TexasHomeLearning

Seventh Grade

Summer At-Home Learning

Everything you need to provide summer lessons at home.

The learning plans included in this document are provided as a resource only. This information is intended to assist in the delivery of educational resources in this time of public crisis.

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Texas Education Agency

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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: “Out Where the West Begins”

- Read and annotate “Out Where the West Begins” (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. 45).
- 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: “Klondike Gold Rush”

- Read and annotate “Klondike Gold Rush” (p. 48).
- 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. 54).
- Write a paragraph explaining how a skater’s uniform affects their performance. Support your claim with evidence from the article. Write a second paragraph about a sport or physical activity of your choice and explain how the uniform and/or gear affects an athlete’s performance.

☐ Day 5

Resilience and Success: “Egypt's Pyramids”

- Read and annotate “Egypt's Pyramids” (p. 56).
- Answer the text dependent questions and the discussion questions.

Week 2

☐ Day 1

Resilience and Success: "NBA to Start Youth Tournament"

- Read and annotate "NBA to Start Youth Tournament" (p. 62).
- Answer the text dependent QUIZ questions.

☐ Day 2

Resilience and Success: "NBA to Start Youth Tournament"

- Reread "NBA to Start Youth Tournament" (p. 62).
- 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. 66).
- 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. 66).
- Write a response to the following questions: What skills do you believe someone needs to pursue a career in youth sports sponsorship? How does youth sports sponsorship affect society, specifically athletes and sporting events?

☐ Day 5

Resilience and Success: "Herd Behavior"

- Read and annotate "Herd Behavior" (p. 70).
- Answer the text dependent questions.

Week 3

☐ Day 1

Making Change: Day 1 of 5

- Read and annotate “Steve Jobs’ Stanford University Commencement Speech” (p. 75).
- Answer the text dependent questions and the discussion questions.

☐ Day 2

Making Change: Day 2 of 5

- Read and annotate “Musk's Plan: Send 1 Million People to Mars and Start a New Civilization” (p. 82).
- Write a paragraph responding to the following prompt: Elon Musk thinks people should plan to live on Mars, but some scientists disagree. Which side makes a stronger argument? Why? Provide evidence from the text to explain your response.

☐ Day 3

Making Change: Day 3 of 5

- Read and annotate “Energy Story” (p. 85).
- 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. 90).
- Write a paragraph that explains how cornmeal represents history and heritage. Write another paragraph explaining why food is so important to your culture or American culture. Use evidence from the article to support your responses.

☐ Day 5

Making Change: Day 5 of 5

- Read and annotate “I Hear America Singing” (p. 93).
- Answer the text dependent questions and the discussion questions.

Week 4

☐ Day 1

Making Change: Day 1 of 5

- Read and annotate “The Chicano Movement” (p. 96).
- Answer the text dependent questions and the discussion questions.

☐ Day 2

Making Change: Day 2 of 5

- Read “Apple's Reason to Buy its Latest Watch is Timed to Your Health” (p. 102).
- 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 “Who is Katherine Johnson?” (p. 105).
- Answer the text dependent questions and the discussion questions.

☐ Day 4

Making Change: Day 4 of 5

- Read “A Modern Take on the Traditional Tipi” (p. 111).
- 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 “These Middle Schoolers Explore the World on a Plate” (p. 114).
- Answer the text dependent Quiz questions.

Additional Lessons

☐ Additional Lesson 1

Community: Day 1 of 5

- Read and annotate “Cinderella” (p. 118).
- 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. 127).
- Write 2-3 paragraphs responding to the following prompt: A safe, supportive, and positive environment in a classroom helps students learn. What evidence from the article supports this claim? Explain how the evidence supports the claim.

☐ Additional Lesson 3

Community: Day 3 of 5

- Read and annotate “Excerpt from Peter Pan: When Wendy Grew Up” (p. 130).
- 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. 145).
- 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 “NOAA’s Big Miracle Worker” (p. 148).
- Answer the text dependent questions and the discussion questions.

☐ Additional Lesson 6

Community: Day 1 of 5

- Read and annotate “A Student with an Idea Helps America Fight Food Waste, One Click at a Time” (p. 154).
- Answer the text dependent quiz questions.

☐ Additional Lesson 7

Community: Day 2 of 5

- Reread “A Student with an Idea Helps America Fight Food Waste, One Click at a Time” (p. 154).
- 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. 158).
- Answer the text dependent quiz questions.

☐ Additional Lesson 9

Community: Day 4 of 5

- Reread "East African Runners One Step Ahead" (p. 158).
- 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 "The Surprisingly Positive Power of Texting, According to Science" (p. 162).
- Answer the text dependent QUIZ questions.

☐ Additional Lesson 11

Personal Growth: Day 1 of 5

- Read and annotate "The Land of Story-Books" (p. 167).
- 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. 171).
- 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 "Casey at the Bat" (p. 175).
- Answer the text dependent questions and the discussion questions.

☐ Additional Lesson 14

Personal Growth: Day 4 of 5

- Read and annotate "The Difference Between Empathy and Sympathy" (p. 181).
- Write a paragraph explaining benefits and consequences of having sympathy and/or empathy. Use at least two details to support your response.

☐ Additional Lesson 15

Personal Growth: Day 5 of 5

- Read and annotate "How Autism Freed Me to Be Myself" (p. 184).
- Answer the text dependent questions and the discussion questions.

☐ Additional Lesson 16

Education and Knowledge: Day 1 of 5

- Read and annotate "Curiosity Changes the Brain to Boost Memory and Learning" (p. 190).
- Answer the text dependent quiz questions.

☐ Additional Lesson 17

Education and Knowledge: Day 2 of 5

- Reread “Curiosity Changes the Brain to Boost Memory and Learning” (p. 190).
- Write 1-2 paragraphs responding to the following prompt: The article states that the more curious we are about a topic, the easier it will be to remember not only information about that topic but also other unrelated information shown at the same time. What are 1-2 skills or topics you would like to learn? What are interesting ways you could learn these new concepts while maintaining your curiosity and excitement?

☐ 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. 194).
- 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. 194).
- 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. 198).
- Answer the text dependent quiz questions.

Week 1

☐ Day 1

Modeling the Multiplication of Integers

- Complete the warmup and getting started sections (p. 202).
- Complete activity 1.1.

☐ Day 2

Signed Multiplication Facts

- Complete activity 1.2 (p. 208).

☐ Day 3

Signed Fact Families

- Complete activity 1.3 and Talk the Talk (p. 211 and 213).

☐ Day 4

Practice and Review

- Complete the assignment problems (p. 214).

☐ Day 5

Classifying Decimals

- Complete the warmup and getting started (p. 216).
- Complete activity 2.1.

Week 2

☐ Day 1

Equivalent Rational Numbers

- Complete activity 2.2 and the Talk the Talk (p. 220).

☐ Day 2

Practice and Review

- Complete the assignment problems (p. 224).

☐ Day 3

Operating with Rational Numbers to Solve Problems

- Complete the warmup and getting started sections (p. 226).
- Complete activity 3.1.

☐ Day 4

Using Rational Numbers in Equations

- Complete activity 3.2 (p. 230).

☐ Day 5

Calculating Percent Error

- Complete activity 3.3 (p. 231).

Week 3

☐ Day 1

Evaluating Expressions with Rational Numbers and Variables

- Complete activity 3.4 and Talk the Talk (p. 233).

☐ Day 2

Practice and Review

- Complete the assignment problems (p. 236).

☐ Day 3

Distributing and Factoring with -1

- Complete the warmup and getting started sections (p. 238).
- Complete activity 4.1.

☐ Day 4

Subtracting as Adding the Opposite

- Complete activity 4.2 (p. 242).

☐ Day 5

Practice with the Properties

- Complete activity 4.3 and Talk the Talk (p. 243).

Week 4

☐ Day 1

Practice and Review

- Complete the assignment problems (p. 246).

☐ Day 2

Skills Practice: Multiplying and Dividing Rational Numbers

- Complete sections I and II (p. 248).

☐ Day 3

Skills Practice: Multiplying and Dividing Rational Numbers

- Complete section III (p. 251).

☐ Day 4

Algebraic Expressions

- Complete the warm and getting started (p. 253).
- Complete activity 1.1.

☐ Day 5

Substitution with Rational Numbers

- Complete activity 1.2 (p. 257).

Additional Lessons

☐ Additional Lesson 1

Evaluating Expressions

- Complete activity 1.3 and Talk the Talk (p. 259).

☐ Additional Lesson 2

Practice and Review

- Complete the assignment problems (p. 263).

☐ Additional Lesson 3

Algebraic Expressions on the Number Line

- Complete the warmup and getting started sections (p. 265).
- Complete activity 2.1.

☐ Additional Lesson 4

Applying the Distributive Property

- Complete activity 2.2 (p. 269).

☐ Additional Lesson 5

Factoring Linear Expressions

- Complete the activity 2.3 and Talk the Talk (p. 273).

☐ Additional Lesson 6

Practice and Review

- Complete the assignment problems (p. 277).

☐ Additional Lesson 7

Combining Like Terms

- Complete the warmup and getting started section (p. 279).
- Complete activity 3.1.

☐ Additional Lesson 8

Combining Like Terms with Decimal and Fractional Coefficients

- Complete activity 3.2 (p. 284).

☐ Additional Lesson 9

Adding the Opposite to Subtract

- Complete activity 3.3 and Talk the Talk (p. 286).

☐ Additional Lesson 10

Practice and Review

- Complete the assignment problems (p. 289).

☐ Additional Lesson 11

Skills Practice: Algebraic Expressions

- Complete section I and section II part A (p. 291).

☐ Additional Lesson 12

Skills Practice- Algebraic Expressions

- Complete section II-part B and section III (p. 295).

☐ Additional Lesson 13

Creating a Model to Represent Equal Expressions

- Complete the warmup and getting started sections (p. 296).
- Complete activity 1.1.

☐ Additional Lesson 14

Creating a Model to Solve an Equation

- Complete activity 1.2 (p. 299).

☐ Additional Lesson 15

Solving Addition Equations

- Complete activity 1.3 (p. 301).

☐ Additional Lesson 16

Solving a Subtraction Equation

- Complete activity 1.4 and Talk the Talk (p. 303).

☐ Additional Lesson 17

Practice and Review

- Complete the assignment problems (p. 306).

☐ Additional Lesson 18

Skills Practice: Adding and Subtracting Rational Numbers

- Complete section I (p. 308).

☐ Additional Lesson 19

Skills Practice: Adding and Subtracting Rational Numbers

- Complete section II (p. 310).

☐ Additional Lesson 20

Skills Practice: Adding and Subtracting Rational Numbers

- Complete section III (p. 312).

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. 314).
- 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. 314).
- 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. 319).
- 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. 322).
- 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

- Reread “How roller coasters work” (p. 325).
- 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. 329).
- 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. 333).

☐ Day 5

Potential and Kinetic Energy: Day 5 of 5

- Reread “Experiment: swinging with a pendulum” (p. 333).
- 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 expected? 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. 393).
- 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. 397).
- 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. 401). 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 and Transformation: Day 1 of 5

- Read “Explaining energy transfer and transformations” (p. 349).
- Use the article to explain how energy transfers and transforms.

☐ Day 2

Energy Transformations: 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 Transformations: Day 3 of 5

- Read “Heat, or thermal energy, can be transferred in three ways” (p. 354).
- Describe the three types of thermal energy transfer. List an example of each type.

☐ Day 4

Energy Transformations: Day 4 of 5

- If you have the materials, create a solar oven using “Make It Yourself: Sun s’mores” (p. 358).
- Many materials can be substituted, be creative and find other options to experiment. Test out the solar oven.

☐ Day 5

Energy Transformations: 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. 362).
- Explain how submarine volcanoes form.

☐ Additional Lesson 2

Land Transformations: Day 2 of 5

- Reread “Underwater volcanoes and the ecosystems they create” (p. 362).
- 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. 366).
- 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. 367). Many materials can be substituted, be creative and find other options to experiment.

☐ Additional Lesson 5

Land Transformations: Day 5 of 5

- If you have materials, perform the experiment and record finding for “Experiment: Exploring the erosive energy of waves” (p. 367). Many materials can be substituted, be creative and find other options to experiment.

