Alabama. She was the youngest child of Charlie Jemison, a carpenter, and Dorothy (Green) Jemison, a teacher. Jemison has a sister, Ada, and a brother, Charles. The family moved to Chicago, Illinois, in search of better schools. Jemison was just 3 years old at the time. She calls Chicago her hometown.

Jemison went to her school library often when she was young. She read about all kinds of science. She really liked astronomy, the study of stars, planets and other objects in outer space. In high school, Jemison decided that she wanted to use science to make new things to help the human body. For example, she wanted to learn how to design machines that make the heart beat normally, and how to create artificial skin to help burn victims or develop new arms and legs to help people who had been injured or sick.

Jemison's parents supported her dreams. She graduated from high school with honors in 1973 and earned a National Achievement Scholarship. The award is given to hard-working African-American high school students who earn good grades. It paid her way through college in California.

An Engineer And A Doctor

Jemison was only 16 when she started college at Stanford University, one of the best colleges in the world. She studied engineering. But she also kept dancing and working on theater productions at Stanford, continuing two of her favorite activities from high school. She was even head of the Black Student Union, a social, cultural and political group. After earning a degree in chemical engineering in 1977, Jemison went to medical school at Cornell University in New York. While she was learning to be a doctor, she studied in Cuba and Kenya. She also worked at a Cambodian refugee camp in Thailand.

Jemison graduated from Cornell medical school and became a doctor in 1981. She began practicing medicine in Los Angeles, California. Later, Jemison moved to Africa, where she worked as a doctor in the Peace Corps in the west coast countries of Sierra Leone and Liberia. The Peace Corps is a United States group that trains Americans and sends them to help poor people in other countries.

She's Out Of This World

Jemison returned to the United States in 1985. She decided to chase another dream of becoming an astronaut. She applied to the National Aeronautics and Space Administration (NASA). On June 4, 1987, she was chosen - one of only 15 people admitted to the astronaut training program out of about 2,000 who applied.

She was the first African-American woman to be chosen for the astronaut training program. After more than a year of training, she became the first African-American female astronaut.

Jemison finally flew into space in September 1992, aboard the Space Shuttle Endeavour with six other astronauts. For eight days, the first African-American woman in space did science experiments. She was in space for more than 190 hours. The first sight she saw from space was her hometown of Chicago. After returning to Earth, Jemison said that people should recognize how much women and members of minority groups can do. Minorities are smaller groups of people who are different in some ways, such as race or religion, from people in a larger group within a country, a town, a company or a school.

Awards And A School Named For Her

Jemison has earned a lot of awards. She is a member of several important groups. Some colleges even gave her their highest degrees. A public school in Detroit, Michigan, was named the Mae C. Jemison Academy in her honor in 1992.

Dr. Mae Jemison left NASA in March 1993. She started her own company in Houston, Texas, where NASA is based. She also taught at a college in New Hampshire for several years.

Quiz

1 Read the following statement.

> *Ever since she was young, Jemison wanted to study science in order to make the world a better place.*

Which selection from the biography BEST supports the idea above?

(A) Jemison went to her school library often when she was young. She read about all kinds of science.

(B) In high school, Jemison decided that she wanted to use science to make new things to help the human body.

(C) After earning a degree in chemical engineering in 1977, Jemison went to medical school at Cornell University in New York.

(D) For eight days, the first African-American woman in space did science experiments.

2 Which selection from the section "She's Out Of This World" shows that becoming an astronaut is a rare and remarkable achievement?

(A) She applied to the National Aeronautics and Space Administration (NASA).

(B) On June 4, 1987, she was chosen - one of only 15 people admitted to the astronaut training program out of about 2,000 who applied.

(C) She was in space for more than 190 hours. The first sight she saw from space was her hometown of Chicago.

(D) After returning to Earth, Jemison said that people should recognize how much women and members of minority groups can do.

3 Which of the following answer choices BEST describes how the structure in the section "A Girl Who Loved The Stars" is different from the structure in the section "An Engineer And A Doctor"?

(A) The first section uses cause and effect and the second section uses chronological order.

(B) The first section uses order of importance and the second section uses problem and solution.

(C) The first section uses chronological order and the second section uses compare and contrast.

(D) The first section uses problem and solution and the second section uses order of importance.

4 What is the connection between the biography's first section, "A Girl Who Loved The Stars," and the final selection, "Awards And A School Named For Her"?

(A) The first section describes Jemison's early education as a young student and the final section describes her passion for the education of young children.

(B) The first section explains how Jemison wanted to use science to help people and the final section explains how her company accomplishes this goal.

(C) The first section explains how important school libraries were to Jemison as a child and the final section explains how her school provides resources to children.

(D) The first section describes her early interests and dreams for her future and the final section describes what she ultimately accomplished.

How to save money as a teenager

By Wikihow on 11.17.19
Word Count **1,407**
Level **MAX**

Get a piggy bank if you want to keep your money at home.

As you get older there seem to be more and more things that you want, but not enough money to get them. It could be a new cell phone or video game, some cute clothes or new makeup, or even some extra cash for a movie or date. When you are struggling to afford all the things you want, it might be time to take matters into your own hands and start saving up some money!

Method 1. Finding A Way To Save That Works For You

1. Get a piggy bank if you want to keep your money at home. It doesn't have to be an actual piggy bank, but that could be fun too. Call it a "money-saving container." You can use an old shoebox or an empty coffee canister with a slot cut in the lid. The point is just to have something that you can deposit your bills and loose change into. Having your money easily accessible might be very tempting. If you don't think you can trust yourself not to break into your container every time you want money, think about opening a savings account instead. If a money-saving container is your only option right now, try to make it harder to access. You can buy banks with lock combinations or that have no openings and must be broken in order to open it. If you made a homemade container, seal all the edges with duct tape or glue.

2. Open a savings account if you want to keep your money in a safe place. Look for an account that offers high interest rates, which are bonuses that the bank gives you for keeping your money in one of their accounts. Get an account with no monthly service fees as well. A savings account at a local bank or credit union makes it a little easier to save your money because you can't access it as easily. Check with the banks in your area for the requirements to open an account. You may have to have an initial deposit, usually between $25 and $100, to open one. Some institutions may require that you be 18 years old to open an account or that you have a parent or guardian with you. You may also need some form of ID to open your account. If you don't have an official ID card, they may accept a school ID or yearbook photo as well as other documents that your parents can help you with.

3. Ask someone you trust to hold your money if you have a short-term goal. If you don't trust yourself enough to manage your own money-saving container, and you aren't able to open a savings account, ask someone you can trust to hold onto your money for you. This may be a close friend, family member or anyone else you trust. Just make sure you tell them not to give in if you ask them for some money. This works best for specific short-term goals rather than building a general savings. Say you need to save $50 to buy a new pair of shoes. Tell your trusted person what your goal is and once you reach that specific amount, they can give you the money — no begging required.

Method 2. Fighting The Urge To Spend

1. Save at least one-third of your money if you want to build your savings. If you put all the money you earn directly into savings, it can feel like you did a lot of work for nothing, and creates the urge to want to spend it on something to show for all your hard work. To help with this, put one-third of your money into your savings as soon as you get it. Allow yourself to spend the other two-thirds. For instance, if you earn $25 for something, put about $8.33 into savings. This way, you can give yourself some spending money while still building up your savings. For larger amounts that you earn, or if you have something specific you are saving for, increase the amount you put into savings to about half. If you really have nothing to spend money on, and would just be wasting it anyway, try putting three-quarters of it into savings and spending the other one-quarter.

2. Wait 30 days before buying an item if it's not something you need. It's easy to splurge and buy something on impulse. If you find yourself in this situation, force yourself to stop the purchase. If you are at the store, put the item back and leave; if you are looking online, exit out of the browser. Write down the name of the item, the price, why you want it, the name of the store and the date. Over the next 30 days, think about the item. Really think through why you want it, if it's worth the price and if you can do without. This waiting period will also give you time to do some research to see if you can find better deals. If after 30 days you decide that you still really want the item, consider purchasing it. If you decide to buy it, the delayed gratification will make getting it seem so much better!

3. Make a budget if you need help staying on track. Each month, figure out which things you absolutely need money for, which are negotiable and which you can do without in order to save money. Then keep track of your spending and stick to your budget. Avoid buying things that go above and beyond your allotted spending amount so that you can still work toward your goals.