☐ Additional Lesson 6

Ecosystems: Day 1 of 5

- Read “Ecosystem superheroes: Sea otters help coastal waters in check” (p. 372.)
- 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. 377).
- 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. 381).
- 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. 384).
- 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. 387).
- 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. 392).
- 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. 396).
- List and describe the different types of cells in the reading.
- Describe the role that sea otters play in the environment.

☐ 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. 401).
- 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. 408).
- 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. 408).
- 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. 412).
- 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. 416).
- 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. 421).
- 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. 424).
- 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. 424).
- 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. 429).
- 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 your read this week.

Week 4

☐ Day 1

Culture: Day 1 of 5

- Read and annotate “A Year Redacted” (p. 433).
- 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. 437).
- Take the quiz.

☐ Day 3

Culture: Day 3 of 5

- Reread “Food and Agriculture in Ancient Greece” (p. 437).
- 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. 441).
- 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. 441).
- 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 freedom in telling their stories” (p. 446).
- 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. 450).
- 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. 452).

☐ Additional Lesson 8

Citizenship: Day 3 of 5

- Read and annotate “Rights and responsibilities of U.S. Citizenship” (p. 453).
- 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. 458).
- 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. 460).
- Answer the question: What is Dr. Mae C. Jemison and 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. 463).
- Take the quiz.

☐ Additional Lesson 17

Economics: Day 2 of 5

- Reread "How to save money as a teenager" (p. 463).
- 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. 468).
- 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. 472).
- 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: _____

Out Where the West Begins

By Arthur Chapman
From Out Where The West Begins: And Other Western Verses ● 1917

Arthur Chapman was an American journalist who wrote the poem "Out Where The West Begins" in response to some Western governors who were having a dispute over which American states should be considered "the West." As you read, find evidence that reveals how ordinary Americans must have perceived The West during this time.

Out where the handclasp's a little stronger,
Out where the smile dwells a little longer,
That's where the West begins;
Out where the sun is a little brighter,
Where the snows that fall are a trifle whiter,
Where the bonds of home are a wee bit tighter—
That's where the West begins.

Out where the skies are a trifle bluer,
Out where friendship's a little truer,
That's where the West begins;
Out where a fresher breeze is blowing,
Where there's laughter in every streamlet flowing,
Where there's more of reaping[1] and less of sowing[2]—
That's where the West begins.

Out where the world is in the making,
Where fewer hearts in despair are aching,
That's where the West begins;
Where there's more of singing and less of sighing,
Where there's more of giving and less of buying,
And a man makes friends without half trying –
That's where the West begins.

"Shoshone Falls, Snake River, Idaho" is licensed under CC BY 2.0.

1. **Reap** ***(verb):*** to cut or gather a crop or harvest; to receive (a reward or benefit) as a result of one's own actions
2. **Sow** ***(verb):*** to plant (seeds)

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 “trifle” as it is used in line 5?
    A. Bright and shining
    B. Stunning and impressive
    C. Great deal
    D. Little bit

2. PART B: Which TWO words from the poem provide the best clue to the answer to Part A?
    A. "stronger"
    B. "smile"
    C. "dwells"
    D. "little"
    E. "brighter"
    F. "whiter"
    G. "wee bit"

3. Which of the following best describes how the author develops the speaker’s point of view about the exceptionalism of The West throughout the poem?
    A. By using plenty of imagery and diction to paint an elaborate picture of The West as stunningly beautiful.
    B. By using quantitative examples to convince the reader of the economic gains one will find out West.
    C. By using comparative language to suggest that life out West is friendlier, more beautiful, more rewarding, and more joyful than anywhere else in the country.
    D. By using disparaging imagery to paint a negative picture of the eastern part of the country.

4. What does the imagery Chapman includes in the poem suggest about what The West represented to ordinary Americans during this time? Cite evidence in your answer.

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. Based on what you know about The West, do you think Arthur Chapman paints a "true" picture of what it was like? Explain your answer.

2. Make an inference: What sort of families moved West in the late 1800's?

3. Compare this poem with your vision of America. Using supporting evidence, answer this question: How has America changed over time?

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

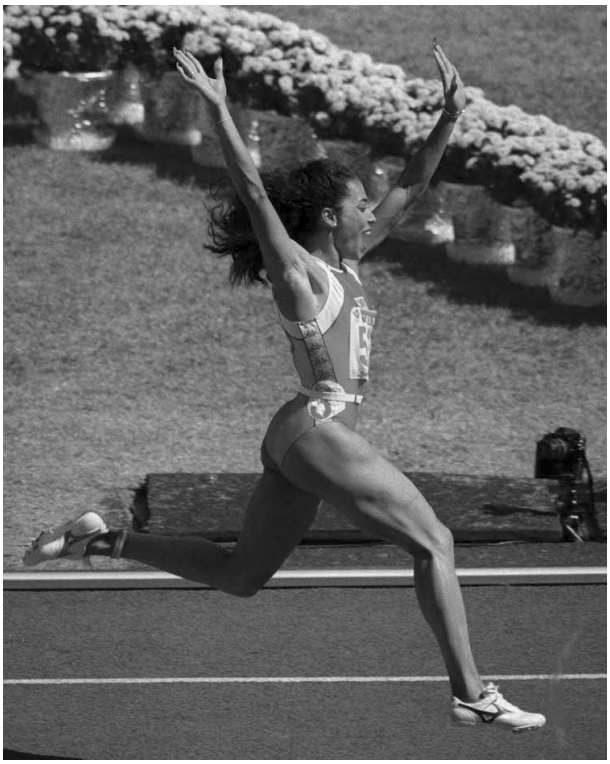
In comparison to other animals, humans are very slow. The fastest animal on record is the cheetah, which can run up to 70 mph. Even Usain Bolt can only attain a fraction of that.

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: _____

Klondike Gold Rush

By Anonymous
1898

On August 16, 1896, miners found gold in the Klondike region of the Yukon in northwestern Canada. This inspired a migration of an estimated 100,000 people between 1896 and 1899, hoping to find similar success and riches. As you read, takes notes on what miners expected to find and how this compared to the reality of their experiences.

Yukon Territory 1897

"Underground mining at Klondike gold field, 1898" by Curtis, Asahe is in the public domain.

[1] The Klondike gold rush began in July of 1897 when two ships docked in San Francisco and Seattle carrying miners returning from the Yukon with bags of gold. The press was alerted and papers carried the story to the masses.

Soon, miners of all shapes and sizes, called "stampeders," were on their way to the gold fields. Within six months, approximately 100,000 gold-seekers set off for the Yukon. Only 30,000 completed the trip.

Most stampeders knew little or nothing about where they were going, so pamphlets were available to help them on their way. Many of the pamphlets contained little or no real information and made outrageous claims of wealth to be had by everyone. Outfitters[1] sprang up overnight that were happy to sell the stampeders whatever they needed to get started. This included food, clothing, tools, and camping, mining and transportation equipment. Helping the outfitters in this regard were the Northwest Mounted Police who required all stampeders to have one year's supply of goods before they allowed them across the border into Canada. This was roughly one ton of goods per person. Towns such as Seattle made fortunes outfitting the miners.

The easiest and more expensive route to the gold fields was by boat upstream from the mouth of the Yukon in western Alaska. The most difficult route was the "All Canadian Route" from Edmonton and overland through the wilderness.

[5] The most common route taken by the stampeders to reach the fields was by boat from the west coast of the continental U.S. to Skagway in Alaska, over the Chilkoot or White Passes to the Yukon River at Whitehorse and then by boat 500 miles to Dawson City.

1. an establishment that sells clothing, equipment, and services, especially for outdoor activities

The Chilkoot Pass trail was steep and hazardous.[2] Rising 1,000 feet in the last ½ mile, it was known as the "golden staircase": 1,500 steps carved out of snow and ice worked their way to the top of the pass. Too steep for packhorses,[3] stampeders had to "cache"[4] their goods, moving their equipment piecemeal[5] up the mountain. Stampeders who gave up often did it here, discarding their unneeded equipment on the side of the trail.

Conditions on the White Pass trail were even more horrendous.[6] Steep, narrow and slick, over 3,000 pack animals died on the trail causing it to be dubbed the "Dead horse trail."

Those who made it across the passes found themselves at Bennett Lake. Here, boats had to be built to run the final 500 miles down the Yukon River to the gold fields. A three week trip, the miners had to survive many sets of rapids before making it to Dawson City. Many miners lost their lives or their possessions when their boats broke up in the rapids.

Those who survived the perilous[7] journey mostly found disappointment once they reached Dawson City. Locals had already claimed all of the gold-bearing creeks and claims of "gold for the taking" were grossly exaggerated. Many stampeders headed home, some worked for others on the claims, and still others stayed to work in Dawson City.

[10] The work that was necessary to retrieve the gold was incredible. Most of the gold was not at the surface, but rather 10 or more feet below. To reach it, the miners had to dig through the permafrost — the layer of permanently frozen ground. The ground had to be thawed before it could be dug. Then the dirt had to be sluiced[8] to separate it from the gold. All digging had to be done during the summer as it was impossible to dig in the winter when temperatures could reach -60°F. It was incredibly difficult work.

The biggest boom to hit this part of the world was a huge bust for the miners. The only ones to strike it rich were the merchants and profiteers who took advantage of those who hoped to "get rich quick."

2. **Hazardous** ***(adjective):*** risky; dangerous
3. a horse used to carry loads
4. to place or store something in a hidden or secure place
5. one piece at a time
6. **Horrendous** ***(adjective):*** extremely bad or unpleasant
7. **Perilous** ***(adjective):*** full of danger
8. to wash or rinse with water

Text-Dependent Questions

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

1. PART A: In paragraph 2, what does the phrase "miners of all shapes and sizes" mean?
    A. Many people were invited.
    B. People with supplies traveled to the Yukon.
    C. People experienced discrimination.
    D. Many types of people traveled to the Yukon.

2. PART B: What additional idea does the reader understand from the phrase in Part A?
    A. a large number of miners arrived
    B. most miners had gold field experience
    C. a large number of miners were rejected
    D. most miners could handle the hard labor

3. PART A: What is the meaning of "pamphlets" as it is used in paragraph 3 of "Klondike Gold Rush"?
    A. tokens for miners
    B. stocked wagons
    C. guides for miners
    D. camping kits

4. PART B: Which detail from paragraph 3 helps the reader understand the meaning of "pamphlets"?
    A. "Most stampeders knew little or nothing about where they were going"
    B. "This included food, clothing, tools, and camping, mining and transportation equipment."
    C. "Helping the outfitters in this regard were the Northwest Mounted Police"
    D. "This was roughly one ton of goods per person."

5. PART A: Based on the information from "Klondike Gold Rush," which sentence states a central idea of the article?
    A. Most miners were pleased with the outcome of the gold rush.
    B. Most miners labored hard for very little gain.
    C. Work in the Yukon Territory was worth the danger of traveling there.
    D. The gold rush hurt many small businesses.

6. PART B: Which TWO sentences from the article provide the best evidence for the answer in Part A?
    A. “Outfitters sprang up overnight that were happy to sell the stampeders whatever they needed to get started.” (Paragraph 3)
    B. “Towns such as Seattle made fortunes outfitting the miners.” (Paragraph 3)
    C. “Those who made it across the passes found themselves at Bennett Lake.” (Paragraph 8)
    D. “Many stampeders headed home, some worked for others on the claims, and still others stayed to work in Dawson City.” (Paragraph 9)
    E. “The work that was necessary to retrieve the gold was incredible.” (Paragraph 10)
    F. “The biggest boom to hit this part of the world was a huge bust for the miners.) (Paragraph 11)

7. PART A: Based on evidence in the article, why did so few miners stay in the Klondike to mine gold after arriving?
    A. The conditions for mining were difficult.
    B. Many laws outlawed miners.
    C. The lack of wildlife made mining nearly impossible.
    D. The value of gold dropped significantly.