Method 3. Making Money

1. Do household chores if you want to earn money at home. Talk to your parents to see if you can work out a deal. You could ask for a list of chores to complete for a weekly or monthly payment, or you could request a set amount for each chore you do. For instance, you could ask for $2 each time you wash the dishes and $5 for picking weeds. If you decide on a set amount, a good rule of thumb is for parents to pay $1 per year of age every week. For instance, a 15-year-old would get $15 a week. Any money paid to you by your parents can vary greatly depending on your family's circumstances. Do not demand or expect a certain amount of money, and understand that paying you an allowance may not even be an option. Instead, work together to figure out what is doable. If you aren't able to get an allowance from your parents, you can try checking with other family members and neighbors. Ask if they have any chores they need help with and would be willing to pay you for.

2. Find a gig if you want to earn money on your own terms. Think of something you enjoy doing, and then use that to earn some cash. If you like children, start babysitting; if you like animals, walk dogs or pet sit; if you like doing outdoor work, rake leaves or mow lawns. You could also clean houses or wash cars — your options here are really endless. Start out by doing these service jobs for your parents, neighbors and other friends and family members. Ask them to pass your name onto their friends and family to help you get even more opportunities. If you really get into a gig you like, consider making business cards to hand out. This is a flexible money-earning option. You'll be in charge of what you do and when you do it.

3. Get a job if you want to work regular hours. Once you create a résumé, start looking online or for "help wanted" signs in your area. After you've decided on a couple of places you might like to work, start putting in applications at those locations. Consider working as a barista at a nearby coffee shop, in retail at a department store or hostessing at a restaurant. If you want a more low-key job that still has consistent pay, look into delivering newspapers. You'll need to check your local laws for the minimum age requirement to work and whether or not a permit is required. If your family owns their own business, or you know someone who does, this can be a great place to start.

Quiz

1 Which of the following statements accurately represents the relationship between the article's CENTRAL ideas?

(A) Teens need to understand that they will not always have parents or guardians who will buy them whatever they want; teens who attempt to save their money should keep in mind that most banks require initial deposits of $25 to $100 for them to be able to open an account.

(B) Teens need to understand that they will not always have parents or guardians who will buy them whatever they want; teens who attempt to save their money should learn to set aside a portion of their earnings, practice avoiding unnecessary spending and set budgets for themselves.

(C) Teens need to discover savings techniques that will accomplish the goals they set for saving and for the things they want to buy; teens who attempt to save their money should keep in mind that most banks require initial deposits of $25 to $100 for them to be able to open an account.

(D) Teens need to discover savings techniques that will accomplish the goals they set for saving and for the things they want to buy; teens who attempt to save their money should learn to set aside a portion of their earnings, practice avoiding unnecessary spending and set budgets for themselves.

2 Read the following two details from the article.

> *Write down the name of the item, the price, why you want it, the name of the store and the date. Over the next 30 days, think about the item. Really think through why you want it, if it's worth the price and if you can do without.*
>
> *Each month, figure out which things you absolutely need money for, which are negotiable and which you can do without in order to save money.*

Select the option that BEST explains how these details develop a CENTRAL idea of the article.

(A) Both details contribute to the idea that teens can use the money that they save to actually earn them more money in savings.

(B) Both details contribute to the idea that there are many ways kids can make money for the things they want to buy.

(C) Both details support the idea that teens should have strategies and limits in place that will help them avoid careless spending.

(D) Both details support the idea that teens need to put away different percentages of their money depending on the item they want to buy.

3 What purpose is served by including examples in the article of different ways to save?

(A) to provide suggestions that teens can choose from that will best help them achieve the savings target they envision

(B) to offer teens all three strategies that they must attempt in order to be successful in saving up for the item they want

(C) to compare and contrast methods so that teens can come to the conclusion that savings accounts are the best way to save money

(D) to demonstrate that saving money is difficult for most teens and they should focus their energies on making money instead

4 Which of the following provides the BEST analysis of the section "Making Money" as a conclusion to the article?

(A) The conclusion effectively summarizes the important points from the different sections and connects them to the main ideas introduced in the first paragraph.

(B) The conclusion effectively highlights different ways that teens can approach saving and spending money so that they can become better at making money.

(C) The conclusion does not effectively illustrate the reasons why a teen would want to make money or save money and instead focuses only on ways that they can earn money.