8. PART B: Which detail from the article supports the answer to Part A?
    A. “helping the outfitters in this regard were the Northwest Mounted Police” (Paragraph 3)
    B. “The Chilkoot Pass trail was steep and hazardous.” (Paragraph 6)
    C. “Here, boats had to be built” (Paragraph 8)
    D. “Most of the gold was not at the surface” (Paragraph 10)

9. PART A: Based on the information in “Klondike Gold Rush,” how did most miners reach the Yukon territory?
    A. by boat and by train
    B. by train and using pack animals
    C. by boat and by walking overland
    D. by train and by walking overland

10. PART B: Which paragraph offers evidence for the answer to Part A?
    A. Paragraph 2
    B. Paragraph 5
    C. Paragraph 9
    D. Paragraph 10

11. PART A: How does the author mainly organize paragraphs 1-2 in the article “Klondike Gold Rush”?
    A. chronological order
    B. cause and effect
    C. problem and solution
    D. compare and contrast

12. PART B: Which description best illustrates how the structure in Part A is achieved?

A. “The Klondike gold rush began in July of 1897” (Paragraph 1)
B. “The press was alerted” (Paragraph 1)
C. “miners of all shapes and sizes” (Paragraph 2)
D. “Only 30,000 completed the trip” (Paragraph 2)

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 text, how does power corrupt? How did some people abuse their influence in the Klondike? Do you think miners were treated fairly in the Klondike? Why or why not?

2. In the context of the text, how has America changed over time? How has the American Dream changed over time? Do you think the miners were pursuing a version of the American Dream? Why or why not?

3. In the context of the text, how can we achieve happiness? What did the miners think would bring them happiness? Did they achieve happiness? Why or why not? Cite evidence from this 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: _____

Egypt's Pyramids

By USHistory.org
2016

Today, the Pyramids of Giza stand as the last remaining of the Seven Wonders of the ancient world. But what did the pyramids mean to the ancient Egyptians who constructed them? The following text explores what these amazing landmarks meant to their builders, and why they put such effort into creating these enormous structures in a period when they had little more to rely on than human labor and their own ingenuity. As you read, identify the reasons why the pyramids were built.

[1] For centuries, they were the tallest structures on the planet. The Pyramids of Giza,[1] built over 4,000 years ago, still stand atop an otherwise flat, sandy landscape.

"Sphinx" by (stephan) is licensed under CC BY-NC-ND 2.0.

One of the Seven Wonders of the World, the pyramids defy 21st-century humans to explain their greatest secrets. How could a civilization that lacked bulldozers, forklifts, and trucks build such massive[2] structures? Why would anyone have spent the time and energy to attempt such a task? What treasures were placed inside these monuments?[3]

Only a powerful pharaoh[4] could marshal[5] the necessary human resources to build giant pyramids. During the flood seasons, farmers became builders. Huge stone blocks averaging over two tons[6] in weight were mined in quarries[7] and transported to the pyramid site.

Egyptologists[8] theorize that the workers used either rollers[9] or slippery clay to drag the blocks from the quarries to their eventual placement on the pyramid. Construction of the larger pyramids took decades.

1. Also known as the Great Pyramids. Giza is located on the west bank of the Nile and is the third-largest city in modern Egypt.
2. **Massive** ***(adjective):*** large and heavy or solid
3. **Monument** ***(noun):*** a statue, building, or other structure built to celebrate a famous or notable person or event
4. The pharaoh was the absolute ruler of ancient ruler, often associated with the gods or considered to be godlike.
5. **Marshal** ***(verb):*** to arrange or assemble
6. A ton weighs 2000 pounds.
7. **Quarry** ***(noun):*** a place, typically a large, deep pit, from which stone or other materials are mined
8. An Egyptologist is an archaeologist, historian, linguist, or art historian who specializes in the study of ancient Egypt.
9. A roller is a cylinder or group of cylinders that rotates around a central axis and it was used to move things.

Why Pyramids?

[5] Pyramids were built for religious purposes. The Egyptians were one of the first civilizations to believe in an afterlife. They believed that a second self called the *ka*[10] lived within every human being. When the physical body expired, the *ka* enjoyed eternal[11] life. Those fortunate[12] enough to pass the test of Osiris[13] wanted to be comfortable in their lives beyond earth. The Great Pyramids were simply grand tombs of powerful pharaohs.

Three pyramids were built at Giza, and many smaller pyramids were constructed around the Nile Valley. The tallest of the Great Pyramids reaches nearly 500 feet into the sky and spans an area greater than 13 acres. The Great Sphinx was sculpted nearby to stand watch over the pyramids. It stands 65 feet tall and consists of a human head atop the body of a lion.

Many believe that the Sphinx was a portrait of King Chefren (Khafret),[14] who was placed in the middle Pyramid. The lion symbolized immortality.

You *Can* Take It with You

Egyptians who ranked high in status often wanted to take their most prized possessions with them in death, so the *ka* could enjoy them in its next life. Gold, silver, and bronze artifacts[15] were loaded into the interiors of the great tombs. Fine linens and artwork adorned the secret chambers.

In the early days, dead nobles were often interned[16] with their living slaves and animals. Because this practice eventually proved too costly, artists instead depicted scenes of human activity on the inside walls. Some pyramids were even equipped with a rest room for the pharaoh.

[10] Great precautions were taken to protect the tombs from looters.[17] Egyptians believed that a defiler[18] of a pharaoh's resting place would be cursed for eternity.[19] The entrance to the inner chambers was carefully hidden. The pharaoh's mummy was placed in a huge coffin called a sarcophagus,[20] which was made of the hardest known stone blocks. But despite such warnings and precautions, tombs were raided over the years by grave robbers.

10. The ka was one of the five parts of the soul, according to the ancient Egyptians. It was the vital spark that distinguishes between a living and a dead person.
11. **Eternal** ***(adjective):*** lasting or existing forever; without end or beginning
12. **Fortunate** ***(adjective):*** lucky
13. Osiris was the brother and husband of Isis, and the god of resurrection and the dead, as well as ruler of the underworld. The test was daunting; the dead spirit would have their heart weighed against a feather, and if it was deemed lighter than the feather, the spirit could move on to a peaceful afterlife. Ma'at, the goddess of justice, is typically depicted as weighing the heart, but the entire series of trials is referred to as the Judgement of Osiris.
14. King Chefren (Khafret) was an ancient Egyptian of 4th dynasty during the Old Kingdom. There isn't much known about him.
15. **Artifact** ***(noun):*** an object made by a human being, typically an item of cultural or historical interest
16. **Intern** ***(verb):*** to confine (someone)
17. **Looter** ***(noun):*** a person that steals by force
18. A "defiler" refers to someone who spoils or ruins something, especially something sacred.
19. **Eternity** ***(noun):*** a state that comes after death and never ends
20. A "sarcophagus" refers to a stone coffin typically decorated with a sculpture, painting, and or inscription.

The pyramids, however, have stood the test of time. Although their outer limestone layers have long since been stripped or passed into dust, the pyramids still stand. About 80 dot the horizons of modern Egypt. They remain as time capsules cast forward by a once-great civilization.

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 text?
    A. No society except the ancient Egyptians had the resources or authority to build monuments like the pyramids.
    B. The ancient Egyptians' original goal was to make grand structures; it wasn't until after the first pharaoh died that they later became tombs.
    C. Preparation for the afterlife was an important part of ancient Egyptians culture, especially for the pharaoh, for whom grand tombs (i.e. pyramids) were built and decorated.
    D. The ancient Egyptians did not believe in an afterlife; rather, the pharaoh physical body, once entombed with its possessions, would rise again.

2. PART B: Which of the following quotes best supports the answer to Part A?
    A. "Only a powerful pharaoh could marshal the necessary human resources to build giant pyramids." (Paragraph 3)
    B. "Pyramids were built for religious purposes. The Egyptians were one of the first civilizations to believe in an afterlife.... The Great Pyramids were simply grand tombs of powerful pharaohs." (Paragraph 5)
    C. "Many believe that the Sphinx was a portrait of King Chefren (Khafret), who was placed in the middle Pyramid. The lion symbolized immortality." (Paragraph 7)
    D. "Because this practice eventually proved too costly, artists instead depicted scenes of human activity on the inside walls. Some pyramids were even equipped with a rest room for the pharaoh." (Paragraph 9)

3. PART A: What does the word "adorn" most likely mean as used in paragraph 8?
    A. To cover up entirely
    B. To like or love
    C. To decorate
    D. To clutter

4. PART B: Which of the following phrases from paragraph 8 best supports the answer to PART A?
    A. "ranked high in status"
    B. "so the ka could enjoy them"
    C. "loaded into the interiors of the great tombs"
    D. "Fine linens and artwork"

5. What purpose does including the concept of ka serve in the author's central ideas? Explain what ka is in your answer.

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. It's hard to imagine just what would drive a civilization to build not one but several stone pyramids by hand—but there are many examples throughout history of human-built monuments. List at least one example of this and compare it to the pyramids (hint: the example does not necessarily have to be from an ancient civilization). Why do you think humans are driven to build, monuments or otherwise? What does this accomplish?

2. In the context of this passage, does money buy happiness? What purpose did entombing someone's valuables with the deceased serve? Why did the ancient Egyptians think they would need these things in the afterlife? Do you think the construction of the pyramids, a project that took years and countless resources, brought peace or happiness to the people, especially the pharaoh? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

3. In the context of this passage, how do people—specifically the ancient Egyptians—face death? How did they think of or conceptualize death—was it the end or extension of life? Compare this idea of the afterlife to other cultures' ideas about what happens to a person after death. Is the Egyptian idea any more or less reasonable? 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.

Name: _____ Class: _____

Herd Behavior

By
2014

"Herd behavior" is a term used to describe the tendency of individuals to think and act as a group. As you read, take notes on the causes of herd behavior.

Background

"Herd of Goats" by Unknown is in the public domain.

[1] The term "herd behavior" comes from the behavior of animals in herds, particularly when they are in a dangerous situation such as escaping a predator. All of the animals band closely together in a group and, in panic mode, move together as a unit. It is very unusual for a member of the herd to stray from the movement of the unit.

The term also applies to human behavior, and it usually describes large numbers of people acting the same way at the same time. It often has a connotation[1] of irrationality, as people's actions are driven by emotion rather than by thinking through a situation. Human herd behavior can be observed at large-scale demonstrations, riots, strikes, religious gatherings, sports events, and outbreaks of mob violence. When herd behavior sets in, an individual person's judgment and opinion-forming process shut down as he or she automatically follows the group's movement and behavior.

Examples of Herd Behavior

Herd behavior in humans is frequently observed at times of danger and panic; for example, a fire in a building often causes herd behavior, with people often suspending their individual reasoning and fleeing together in a pack. People in a crisis that requires escape will attempt to move faster than normal, copy the actions of others, interact physically with each other, and ignore alternative strategies in favor of following the mass escape trend.

Another commonly cited example of human herd behavior is the phenomenon of stock market bubbles. Large stock market trends often begin and end with a mass frenzy of buying (bubbles) or selling (crashes). Many observers see these stock market trends as examples of herding behavior because individuals are driven by emotion rather than reason to "join the crowd"; greed drives mass buying frenzies, and fear drives crashes.

1. **Connotation** ***(noun):*** an idea or quality that a word expresses in addition to its meaning

Behavior in Crowds

[5] A more obvious example of human herd behavior occurs in dense public crowds or mobs. Crowds that gather because of a grievance or protest can involve herding behavior that becomes violent. Psychologists posit that a "group mind" can overtake a mob and embolden people to act in ways they would not individually, increasing the likelihood that situations become violent.

Sporting events can also create herd behavior on a violent scale. The football hooliganism prevalent in Europe in the 1980s is a well-known example of sports-related herding behavior and violence. Overzealous fans of football teams often engaged in unruly or destructive behavior in the name of supporting their team and intimidating the rival team, to the extent that people involved could be badly injured or even killed.

Some historians believe that Adolf Hitler purposefully took advantage of herd behavior psychology by planting a significant number of undercover German officers in the crowds at his speeches. These officers would enthusiastically cheer for Hitler, and the rest of the crowd followed suit, making it seem as if the entire crowd supported Hitler. These speeches would then be broadcast to a larger public audience, magnifying the effect.

Everyday Decision-Making

Herd behavior does not always have such harmful effects; it can be influential in people's everyday, simple decisions. For example, suppose that a family is walking down the street looking for a restaurant to have dinner. If they pass a restaurant that is empty and one that is relatively crowded with patrons, they are far more likely to choose the crowded one, on the assumption that it's better because there are more people there. Herding can be subtle in this way; it simply involves people's tendency to follow a crowd rather than carve out an individual path in many situations.

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 summarizes the central idea of the text?
    A. Even when acting alone, humans are not as advanced as we would like to think.
    B. Herd behavior suggests that there are limits to human beings' free will.
    C. The actions of a large group can greatly influence an individual's decisions.
    D. Crowds always become violent and chaotic when individuals begin to panic.

2. PART B: Which of the following quotes best supports the answer to Part A?
    A. "All of the animals band closely together in a group and, in panic mode, move together as a unit" (Paragraph 1)
    B. "When herd behavior sets in, an individual person's judgment and opinion-forming process shut down" (Paragraph 2)
    C. "Herd behavior in humans is frequently observed at times of danger and panic; for example, a fire in a building" (Paragraph 3)
    D. "suppose that a family is walking down the street looking for a restaurant to have dinner" (Paragraph 8)

3. Which statement best describes the relationship between the stock market and herd behavior?
    A. Stock market employees work in a constant state of anxiety, much like herding animals.
    B. Herd behavior contributes to stock market surges and crashes because it compels stockbrokers to act on emotion rather than reason.
    C. Both herd behavior and the stock market are motivated mainly by greed, which prevents people from using logic and reason.
    D. Stock market bubbles and crashes are sometimes caused by herd behavior but are most often caused by fear.

4. Why does the author likely include the final section titled "Everyday Decision-Making" in the article?
    A. to show how not every case of herd behavior is necessarily negative or violent
    B. to show that herd behavior also occurs in smaller groups
    C. to demonstrate how herd behavior allows individuals to avoid risks
    D. to acknowledge that herd behavior is a problem that everyone faces

5. How does paragraph 7 contribute to the development of ideas in the article?

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. Think of a real-life example you have seen of herd behavior. What do you think caused the people in your example to think or act as a group? Do you remember seeing anyone who chose to do something different from the rest of the group?

2. Think of a movie or a book in which someone has to stand up to a group. Why does this character refuse to follow along and engage in herd behavior? In other words, what makes this character different? What would you have done if you were in this character's shoes?

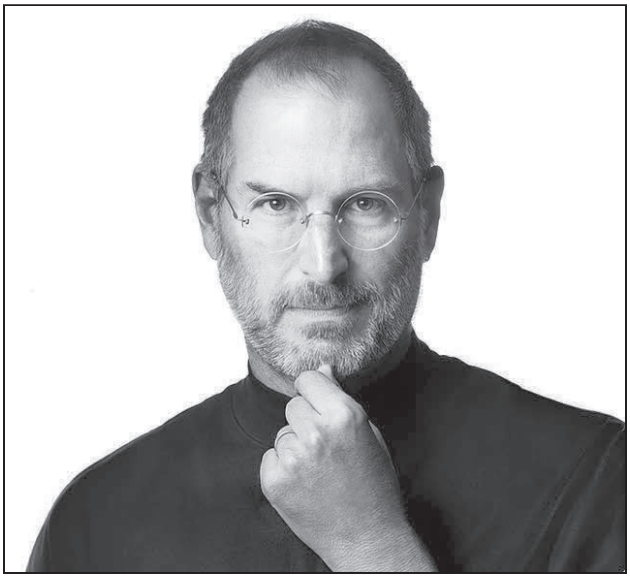
Name: _____ Class: _____

Steve Jobs' Stanford University Commencement Speech

By Steve Jobs
2005

Steve Jobs (1955-2011) was the co-founder, chairman and CEO of Apple Inc., and is well known as a very successful and charismatic entrepreneur. In addition, Jobs was a pioneer of the personal computer revolution and co-founder and chief executive of Pixar Animated Studios. In his 2005 commencement address at Stanford University, Jobs offers students insight into how to lead a successful life. As you read, take notes on the central ideas of Jobs' stories, and the rhetorical devices that make his points effective.

[1] I am honored to be with you today at your commencement from one of the finest universities in the world. I never graduated from college. Truth be told, this is the closest I've ever gotten to a college graduation. Today I want to tell you three stories from my life. That's it. No big deal. Just three stories.



"Steve Jobs 1955-2011" by segagman is licensed under CC BY 2.0.

The first story is about connecting the dots.

I dropped out of Reed College after the first 6 months, but then stayed around as a drop-in for another 18 months or so before I really quit. So why did I drop out?

It started before I was born. My biological mother was a young, unwed college graduate student, and she decided to put me up for adoption. She felt very strongly that I should be adopted by college graduates, so everything was all set for me to be adopted at birth by a lawyer and his wife. Except that when I popped out they decided at the last minute that they really wanted a girl. So my parents, who were on a waiting list, got a call in the middle of the night asking: "We have an unexpected baby boy; do you want him?" They said: "Of course." My biological mother later found out that my mother had never graduated from college and that my father had never graduated from high school. She refused to sign the final adoption papers. She only relented a few months later when my parents promised that I would someday go to college.

[5] And 17 years later I did go to college. But I naively chose a college that was almost as expensive as Stanford, and all of my working-class parents' savings were being spent on my college tuition. After six months, I couldn't see the value in it. I had no idea what I wanted to do with my life and no idea how college was going to help me figure it out. And here I was spending all of the money my parents had saved their entire life. So I decided to drop out and trust that it would all work out OK. It was pretty scary at the time, but looking back it was one of the best decisions I ever made. The minute I dropped out I could stop taking the required classes that didn't interest me, and begin dropping in on the ones that looked interesting.

It wasn't all romantic. I didn't have a dorm room, so I slept on the floor in friends' rooms, I returned coke bottles for the 5¢ deposits to buy food with, and I would walk the 7 miles across town every Sunday night to get one good meal a week at the Hare Krishna temple. I loved it. And much of what I stumbled into by following my curiosity and intuition turned out to be priceless later on. Let me give you one example:

Reed College at that time offered perhaps the best calligraphy instruction in the country. Throughout the campus every poster, every label on every drawer, was beautifully hand calligraphed. Because I had dropped out and didn't have to take the normal classes, I decided to take a calligraphy class to learn how to do this. I learned about serif and san serif typefaces, about varying the amount of space between different letter combinations, about what makes great typography great. It was beautiful, historical, artistically subtle in a way that science can't capture, and I found it fascinating.

None of this had even a hope of any practical application in my life. But ten years later, when we were designing the first Macintosh computer, it all came back to me. And we designed it all into the Mac. It was the first computer with beautiful typography. If I had never dropped in on that single course in college, the Mac would have never had multiple typefaces or proportionally spaced fonts. And since Windows just copied the Mac, it's likely that no personal computer would have them. If I had never dropped out, I would have never dropped in on this calligraphy class, and personal computers might not have the wonderful typography that they do. Of course it was impossible to connect the dots looking forward when I was in college. But it was very, very clear looking backwards ten years later.

Again, you can't connect the dots looking forward; you can only connect them looking backwards. So you have to trust that the dots will somehow connect in your future. You have to trust in something — your gut, destiny, life, karma, whatever. This approach has never let me down, and it has made all the difference in my life.

[10] My second story is about love and loss.

I was lucky — I found what I loved to do early in life. Woz and I started Apple in my parents' garage when I was 20. We worked hard, and in 10 years Apple had grown from just the two of us in a garage into a $2 billion company with over 4000 employees. We had just released our finest creation — the Macintosh — a year earlier, and I had just turned 30. And then I got fired. How can you get fired from a company you started? Well, as Apple grew we hired someone who I thought was very talented to run the company with me, and for the first year or so things went well. But then our visions of the future began to diverge and eventually we had a falling out. When we did, our Board of Directors sided with him. So at 30 I was out. And very publicly out. What had been the focus of my entire adult life was gone, and it was devastating.

I really didn't know what to do for a few months. I felt that I had let the previous generation of entrepreneurs down — that I had dropped the baton as it was being passed to me. I met with David Packard and Bob Noyce and tried to apologize for screwing up so badly. I was a very public failure, and I even thought about running away from the valley. But something slowly began to dawn on me — I still loved what I did. The turn of events at Apple had not changed that one bit. I had been rejected, but I was still in love. And so I decided to start over .

I didn't see it then, but it turned out that getting fired from Apple was the best thing that could have ever happened to me. The heaviness of being successful was replaced by the lightness of being a beginner again, less sure about everything. It freed me to enter one of the most creative periods of my life.

During the next five years, I started a company named NeXT, another company named Pixar, and fell in love with an amazing woman who would become my wife. Pixar went on to create the world's first computer animated feature film, *Toy Story,* and is now the most successful animation studio in the world. In a remarkable turn of events, Apple bought NeXT, I returned to Apple, and the technology we developed at NeXT is at the heart of Apple's current renaissance. And Laurene and I have a wonderful family together.

[15] I'm pretty sure none of this would have happened if I hadn't been fired from Apple. It was awful tasting medicine, but I guess the patient needed it. Sometimes life hits you in the head with a brick. Don't lose faith. I'm convinced that the only thing that kept me going was that I loved what I did. You've got to find what you love. And that is as true for your work as it is for your lovers. Your work is going to fill a large part of your life, and the only way to be truly satisfied is to do what you believe is great work. And the only way to do great work is to love what you do. If you haven't found it yet, keep looking. Don't settle. As with all matters of the heart, you'll know when you find it. And, like any great relationship, it just gets better and better as the years roll on. So keep looking until you find it. Don't settle.

My third story is about death.

When I was 17, I read a quote that went something like: "If you live each day as if it was your last, someday you'll most certainly be right." It made an impression on me, and since then, for the past 33 years, I have looked in the mirror every morning and asked myself: "If today were the last day of my life, would I want to do what I am about to do today?" And whenever the answer has been "No" for too many days in a row, I know I need to change something.

Remembering that I'll be dead soon is the most important tool I've ever encountered to help me make the big choices in life. Because almost everything — all external expectations, all pride, all fear of embarrassment or failure — these things just fall away in the face of death, leaving only what is truly important. Remembering that you are going to die is the best way I know to avoid the trap of thinking you have something to lose. You are already naked. There is no reason not to follow your heart.

About a year ago I was diagnosed with cancer. I had a scan at 7:30 in the morning, and it clearly showed a tumor on my pancreas. I didn't even know what a pancreas was. The doctors told me this was almost certainly a type of cancer that is incurable, and that I should expect to live no longer than three to six months. My doctor advised me to go home and get my affairs in order, which is doctor's code for prepare to die. It means to try to tell your kids everything you thought you'd have the next 10 years to tell them in just a few months. It means to make sure everything is buttoned up so that it will be as easy as possible for your family. It means to say your goodbyes.

[20] I lived with that diagnosis all day. Later that evening I had a biopsy, where they stuck an endoscope down my throat, through my stomach and into my intestines, put a needle into my pancreas and got a few cells from the tumor. I was sedated, but my wife, who was there, told me that when they viewed the cells under a microscope the doctors started crying because it turned out to be a very rare form of pancreatic cancer that is curable with surgery. I had the surgery and I'm fine now.

This was the closest I've been to facing death, and I hope it's the closest I get for a few more decades. Having lived through it, I can now say this to you with a bit more certainty than when death was a useful but purely intellectual concept:

No one wants to die. Even people who want to go to heaven don't want to die to get there. And yet death is the destination we all share. No one has ever escaped it. And that is as it should be, because Death is very likely the single best invention of Life. It is Life's change agent. It clears out the old to make way for the new. Right now the new is you, but someday not too long from now, you will gradually become the old and be cleared away. Sorry to be so dramatic, but it is quite true.

Your time is limited, so don't waste it living someone else's life. Don't be trapped by dogma — which is living with the results of other people's thinking. Don't let the noise of others' opinions drown out your own inner voice. And most important, have the courage to follow your heart and intuition. They somehow already know what you truly want to become. Everything else is secondary.

When I was young, there was an amazing publication called *The Whole Earth Catalog*, which was one of the bibles of my generation. It was created by a fellow named Stewart Brand not far from here in Menlo Park, and he brought it to life with his poetic touch. This was in the late 1960s, before personal computers and desktop publishing, so it was all made with typewriters, scissors, and polaroid cameras. It was sort of like Google in paperback form, 35 years before Google came along: it was idealistic, and overflowing with neat tools and great notions.