(D) The conclusion does not effectively demonstrate how teens can make money in a way that is actually attainable and realistic for the average teen.

Teen entrepreneur in Peru runs a bank for kids, helps environment

By The Guardian, adapted by Newsela staff on 06.19.19
Word Count **766**
Level **1030L**

José Adolfo Quisocala's student bank took off when he came up with an innovative way for children to make money by collecting waste.
Photo by: Jorge De La Quintana Linkedin

José Adolfo Quisocala is a banker from Peru. He encourages children to save money and offers his customers cash for recycling plastic waste. The really remarkable thing about him is that he is still a kid, too.

When many of his classmates dreamed of becoming professional soccer players, firefighters or music stars, José Adolfo set his sights on finance.

By the age of 7, he decided he wanted to create a bank for children. He was motivated by seeing his peers skipping lunch because they had spent the little money they had on sweets or football cards. What drove him even more was the poverty he saw among children.

Children Living In Poverty

"Seeing children living in poverty, seeing many children working in the streets, at the traffic lights selling sweets, begging ... made me think, why can't these children go to a normal school," he said.

"One of the reasons why those kids were working was because there was no money at home. Why can't I teach them to save?" he said.

The Bartselana student bank he founded now has more than 2,000 clients between the ages of 10 and 18. The bank offers loans, insurance and other financial services. The children can withdraw money from several banks. They can monitor their balances online. He also set savings goals for his clients. They have to reach those goals in order to withdraw money.

Awards And Prizes From All Over The World

José Adolfo managed to convince teachers and students that his idea could work. Then a prize from his local town hall helped him register his bank. Since then he has won awards from all over the world.

José Adolfo won the Child and Youth Finance International Award in 2014 and the Children's Climate Prize in 2018. He has been recognized for combining financial and environmental services.

The student bank really took off when he came up with a way for the children to earn money. Students can collect and turn in recyclable plastic or paper waste.

"The children would sometimes bring savings of a few cents and I had promised that they could buy a bicycle, a computer or a laptop but with that amount of money it would take a long time," he says. "I thought there must be a way they can earn money and I thought about rubbish; we all generate rubbish and I decided that was the solution."

Making Money From Recycling

The children bring plastic bottles, used school books and old newspapers to a kiosk at their school. The recycling is weighed and their bank accounts are credited with money.

José Adolfo struck deals with local recycling companies. He convinced them to pay his bank's clients a slightly higher price than normal.

"We don't want them to be in the street collecting rubbish but at home stopping the rubbish from reaching the street. So in their homes, they put out boxes for cardboard, paper, bottles — they start collecting and it becomes valuable," José Adolfo explains.

His efforts have not gone unnoticed by Peru's environment ministry. The country has introduced a law to tackle its more than 19,000 tons of solid waste a day. Half of the waste ends up on streets, beaches and in rivers.

"He's making an incredible change in financial structuring and financial education that perhaps many adults could not have come up with," said Peru's environment minister, Lucía Ruiz.

"He's scoring a double goal because he's not just designing a financial opportunity for children and teenagers but also helping to reduce the amount of waste in the country," Ruiz said

"It's a very hectic life for a 14-year-old," José Adolfo says. "Even so, I'm passionate about what I do and I always tell people they should do what they like rather than what others believe they should do."

The bank recycles 4.4 tons of material a month and has kiosks in seven schools in Arequipa. More are on a waiting list. Increasingly his creation is in demand in the rest of Peru and abroad.

José Adolfo is studying online because he no longer has time to attend school.

"He's given up many childhood things — games, activities, what normal children do — but he too is a normal child, he just sees things differently and thinks in another way," says his father, Herbert Quisocala. His father left his job a year ago to help.

"If he wants to cry, I'm here to help him understand that life is like that and you have to learn to accept the good with the bad."

Quiz

1 Select the paragraph from the section "Making Money From Recycling" that explains HOW the bank's clients earn money.

(A) The children bring plastic bottles, used school books and old newspapers to a kiosk at their school. The recycling is weighed and their bank accounts are credited with money.

(B) His efforts have not gone unnoticed by Peru's environment ministry. The country has introduced a law to tackle its more than 19,000 tons of solid waste a day. Half of the waste ends up on streets, beaches and in rivers.