[25] Stewart and his team put out several issues of *The Whole Earth Catalog*, and then when it had run its course, they put out a final issue. It was the mid-1970s, and I was your age. On the back cover of their final issue was a photograph of an early morning country road, the kind you might find yourself hitchhiking on if you were so adventurous. Beneath it were the words: "Stay Hungry. Stay Foolish." It was their farewell message as they signed off. Stay Hungry. Stay Foolish. And I have always wished that for myself. And now, as you graduate to begin anew, I wish that for you.

Stay Hungry. Stay Foolish.

Thank you all very much.

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 explains the meaning of the following quotation?: "[Y]ou can't connect the dots looking forward; you can only connect them looking backwards." (Paragraph 9)
    A. Don't concern yourself by looking back on the past; focus on your drive for the future.
    B. It's impossible to know how to get where you want to go, but as long as you're working hard, you'll get there.
    C. While you cannot predict the future, looking back you can often see how you got to where you are.
    D. It is okay to not have an expressed purpose in life; you'll find success once you find what you love.

2. PART B: Which statement from the text best supports the answer to Part A?
    A. "...it's likely that no personal computer would have them." (Paragraph 8)
    B. "...it was very, very clear looking backwards ten years later." (Paragraph 8)
    C. "...destiny, life, karma, whatever." (Paragraph 9)
    D. "This approach has never let me down..." (Paragraph 9)

3. How did Jobs' interest in calligraphy in college benefit him professionally later on?

4. PART A: Which of the following best explains the meaning of the following quote?: "It was awful tasting medicine, but I guess the patient needed it." (Paragraph 15)
    A. The cancer treatments Jobs had to endure were difficult physically and emotionally
    B. The experience was extremely difficult, but in hindsight, it was valuable
    C. Sometimes, you need to be able to swallow difficult information or experiences
    D. You have to suffer in order to grow

5. PART B: Which detail from the text best supports the answer to Part A?

    A. "...it turned out that getting fired from Apple was the best thing that could have ever happened to me." (Paragraph 13)
    B. "Sometimes life hits you in the head with a brick." (Paragraph 15)
    C. "Remembering that you are going to die is the best way I know to avoid the trap of thinking you have something to lose." (Paragraph 18)
    D. "...they stuck an endoscope down my throat, through my stomach and into my intestines, put a needle into my pancreas..." (Paragraph 20)

6. In paragraph 16, Jobs says, "My third story is about death." What is the central idea of that story?

    A. Everyone dies eventually—don't take yourself more seriously or consider yourself more important than anyone else.
    B. The loss of a beloved person or position can be a catalyst for great life changes—embrace them.
    C. Your time on Earth is limited—don't spend it trying to please anyone but yourself.
    D. Don't waste your life working; instead focus only on what is fun and enjoyable.

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. Steve Jobs has faced many challenges; does he think about these changes positively or negatively? Explain your answer.

2. According to Jobs, what does it mean to be grown up? Cite evidence from this text, your own experience, and other art or literature in your answer.

Musk's plan: send 1 million people to Mars and start a new civilization

By Hannah Devlin, The Guardian, adapted by Newsela staff on 06.22.17
Word Count **954**
Level **1120L**

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 ticks most of the boxes: oxygen, water, food and lovely views. But there are risks to be considered, too. What if a nuclear war, an asteroid collision or other disaster sent it all up in smoke, ending our own fragile existence?

Elon Musk is one step ahead. Last year he outlined his ambition to send humans to Mars as a "backup drive" for civilization. Now, the billionaire businessman has provided further details of his vision to make humans a multi-planetary species in a breezy paper, published in the journal New Space.

Musk is the founder and CEO at Space Exploration Technologies, known as SpaceX. He oversees the manufacturing of rockets and spacecraft, says the SpaceX website.

His paper outlines early designs of the gigantic spacecraft, designed to carry 100 passengers, that he hopes to construct.

Do You Want To Be One In A Million?

"The thrust level is enormous," the paper states. "We are talking about a lift-off thrust of 13,000 tons, so it will be quite tectonic when it takes off."

Creating a self-sustained civilization of around 1 million people – the ultimate goal – would take 40 to 100 years, according to the plans. Before full colonization takes place, though, Musk needs to get the first pioneers to pave the way.

The current situation is summed up in a Venn diagram showing two non-intersecting circles representing, on one side, the kind of people who would actually get on the Mars rocket and, on the other, those who could afford this kind of adventure. One estimate of the current cost is put at $10 billion per person.

"What we need to do is to move those circles together," Musk explains. If the mission cost could be dropped to the cost of an average U.S. house price, Musk predicts people would start to sign up in big enough numbers. He thinks they'd be attracted by the opportunity to be among the first to live on the red planet. "Given that Mars would have a labor shortage for a long time, jobs would not be in short supply," he points out.

The Moon And Venus Don't Make The Cut

The paper strikes a buoyant, 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. "Venus is a high-pressure – super-high-pressure – hot acid bath ... not at all like the goddess," Musk writes. "So, it would be really difficult to make things work on Venus."

The moon is dismissed because it would be too small for the overarching vision. "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 and bound around," he adds. He predicts that journey times could eventually be cut to 30 days.

"In some ways, it is not that complicated," Musk said of the spaceship's design. Critics might point out that runs contrary to the reputation of this field of science.

Right Now The Trip Is A Little Pricey

Financially, there are some challenges ahead, the paper acknowledges. "We have to figure out how to improve the cost of trips to Mars by 5 million percent."

However, Musk has some ideas for how such tremendous savings might be achieved. Reusing rockets could reduce the cost of spaceflight one thousandfold and refilling fuel in orbit rather than landing could make 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 transfer of humans to another planet, adding that trumpeting the idea risked

being a distraction from the problems faced on our home planet. “I don’t see a mass transfer of humanity to Mars, ever,” she said. “Job one is to keep this planet habitable. There isn’t a planet B.”

Let's Focus On Saving Earth First

Commenting on Twitter, Mark McCaughrean, senior adviser for science and exploration at the European Space Agency, struck a combative tone. “It’s a wild-eyed investment pitch, pumped up by the enthusiasm of credulous fanboys brought up on comic book sci-fi," he tweeted in response to the paper. It's wrapped in a zeal for "saving humanity from itself and the problems we’ve wrought on this planet,” he said in the same tweet.

“I’m less concerned about making humans a multi-planetary species than I am about making the Earth a sustainable multi-species planet,” he added.

Professor Andrew Coates, who works on the ExoMars rover at University College London’s Mullard Space Science Laboratory, said that the question of whether present or past life existed on Mars needed to be answered before a manned mission, which could contaminate the surface, could take place. He said keeping Mars untouched for now is a moral obligation. "Until we’ve conclusively answered that question we should keep our feet on the ground," he said. Putting humans on Mars would be a type of vandalism, he added.

And what is the timeline for the project? Musk states that he is being “intentionally fuzzy” about when the vision might become a reality. He has noted that the first flights could start as early as 2023, though. “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: _____

Energy Story

By California Energy Commission

How many of the appliances and devices that you use every day are powered by electricity? Probably more than you realize. This informational text describes how electricity is created and travels. As you read, take notes on how the charges of particles contribute to electricity.

Electricity figures everywhere in our lives. Electricity lights up our homes, cooks our food, powers our computers, television sets, and other electronic devices. Electricity from batteries keeps our cars running and makes our flashlights shine in the dark.

Here's something you can do to see the importance of electricity. Take a walk through your school, house or apartment and write down all the different appliances, devices and machines that use electricity. You'll be amazed at how many things we use each and every day that depend on electricity.

"untitled" by Josh Boot is licensed under CC0

But what is electricity? Where does it come from? How does it work? Before we understand all that, we need to know a little bit about atoms and their structure.

All matter is made up of atoms, and atoms are made up of smaller particles. The three main particles making up an atom are the proton, the neutron, and the electron.

Electrons spin around the center, or nucleus, of atoms, in the same way the moon spins around the earth. The nucleus is made up of neutrons and protons.

Electrons contain a negative charge, protons a positive charge. Neutrons are neutral — they have neither a positive nor a negative charge.

There are many different kinds of atoms, one for each type of element. An atom is a single part that makes up an element. There are 118 different known elements that make up everything! Some elements like oxygen we breath are essential to life.

Each atom has a specific number of electrons, protons and neutrons. But no matter how many particles an atom has, the number of electrons usually needs to be the same as the number of protons. If the numbers are the same, the atom is called balanced, and it is very stable.

So, if an atom had six protons, it should also have six electrons. The element with six protons and six electrons is called carbon. Carbon is found in abundance[1] in the sun, stars, comets, atmospheres of most planets, and the food we eat. Coal is made of carbon; so are diamonds.

Some kinds of atoms have loosely attached electrons. An atom that loses electrons has more protons than electrons and is positively charged. An atom that gains electrons has more negative particles and is negatively charged. A “charged” atom is called an “ion.”

Electrons can be made to move from one atom to another. When those electrons move between the atoms, a current of electricity is created. The electrons move from one atom to another in a “flow.” One electron is attached and another electron is lost.

This chain is similar to the fire fighter’s bucket brigades in olden times. But instead of passing one bucket from the start of the line of people to the other end, each person would have a bucket of water to pour from one bucket to another. The result was a lot of spilled water and not enough water to douse[2] the fire. It is a situation that’s very similar to electricity passing along a wire and a circuit. The charge is passed from atom to atom when electricity is “passed.”

Scientists and engineers have learned many ways to move electrons off of atoms. That means that when you add up the electrons and protons, you would wind up with one more proton instead of being balanced.

Since all atoms want to be balanced, the atom that has been “unbalanced” will look for a free electron to fill the place of the missing one. We say that this unbalanced atom has a “positive charge” (+) because it has too many protons.

Since it got kicked off, the free electron moves around waiting for an unbalanced atom to give it a home. The free electron charge is negative, and has no proton to balance it out, so we say that it has a “negative charge” (-).

So, what do positive and negative charges have to do with electricity?

Scientists and engineers have found several ways to create large numbers of positive atoms and free negative electrons. Since positive atoms want negative electrons so they can be balanced, they have a strong attraction for the electrons. The electrons also want to be a part of a balanced atom, so they have a strong attraction to the positive atoms. So, the positive attracts the negative to balance out.

The more positive atoms or negative electrons you have, the stronger the attraction for the other. Since we have both positive and negative charged groups attracted to each other, we call the total attraction “charge.”

Energy also can be measured in joules. Joules sounds exactly like the word jewels, as in diamonds and emeralds. A thousand joules is equal to a British thermal unit.[3]

When electrons move among the atoms of matter, a current of electricity is created. This is what happens in a piece of wire. The electrons are passed from atom to atom, creating an electrical current from one end to the other, just like in the picture.

Electricity is conducted through some things better than others. Its resistance measures how well something conducts electricity. Some things hold their electrons very tightly. Electrons do not move through them very well. These things are called insulators. Rubber, plastic, cloth, glass and dry air are good insulators and have very high resistance.

Other materials have some loosely held electrons, which move through them very easily. These are called conductors. Most metals — like copper, aluminum or steel — are good conductors.

Text-Dependent Questions

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

1. PART A: In paragraph 12 of "Energy Story," what does the word "circuit" mean?
    A. a conductor
    B. a balance
    C. a charge
    D. a path

2. PART B: Which sentence from "Energy Story" best supports the answer in Part A?
    A. "Each atom has a specific number of electrons, protons and neutrons."
    B. "So, if an atom had six protons, it should also have six electrons."
    C. "The charge is passed from atom to atom when electricity is 'passed.'"
    D. "Most metals — like copper, aluminum or steel — are good conductors."

3. PART A: Why does the author most likely place the information in paragraphs 1-2 at the beginning of "Energy Story"?
    A. to encourage the reader to learn how electronic devices are made
    B. to show the reader how different machines can improve our lives
    C. to draw the reader in by showing how electricity affects everyone
    D. to teach the reader how to use electricity in different settings

4. PART B: Which detail from "Energy Story" best supports the answer in Part A?
    A. "walk through your school, house or apartment"
    B. "how many things we use each and every day that depend on electricity."
    C. "in the same way the moon spins around the earth."
    D. "each person would have a bucket of water to pour from one bucket to another."