(C) "He's scoring a double goal because he's not just designing a financial opportunity for children and teenagers but also helping to reduce the amount of waste in the country," Ruiz said

(D) The bank recycles over 4 tons of material a month and has kiosks in seven schools in Arequipa. More are on a waiting list. Increasingly his creation is in demand in the rest of Peru and abroad.

2 Which section from the article BEST explains why Jose Adolfo Quisocla started a bank?

(A) Introduction [paragraphs 1-3]

(B) "Children Living In Poverty"

(C) "Awards And Prizes From All Over The World"

(D) "Making Money From Recycling"

3 Which two of the following sentences from the article include CENTRAL ideas of the article?

1. *"The children would sometimes bring savings of a few cents and I had promised that they could buy a bicycle, a computer or a laptop but with that amount of money it would take a long time," he says.*
2. *"He's making an incredible change in financial structuring and financial education that perhaps many adults could not have come up with," said Peru's environment minister, Lucía Ruiz*
3. *"He's scoring a double goal because he's not just designing a financial opportunity for children and teenagers but also helping to reduce the amount of waste in the country," Ruiz said*
4. *"If he wants to cry, I'm here to help him understand that life is like that and you have to learn to accept the good with the bad."*

(A) 1 and 2

(B) 1 and 3

(C) 2 and 3

(D) 3 and 4

4 Which statement would be MOST important to include in a summary of the article?

(A) Plastic and paper waste is a major problem in Peru.

(B) José Adolfo Quisocala has received awards for his bank.

(C) Many children in Peru live in poverty and have little money.

(D) The bank gives children money in exchange for recycling.

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Learn about your college career and school options

By U.S. Department of Education, adapted by Newsela staff on 07.20.18

Word Count **811**

Level **1070L**

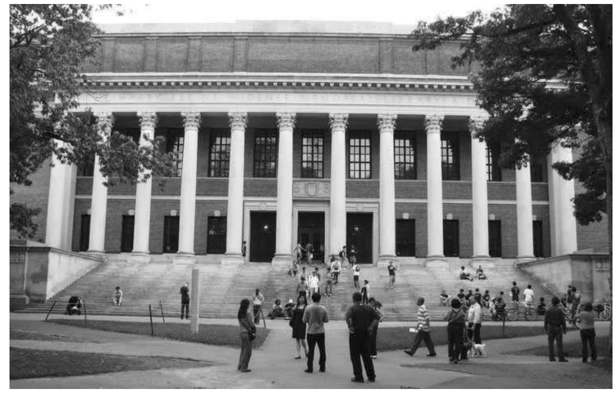
Image 1. Students celebrate as President Barack Obama speaks at the commencement ceremony at Hampton University in Hampton, Virginia, in 2010. In his speech, Obama said that education prepares us to face the challenges of the economy, helps us become good citizens and gives us a path to follow our dreams. Photo by: Pete Souza/White House

There are many different types of colleges and universities. The options after high school can seem overwhelming. To help you figure out which colleges or career schools might be best for you, here is a list of the main types of schools and the average time it takes students to graduate.

Public Or Private?

Public schools are run or funded by state and local governments. Private schools are not connected to a government organization. Some are run by private organizations or religious groups.

Private schools receive less money from state and local governments than public schools, or they receive none at all. As a result, they usually cost the same whether you live in or outside of the state. This cost is often higher than the cost of attending a public school in your state. Public schools usually cost less for people from the same state compared to people from other states. For example, at Ohio State University, students from Ohio pay less than people from Pennsylvania or Michigan.



Because costs are very different from school to school, you should research the schools that interest you. Through federal student aid programs, the U.S. government helps students pay for school. These programs provide either grants, loans or work programs. While you need to pay back loans with interest, you do not pay back the grants you've been awarded.

Any school that participates in these programs has to show its cost of attendance on its website. The school is also required to provide a "net price calculator." This will give you an idea of how much a program may cost, factoring in any money the school may provide for its students.

Four-Year Colleges And Universities

Students who attend a four-year college or university typically earn a bachelor's degree once they have successfully completed a program of study. This usually takes about four years.

A college usually offers a four-year bachelor's degree in the arts (like English or history) or sciences (like chemistry or engineering). Some colleges also offer advanced degrees after you've earned your bachelor's degree, including master's and other graduate degrees.