5. PART A: Which sentence best states the central idea of paragraphs 21-22 in "Energy Story"?
    A. Materials that are insulators and conductors have a high resistance to electricity.
    B. It is more difficult for electricity to pass through insulators than conductors.
    C. Insulators and conductors are able to generate a high amount of electricity.
    D. Electrons move through rubber easier than they move through metal.

6. PART B: Which sentence from "Energy Story" best supports the answer in Part A?
    A. "Electricity is conducted through some things better than others."
    B. "Its resistance measures how well something conducts electricity."
    C. "Some things hold their electrons very tightly."
    D. "Other materials have some loosely held electrons, which move through them very easily."

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. What are some of the devices or appliances that you use that rely on electricity? Do you think you could go a day without electricity? Why or why not? How would your life be different without electricity?

2. In the text, the author discusses how much we rely on electricity. Why do you think it's important to understand the energy source that we depend so much on?

3. What other processes can create energy? How do these energy sources compare to electricity? Why is it important for scientists to continue researching the creation of energy?

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."

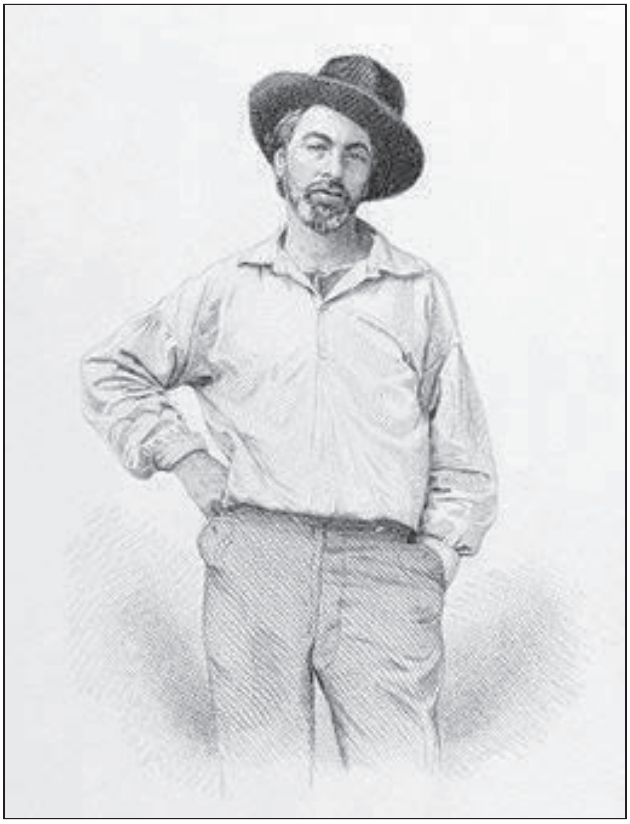
Name: _____ Class: _____

I Hear America Singing

By Walt Whitman
1855

Walt Whitman is a famous American poet, often called the father of "free verse," who wrote during the time of urbanization in America. As you read, consider the images in the poem and the effect they have on the mood.

I hear America singing, the varied carols I hear,
Those of mechanics, each one singing his as it should be blithe[1] and strong,
The carpenter singing his as he measures his plank or beam,
The mason[2] singing his as he makes ready for work, or leaves off work,
The boatman singing what belongs to him in his boat, the deckhand singing on the steamboat deck,
The shoemaker singing as he sits on his bench, the hatter singing as he stands,
The wood-cutter's song, the ploughboy's[3] on his way in the morning, or at noon intermission or at sundown,
The delicious singing of the mother, or of the young wife at work, or of the girl sewing or washing,
Each singing what belongs to him or her and to none else,
The day what belongs to the day—at night the party of young fellows, robust,[4] friendly,
Singing with open mouths their strong melodious songs.



"Walt Whitman Steel Engraving" by Samuel Hollyer (1826-1919) of a daguerreotype by Gabriel Harrison (1818-1902) is in the public domain.

1. **Blithe** ***(adjective):*** carefree, joyous
2. Someone who builds with stone
3. A boy who guides work animals across a farm, drawing a plough
4. **Robust** ***(adjective):*** strong and healthy; vigorous

Text-Dependent Questions

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

1. How do the images in the poem contribute to overall theme? Cite at least two pieces of specific evidence from the text in your response.

2. PART A: In the final line, what does the phrase "€œSinging with open mouths" suggest about what it means to be American?
   - A. that they are diverse, open-minded, tolerant people.
   - B. that they want to be heard.
   - C. that they are generous and benevolent people.
   - D. that they are bold and proud people.

3. PART B: Which phrase provides the best support for the answer to Part A?
   - A. “varied carols”
   - B. “blithe and strong”
   - C. “what belongs to him or her and to none else”
   - D. “delicious singing of the mother”

4. Walt Whitman has been called the father of the free verse. What effect does this poetic form have on the poem overall?

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 is it significant that Walt Whitman discusses the mechanic, carpenter, mason, and boatman? What is his point?

2. Consider other perspectives: how might the American experience depicted in this poem differ from that of immigrants, or of African-Americans (remember, slavery was abolished in 1865 – 5 years after this poem was published)?

3. Compare this poem with your vision of America today. Using supporting evidence, answer this question: How has America changed over time?

Name: _____ Class: _____

The Chicano Movement

By Jessica McBirney
2017

The Chicano Movement of the 1960s was a social movement in the United States. Activists worked to end the discrimination towards and mistreatment of Mexican American citizens. As you read, take notes on the causes of the Chicano Movement and how it affected the lives of Mexican Americans.

[1] In the 1950s, the word "Chicano" was an insulting name for children of Mexican immigrant parents living in the United States. People from the U.S. used it because they did not think Chicanos were "American enough;" people from Mexico also used it because they did not believe Chicanos were "Mexican enough" anymore. After several decades of being mistreated and called names, Mexican Americans decided to embrace the term "Chicano" as a symbol of ethnic pride. The name was then given to the growing Mexican American civil rights movement of the 1960s: the Chicano Movement.

The Chicano Movement had many goals, some of which varied by location. Overall, the movement aimed to end discrimination and negative stereotypes against Mexican Americans, and it sought to expand workers' rights, voting rights, educational equality, and land usage. The movement mainly took place in Southwestern states — such as Texas, New Mexico, and California — and the roots of the struggle ran deep.

Roots of the Movement

It is possible to trace the movement all the way back to the Treaty of Guadalupe Hidalgo in 1848, which redrew the official line between Mexico and the United States. People who had considered themselves Mexican now lived on the American side, and the treaty promised they would be full U.S. citizens with full civil rights. However, over the decades, Mexican Americans, especially those working in agriculture,[1] didn't see that promise was fulfilled. They were never treated fairly by white U.S. citizens, and often, especially during times of economic hardship like the Great Depression,[2] they were actively removed from jobs and sometimes sent "back" to Mexico — even though they had lived in the U.S. for generations. In the 1960s, inspired by the success of the African American Civil Rights Movement[3] in the South, Chicanos began actively fighting for equality. The Chicano Movement expanded and covered many different issues, but it mostly focused on four: land ownership, workers' rights, and educational and political equality.

1. the practice of farming
2. The Great Depression (1929-1939) was the worst period of financial hardship in the history of the United States and caused widespread poverty.

Reclaiming Land and Identity

In the Treaty of Guadalupe Hidalgo in 1848, the U.S. promised to let the people who owned land in the area keep their property, but in the end they did not keep their promise. Mexican Americans in the area had their land taken away.

[5] Chicano activists worked to reclaim their lands in Southwestern states. However, they were unsuccessful, so they began promoting the idea of sacred, ancestral[4] lands. They popularized the notion of Aztlán, an area in northern Mexico and southern United States, thought to be the origin land for the Mexican people. Even if they could not officially own the land, Chicanos saw Aztlán as a symbol of their heritage and their identity as Mexican Americans.

Farmworkers' Rights

Many Mexican Americans worked as migrant farmworkers who traveled from farm to farm harvesting different crops according to the season. Migrant farmworkers were some of the worst treated workers in the country, and their children rarely got to stay in school for more than a few years. In the 1960s, the Chicano Movement hoped to win more protections for these migrant families.

They decided to organize groups of workers that were large enough to stand up to farm owners and demand more rights. Two of the most influential reformers were Dolores Huerta and Cesar Chavez; together they founded the National Farm Workers Association (NFWA). The NFWA organized boycotts[5] against fruit-growers who refused to give rights to their workers, and they worked with the government to give migrant workers greater legal protections. The government agreed to some of the NFWA's demands and instituted some new laws, including higher wages and more secure employment contracts. Unions like the NFWA still fight for Mexican American workers' rights today.

Equality in Education

A California court case in 1947 decided it was illegal to segregate schools between white children and Mexican American children, but there were still great inequalities within schools. Firstly, many Chicano children could only stay at the same school for a few months at a time because their parents were migrant farm workers. Secondly, even when they could stay, many had not grown up speaking English, and their parents still spoke little or no English, so it was hard for them to keep up in the classroom. Instead, they fell further behind; only about one quarter of Chicano students at this time graduated from high school. Thirdly, schools in poorer areas, which sometimes had a higher percentage of Chicano students, received less funding than schools in rich, whiter areas. Students began to realize how all these factors kept Mexican American youths from achieving and left many of them having to eventually take on the same cheap labor jobs their parents had.

3. The African-American Civil Rights Movement (1954-1968) was a social movement in the southeastern United States that worked to end discrimination and gain equality for African-American people.
4. **Ancestral** ***(adjective):*** inherited from past generations
5. **Boycott** ***(noun):*** an act of refusing to use, buy, or deal with a person, organization, or country as a form of protest

High school and university students organized to form the group Movimiento Estudiantil Chicano de Aztlán (MEChA).[6] They walked out of classes on school campuses and negotiated with school administrators and political leaders for education reform. They also called for more Mexican American history to be taught in classrooms, and they wanted more Mexican American teachers.

Political Involvement

[10] None of the changes they worked for were made overnight, but some change came eventually. More importantly, MEChA made many Chicanos see that they could get involved with politics and important social issues. It eventually led to the formation of the Raza Unida Party, a political party focused on the needs of Chicanos across the nation.

The Chicano Movement is less well known than the Civil Rights Movement, which happened in the South around the same time, but it was just as important in establishing civil rights for an oppressed group of people. Although the movement mainly focused on land ownership, workers' rights, and education reform, it promoted equality for Chicanos in many different ways. For example, in the early 1970s there was a whole group of women dedicated to making sure healthcare forms were available in Spanish as well as in English. The movement accomplished many of its goals over several decades, and it is still working today to promote fairer treatment of Mexican Americans in schools, jobs, and even in entertainment. Perhaps most importantly, the Chicano Movement proved to Mexican Americans that they could have just as much of a voice in society and politics as anyone else.

6. Chicano Student Movement of Aztlán

Text-Dependent Questions

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

1. PART A: Which statement best expresses the central idea of the article?
    A. The Chicano Movement was well-intentioned but failed to have any lasting impact.
    B. The Chicano Movement negatively impacted the progress of the African American Civil Rights Movement.
    C. The Chicano Movement successfully gained rights for Mexican Americans and paved the way for future progress.
    D. While the Chicano Movement did help migrant workers, it failed to address the needs of students who were being treated unfairly.

2. PART B: Which quote best expresses the central idea in the answer to Part A?
    A. "In the 1960s, inspired by the success of the African American Civil Rights Movement in the South, Chicanos began actively fighting for equality." (Paragraph 3)
    B. "The government agreed to some of the NFWA's demands and instituted some new laws, including higher wages and more secure employment contracts." (Paragraph 7)
    C. "Students began to realize how all these factors kept Mexican American youths from achieving and left many of them having to eventually take on the same cheap labor jobs their parents had." (Paragraph 8)
    D. "The movement accomplished many of its goals over several decades, and it is still working today to promote fairer treatment of Mexican Americans in schools, jobs, and even in entertainment." (Paragraph 11)

3. PART A: Which statement best describes the experiences Mexican Americans had before the Chicano Movement?
    A. Mexican Americans were encouraged to integrate in the United States.
    B. Mexican Americans revolted against the U.S. government because they wanted to return to Mexico.
    C. Mexican Americans were completely ignored by the United States government.
    D. Mexican Americans were subject to unfair and harsh treatment by other Americans.

4. PART B: Which detail from the text provides evidence for the answer to Part A?
    A. "They were never treated fairly by white U.S. citizens, and often, especially during times of economic hardship like the Great Depression, they were actively removed from jobs and sometimes sent 'back' to Mexico" (Paragraph 3)
    B. "Chicano activists worked to reclaim their lands in Southwestern states." (Paragraph 5)
    C. "The NFWA organized boycotts against fruit-growers who refused to give rights to their workers, and they worked with the government to give migrant workers greater legal protections." (Paragraph 7)
    D. "They also called for more Mexican American history to be taught in classrooms, and they wanted more Mexican American teachers." (Paragraph 9)

5. How does the first paragraph contribute to the development of ideas in the text?

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. What are the effects of prejudice? How were the challenges faced by Mexican Americans a result of prejudice?

2. In the context of the text, how has America changed over time? How has America's treatment of Mexican Americans changed? Has it changed dramatically? Cite evidence from the text, your own experience, and other literature, art, or history in your answer.

3. In your opinion, why is the Chicano Movement less well known than the African American Civil Rights Movement in the U.S.? What factors led to this difference?

4. In the context of this text, how do people create change? What actions led to the successes of the Chicano Movement?

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 to 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.

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.

[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.

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

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?

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.

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."

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: _____

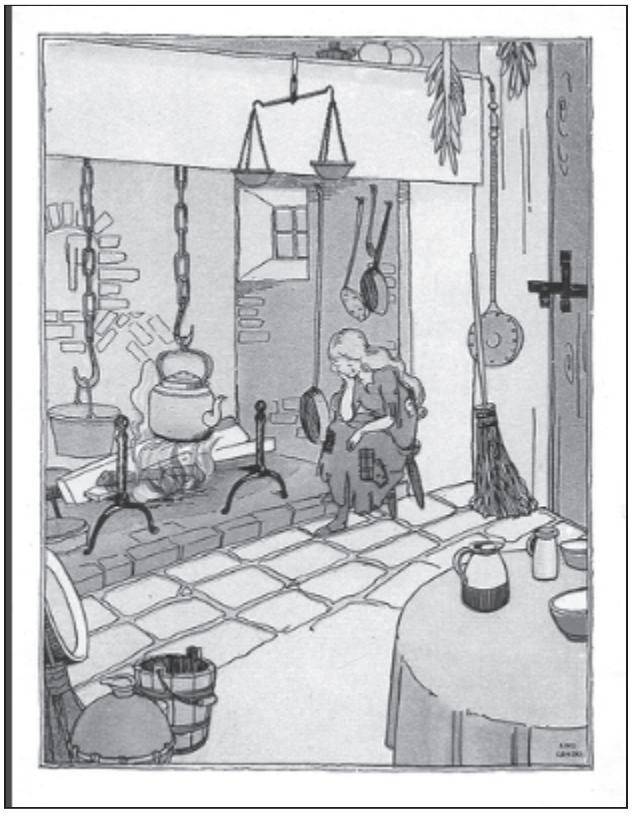
Cinderella

By Charles Perrault
1697

French author Charles Perrault is often called the "father of the fairy tale" for his well known tales such as "Little Red Riding Hood," "Puss in Boots," "Sleeping Beauty," and "Cinderella." Cinderella is a famous folk tale, a story that has been passed down for many generations, about a young woman trying to overcome the cruelty of some of her family. There are numerous different versions of the story, with historical roots in places as far apart as China and Italy. This version, by Perrault, is the first to include the famous pumpkin, fairy godmother, and glass slippers. As you read, take notes on how Cinderella and her stepsisters treat each other throughout the story.

[1] Once there was a gentleman who married, for his second wife, the proudest and most haughty[1] woman that was ever seen. She had, by a former husband, two daughters of her own, who were, indeed, exactly like her in all things. He had likewise, by another wife, a young daughter, but of unparalleled[2] goodness and sweetness of temper, which she took from her mother, who was the best creature in the world.

No sooner were the ceremonies of the wedding over but the stepmother began to show herself in her true colors. She could not bear the good qualities of this pretty girl, and the less because they made her own daughters appear the more odious.[3] She employed her in the meanest work of the house. She scoured[4] the dishes, tables, etc., and cleaned madam's chamber, and those of misses, her daughters. She slept in a sorry garret,[5] on a wretched[6] straw bed, while her sisters slept in fine rooms, with floors all inlaid, on beds of the very newest fashion, and where they had looking glasses[7] so large that they could see themselves at their full length from head to foot.



1. **Haughty** ***(adjective):*** arrogant
2. **Unparalleled** ***(adjective):*** having no equal
3. **Odious** ***(adjective):*** extremely unpleasant; repulsive
4. to clean or brighten the surface of (something) by rubbing it
5. a very small top-floor or attic room
6. **Wretched** ***(adjective):*** of poor quality; very bad
7. an archaic term referring to a mirror

The poor girl bore it all patiently, and dared not tell her father, who would have scolded her; for his wife governed him entirely. When she had done her work, she used to go to the chimney corner, and sit down there in the cinders and ashes, which caused her to be called Cinderwench. Only the younger sister, who was not so rude and uncivil[8] as the older one, called her Cinderella. However, Cinderella, notwithstanding her coarse apparel,[9] was a hundred times more beautiful than her sisters, although they were always dressed very richly.

It happened that the king's son gave a ball, and invited all persons of fashion to it. Our young misses were also invited, for they cut a very grand figure among those of quality. They were mightily delighted at this invitation, and wonderfully busy in selecting the gowns, petticoats,[10] and hair dressing that would best become them. This was a new difficulty for Cinderella; for it was she who ironed her sister's linen and pleated their ruffles. They talked all day long of nothing but how they should be dressed.

[5] "For my part," said the eldest, "I will wear my red velvet suit with French trimming."

"And I," said the youngest, "shall have my usual petticoat; but then, to make amends[11] for that, I will put on my gold-flowered cloak, and my diamond stomacher,[12] which is far from being the most ordinary one in the world."

They sent for the best hairdresser they could get to make up their headpieces and adjust their hairdos, and they had their red brushes and patches from Mademoiselle de la Poche.

They also consulted Cinderella in all these matters, for she had excellent ideas, and her advice was always good. Indeed, she even offered her services to fix their hair, which they very willingly accepted. As she was doing this, they said to her, "Cinderella, would you not like to go to the ball?"

"Alas!" said she, "you only jeer[13] me; it is not for such as I am to go to such a place."

[10] "You are quite right," they replied. "It would make the people laugh to see a Cinderwench at a ball."

Anyone but Cinderella would have fixed their hair awry, but she was very good, and dressed them perfectly well. They were so excited that they hadn't eaten a thing for almost two days. Then they broke more than a dozen laces trying to have themselves laced up tightly enough to give them a fine slender[14] shape. They were continually in front of their looking glass.

At last the happy day came. They went to court, and Cinderella followed them with her eyes as long as she could. When she lost sight of them, she started to cry.

Her godmother, who saw her all in tears, asked her what was the matter.

"I wish I could. I wish I could." She was not able to speak the rest, being interrupted by her tears and sobbing.

8. **Uncivil** ***(adjective):*** discourteous or impolite
9. clothing
10. A petticoat was a common article of clothing worn by women underneath a dress.
11. to make up
12. A stomacher was a piece of decorative cloth worn over the chest.
13. **Jeer** ***(verb):*** to make rude and mocking remarks
14. **Slender** ***(adjective):*** thin

[15] This godmother of hers, who was a fairy, said to her, "You wish that you could go to the ball; is it not so?"

"Yes," cried Cinderella, with a great sigh.

"Well," said her godmother, "be but a good girl, and I will contrive[15] that you shall go." Then she took her into her chamber, and said to her, "Run into the garden, and bring me a pumpkin."

Cinderella went immediately to gather the finest she could get, and brought it to her godmother, not being able to imagine how this pumpkin could help her go to the ball. Her godmother scooped out all the inside of it, leaving nothing but the rind. Having done this, she struck the pumpkin with her wand, and it was instantly turned into a fine coach,[16] gilded all over with gold.[17]

She then went to look into her mousetrap, where she found six mice, all alive, and ordered Cinderella to lift up a little the trapdoor. She gave each mouse, as it went out, a little tap with her wand, and the mouse was that moment turned into a fine horse, which altogether made a very fine set of six horses of a beautiful mouse colored dapple gray.

[20] Being at a loss for a coachman,[18] Cinderella said, "I will go and see if there is not a rat in the rat trap that we can turn into a coachman."

"You are right," replied her godmother, "Go and look."

Cinderella brought the trap to her, and in it there were three huge rats. The fairy chose the one which had the largest beard, touched him with her wand, and turned him into a fat, jolly coachman, who had the smartest whiskers that eyes ever beheld.

After that, she said to her, "Go again into the garden, and you will find six lizards behind the watering pot. Bring them to me."

She had no sooner done so but her godmother turned them into six footmen, who skipped up immediately behind the coach, with their liveries[19] all bedaubed[20] with gold and silver, and clung as close behind each other as if they had done nothing else their whole lives. The fairy then said to Cinderella, "Well, you see here an equipage[21] fit to go to the ball with; are you not pleased with it?"

[25] "Oh, yes," she cried; "but must I go in these nasty rags?"

15. **Contrive** ***(verb):*** to bring about or create; to plan
16. a horse-drawn carriage
17. covered thinly with gold leaf or gold paint
18. someone who drives a coach
19. special uniforms
20. covered
21. the equipment for a particular purpose or, historically, a carriage and horses with attendants

Her godmother then touched her with her wand, and, at the same instant, her clothes turned into cloth of gold and silver, all beset with jewels. This done, she gave her a pair of glass slippers, the prettiest in the whole world. Being thus decked out, she got up into her coach; but her godmother, above all things, commanded her not to stay past midnight, telling her, at the same time, that if she stayed one moment longer, the coach would be a pumpkin again, her horses mice, her coachman a rat, her footmen lizards, and that her clothes would become just as they were before.

She promised her godmother to leave the ball before midnight; and then drove away, scarcely[22] able to contain herself for joy. The king's son, who was told that a great princess, whom nobody knew, had arrived, ran out to receive her. He gave her his hand as she alighted[23] from the coach, and led her into the hall, among all the company. There was immediately a profound[24] silence. Everyone stopped dancing, and the violins ceased[25] to play, so entranced was everyone with the singular beauties of the unknown newcomer.

Nothing was then heard but a confused noise of, "How beautiful she is! How beautiful she is!"

The king himself, old as he was, could not help watching her, and telling the queen softly that it was a long time since he had seen so beautiful and lovely a creature.

[30] All the ladies were busied in considering her clothes and headdress, hoping to have some made next day after the same pattern, provided they could find such fine materials and as able hands to make them.

The king's son led her to the most honorable seat, and afterwards took her out to dance with him. She danced so very gracefully that they all more and more admired her. A fine meal was served up, but the young prince ate not a morsel,[26] so intently was he busied in gazing on her.

She went and sat down by her sisters, showing them a thousand civilities,[27] giving them part of the oranges and citrons[28] which the prince had presented her with, which very much surprised them, for they did not know her. While Cinderella was thus amusing her sisters, she heard the clock strike eleven and three-quarters, whereupon she immediately made a curtsy to the company and hurried away as fast as she could.

Arriving home, she ran to seek out her godmother, and, after having thanked her, she said she could not but heartily wish she might go to the ball the next day as well, because the king's son had invited her.

As she was eagerly telling her godmother everything that had happened at the ball, her two sisters knocked at the door, which Cinderella ran and opened.

22. **Scarcely** ***(adverb):*** barely, hardly
23. to exit from a train, bus, or other form of transportation
24. **Profound** ***(adjective):*** very great or intense
25. **Cease** ***(verb):*** to stop
26. **Morsel** ***(noun):*** a small piece
27. formal politeness and courtesy in behavior or speech
28. fruits such as lemons and limes

[35] “You stayed such a long time!” she cried, gaping, rubbing her eyes and stretching herself as if she had been sleeping; she had not, however, had any manner of inclination[29] to sleep while they were away from home.

“If you had been at the ball,” said one of her sisters, “you would not have been tired with it. The finest princess was there, the most beautiful that mortal eyes have ever seen. She showed us a thousand civilities, and gave us oranges and citrons.”