Universities offer bachelor's, master's and doctorate degrees. Some also have professional schools such as a law school or medical school. Universities tend to be larger than colleges, may have larger class sizes, and often focus on scholarly or scientific research.

Two-Year Colleges: Community And Junior Colleges

Community colleges and junior colleges award associate degrees once students have successfully completed a two-year course of study. Some two-year colleges grant diplomas or certificates of completion. These are for students who have met the course requirements and are ready to start careers, like nursing. Community and junior colleges are similar, except that a junior college is usually a private school.

Two-year colleges often cost less. They are also easier to get into. Many students begin their college careers at a community or junior college and later transfer to a four-year college. If you do this, you should make sure your community college courses will transfer to any colleges you are interested in and count toward your bachelor's degree. Many community colleges have "articulation agreements" with four-year colleges, meaning the classes taken at the community college transfer into the four-year degree program. Be sure to ask about the types of agreements the community college has.

Career Schools

Career schools are also known as technical, vocational or trade schools. They can be public or private. Many of them offer programs that are two years or less. They provide students with formal classes and hands-on experience related to their future career interests, from welding to medical imaging to skin care and makeup.

Technical schools teach the science behind the job. Vocational schools focus on hands-on skills needed to do that job. You may earn a degree or a certificate, prepare for a licensing exam or study to begin work in a skilled trade.

Some schools offer distance learning. This allows you to access lectures or course materials online or through other electronic media. Federal student aid is not available for all distance learning courses or online degrees, though. Check with the school to find out whether you can receive help from the government.

International Schools

You might be considering going to college outside the United States. Make sure you do your research, whether you plan to spend one semester abroad or get your entire degree from an international school.

Quiz

1 Read the selection from the section "Two-Year Colleges: Community And Junior Colleges."

> *Two-year colleges often cost less. They are also easier to get into. Many students begin their college careers at a community or junior college and later transfer to a four-year college. If you do this, you should make sure your community college courses will transfer to any colleges you are interested in and count toward your bachelor's degree.*

Which conclusion is BEST supported by this selection?

(A) While most students plan to transfer to four-year colleges after community college, many stop taking courses after two years.

(B) While it can be easy to get into a community college, it will cost less to spend all four years of school at the same college.

(C) Although many people like to take courses at community colleges, these courses will not count toward their degrees at a four-year college.

(D) Although there are advantages to two-year colleges, some of their classes may not transfer to the four-year college you plan on attending.

2 Which section highlights the idea that there are options for students who do NOT want to pursue a traditional arts or science degree?

(A) "Public Or Private"

(B) "Four-Year Colleges And Universities"

(C) "Two-Year Colleges: Community And Junior Colleges"

(D) "Career Schools"

3 Which summary of the article is BOTH accurate and objective?

(A) Public colleges often cost more to attend than private schools since they receive less money from the government. Some students who are not interested in arts and science degree programs want more technical training. This is a smart way to get a job quickly.

(B) Public and private four-year schools vary in cost and offer many different degree programs. Other options include two-year community college programs, or schools that focus on technical or hands-on skills. Whatever you decide, it is important to do your research.

(C) Students can choose to go to a private or public college after graduating from high school. Because private colleges cost more, the wisest choice is to attend a two-year college and transfer to a public school. This will guarantee a job after you earn your degree.

(D) Students who want to get the most hands-on training should attend career schools instead of four-year colleges. Those who are more adventurous will love a semester at an international school. Student aid is available for all colleges and programs, including online degrees.

4 Read the paragraphs from the section "Public Or Private?"

> *Public schools are run or funded by state and local governments. Private schools are not connected to a government organization. Some are run by private organizations or religious groups.*
>
> *Private schools receive less money from state and local governments than public schools, or they receive none at all. As a result, they usually cost the same whether you live in or outside of the state. This cost is often higher than the cost of attending a public school in your state. Public schools usually cost less for people from the same state compared to people from other states. For example, at Ohio State University, students from Ohio pay less than people from Pennsylvania or Michigan.*

How do these paragraphs develop a MAIN idea of the article?

(A) by contrasting the funding and costs of public and private schools

(B) by highlighting the affordability of Ohio State University

(C) by emphasizing the importance of choosing a school close to home

(D) by illustrating the role of government and religion in some schools