Cinderella seemed very indifferent[30] in the matter. Indeed, she asked them the name of that princess; but they told her they did not know it, and that the king’s son was very uneasy on her account and would give all the world to know who she was. At this Cinderella, smiling, replied, “She must, then, be very beautiful indeed; how happy you have been! Could not I see her? Ah, dear Charlotte, do lend me your yellow dress which you wear every day.”

“Yes, to be sure!” cried Charlotte; “lend my clothes to such a dirty Cinderwench as you are! I should be such a fool.”

Cinderella, indeed, well expected such an answer, and was very glad of the refusal; for she would have been sadly put to it, if her sister had lent her what she asked for jestingly.[31]

[40] The next day the two sisters were at the ball, and so was Cinderella, but dressed even more magnificently than before. The king’s son was always by her, and never ceased his compliments and kind speeches to her. All this was so far from being tiresome to her, and, indeed, she quite forgot what her godmother had told her. She thought that it was no later than eleven when she counted the clock striking twelve. She jumped up and fled, as nimble as a deer. The prince followed, but could not overtake her. She left behind one of her glass slippers, which the prince picked up most carefully. She reached home, but quite out of breath, and in her nasty old clothes, having nothing left of all her finery but one of the little slippers, the mate to the one that she had dropped.

The guards at the palace gate were asked if they had not seen a princess go out. They replied that they had seen nobody leave but a young girl, very shabbily[32] dressed, and who had more the air of a poor country wench than a gentlewoman.

When the two sisters returned from the ball Cinderella asked them if they had been well entertained, and if the fine lady had been there.

They told her, yes, but that she hurried away immediately when it struck twelve, and with so much haste[33] that she dropped one of her little glass slippers, the prettiest in the world, which the king’s son had picked up; that he had done nothing but look at her all the time at the ball, and that most certainly he was very much in love with the beautiful person who owned the glass slipper.

29. **Inclination** ***(noun):*** a desire, interest, or natural attitude towards something
30. **Indifferent** ***(adjective):*** having no particular interest in or sympathy towards something
31. **Jestingly** ***(adverb):*** jokingly
32. **Shabbily** ***(adverb):*** showing signs of wear and tear
33. **Haste** ***(noun):*** speed or hurry, often made with urgency

What they said was very true; for a few days later, the king's son had it proclaimed,[34] by sound of trumpet, that he would marry her whose foot this slipper would just fit. They began to try it on the princesses, then the duchesses and all the court, but in vain; it was brought to the two sisters, who did all they possibly could to force their foot into the slipper, but they did not succeed.

[45] Cinderella, who saw all this, and knew that it was her slipper, said to them, laughing, "Let me see if it will not fit me."

Her sisters burst out laughing, and began to banter[35] with her. The gentleman who was sent to try the slipper looked earnestly[36] at Cinderella, and, finding her very handsome, said that it was only just that she should try as well, and that he had orders to let everyone try.

He had Cinderella sit down, and, putting the slipper to her foot, he found that it went on very easily, fitting her as if it had been made of wax. Her two sisters were greatly astonished, but then even more so, when Cinderella pulled out of her pocket the other slipper, and put it on her other foot. Then in came her godmother and touched her wand to Cinderella's clothes, making them richer and more magnificent than any of those she had worn before.

And now her two sisters found her to be that fine, beautiful lady whom they had seen at the ball. They threw themselves at her feet to beg pardon for all the ill treatment they had made her undergo. Cinderella took them up, and, as she embraced them, said that she forgave them with all her heart, and wanted them always to love her.

She was taken to the young prince, dressed as she was. He thought she was more charming than before, and, a few days after, married her. Cinderella, who was no less good than beautiful, gave her two sisters lodgings[37] in the palace, and that very same day matched them with two great lords of the court.

[50] Moral: Beauty in a woman is a rare treasure that will always be admired. Graciousness,[38] however, is priceless and of even greater value. This is what Cinderella's godmother gave to her when she taught her to behave like a queen. Young women, in the winning of a heart, graciousness is more important than a beautiful hairdo. It is a true gift of the fairies. Without it nothing is possible; with it, one can do anything.

Another moral: Without doubt it is a great advantage to have intelligence, courage, good breeding,[39] and common sense. These, and similar talents come only from heaven, and it is good to have them. However, even these may fail to bring you success, without the blessing of a godfather or a godmother.

34. **Proclaim** ***(verb):*** to announce
35. **Banter** ***(verb):*** to speak in a friendly and teasing way
36. **Earnest** ***(adjective):*** serious and sincere
37. a room or place to sleep; a form of shelter
38. kindness
39. upbringing

Text-Dependent Questions

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

1. Part A: At the beginning of the story, how is Cinderella treated differently than her stepsisters?
    A. Cinderella is forced by her stepmother to live in a smaller room and do harder work.
    B. Cinderella lives and works in a different city.
    C. Cinderella and her stepsisters are all treated the same.
    D. Cinderella is forced by her stepmother to live in a smaller room and wear a glass slipper.

2. PART B: Which phrase from the text best supports the answer to Part A?
    A. "She employed her in the meanest work of the house." (Paragraph 2)
    B. "It happened that the king's son gave a ball" (Paragraph 4)
    C. "They sent for the best hairdresser they could get to make up their headpieces and adjust their hairdos…" (Paragraph 7)
    D. "she dropped one of her little glass slippers, the prettiest in the world, which the king's son had picked up" (Paragraph 43)

3. What does paragraph 18 contribute to the structure of the overall story?
    A. It explains why Cinderella wants to go to the ball.
    B. It explains how Cinderella's stepsisters get to the ball in a magic carriage.
    C. It explains how the fairy godmother's magic is used to help Cinderella get to the ball.
    D. It explains why Cinderella lives in an attic instead of a nicer room.

4. At the end of the story, how does Cinderella treat her stepsisters? What does this reveal about her character?

5. What is the author's purpose in the final two paragraphs?

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 stepsisters were mean to Cinderella? Did the stepsisters get what they deserved in the end? Do you think they have learned a lesson? Why or why not?

2. Based on the story, what are the characteristics of a good person? After reading the story, which characters do you consider good and why?

3. According to the morals described by the author in the story, how should we respond to adversity? Do you agree with the author? Why or why not? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

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: _____

Excerpt from Peter Pan: "When Wendy Grew Up"

By J.M. Barrie
1911

Sir James Mathew Barrie (1860-1937), known as J. M. Barrie, was a Scottish author. Peter Pan *is his most famous work. Peter Pan is a young boy who flies about and never grows older. Peter meets Wendy Darling in London, and takes Wendy and her brothers to adventure in Neverland. In Neverland, the Darling children meet the Lost Boys (a group of orphaned boys who take care of themselves), a fairy named Tinker Bell, and the evil Captain Hook. The final chapter of Peter Pan, titled "When Wendy Grew Up," explains how Wendy's life changes after her adventures with Peter and the Lost Boys end. As you read, make note of the author's differences in characterization between the adult and child characters.*

[1] I hope you want to know what became of the other boys.[1] They were waiting below to give Wendy time to explain about them; and when they had counted five hundred they went up. They went up by the stair, because they thought this would make a better impression. They stood in a row in front of Mrs. Darling[2], with their hats off, and wishing they were not wearing their pirate clothes. They said nothing, but their eyes asked her to have them. They ought to have looked at Mr. Darling also, but they forgot about him.

"Peter Pan and Wendy" by Andrew Poole is licensed under CC BY-NC-ND 2.0.

Of course Mrs. Darling said at once that she would have them; but Mr. Darling was curiously depressed, and they saw that he considered six a rather large number.

"I must say," he said to Wendy, "that you don't do things by halves," a grudging[3] remark which the twins thought was pointed at them.

The first twin was the proud one, and he asked, flushing, "Do you think we should be too much of a handful, sir? Because, if so, we can go away."

[5] "Father!" Wendy cried, shocked; but still the cloud was on him. He knew he was behaving unworthily, but he could not help it.

"We could lie doubled up," said Nibs.

"I always cut their hair myself," said Wendy.

1. A reference to the Lost Boys, who came back to London with Wendy and her brothers in the hopes of having a mother.
2. Wendy's mother
3. **Grudging** ***(adjective):*** said, done, or given in an unwilling or doubtful way

"George!" Mrs. Darling exclaimed, pained to see her dear one showing himself in such an unfavourable light.

Then he burst into tears, and the truth came out. He was as glad to have them as she was, he said, but he thought they should have asked his consent[4] as well as hers, instead of treating him as a cypher[5] in his own house.

[10] "I don't think he is a cypher," Tootles cried instantly. "Do you think he is a cypher, Curly?"

"No, I don't. Do you think he is a cypher, Slightly?"

"Rather not. Twin, what do you think?"

It turned out that not one of them thought him a cypher; and he was absurdly gratified, and said he would find space for them all in the drawing-room[6] if they fitted in.

"We'll fit in, sir," they assured him.

[15] "Then follow the leader," he cried gaily[7]. "Mind you, I am not sure that we have a drawing-room, but we pretend we have, and it's all the same. Hoop la!"

He went off dancing through the house, and they all cried "Hoop la!" and danced after him, searching for the drawing-room; and I forget whether they found it, but at any rate they found corners, and they all fitted in.

As for Peter, he saw Wendy once again before he flew away. He did not exactly come to the window, but he brushed against it in passing so that she could open it if she liked and call to him. That is what she did.

"Hullo, Wendy, good-bye," he said.

"Oh dear, are you going away?"

[20] "Yes."

"You don't feel, Peter," she said falteringly[8], "that you would like to say anything to my parents about a very sweet subject?"

"No."

"About me, Peter?"

"No."

4. **Consent** ***(noun):*** agreement or willingness for something to happen or be done
5. A drawing-room is an old name for a living room, or a room in a house where visitors may be entertained.
6. A dated term for zero (0), referring to him as being something of no value
7. It was done joyfully or cheerfully
8. **Falteringly** ***(adverb):*** hesitantly, uncertainly

[25] Mrs. Darling came to the window, for at present she was keeping a sharp eye on Wendy. She told Peter that she had adopted all the other boys, and would like to adopt him also.

"Would you send me to school?" he inquired craftily.

"Yes."

"And then to an office?"

"I suppose so."

[30] "Soon I would be a man?"

"Very soon."

"I don't want to go to school and learn solemn[9] things," he told her passionately. "I don't want to be a man. O Wendy's mother, if I was to wake up and feel there was a beard!"

"Peter," said Wendy the comforter, "I should love you in a beard;" and Mrs. Darling stretched out her arms to him, but he repulsed her.

"Keep back, lady, no one is going to catch me and make me a man."

[35] "But where are you going to live?"

"With Tink in the house we built for Wendy. The fairies are to put it high up among the tree tops where they sleep at nights."

"How lovely," cried Wendy so longingly that Mrs. Darling tightened her grip.

"I thought all the fairies were dead," Mrs. Darling said.

"There are always a lot of young ones," explained Wendy, who was now quite an authority, "because you see when a new baby laughs for the first time a new fairy is born, and as there are always new babies there are always new fairies. They live in nests on the tops of trees; and the mauve ones are boys and the white ones are girls, and the blue ones are just little sillies who are not sure what they are."

[40] "I shall have such fun," said Peter, with eye on Wendy.

"It will be rather lonely in the evening," she said, "sitting by the fire."

"I shall have Tink."

"Tink can't go a twentieth part of the way round," she reminded him a little tartly.

"Sneaky tell-tale!" Tink called out from somewhere round the corner.

9. **Solemn** ***(adjective):*** very serious or formal in manner, behavior, or expression

[45] “It doesn’t matter,” Peter said.

“O Peter, you know it matters.”

“Well, then, come with me to the little house.”

“May I, mummy?”

“Certainly not. I have got you home again, and I mean to keep you.”

[50] “But he does so need a mother.”

“So do you, my love.”

“Oh, all right,” Peter said, as if he had asked her from politeness merely; but Mrs. Darling saw his mouth twitch, and she made this handsome offer: to let Wendy go to him for a week every year to do his spring cleaning. Wendy would have preferred a more permanent arrangement; and it seemed to her that spring would be long in coming; but this promise sent Peter away quite gay[10] again. He had no sense of time, and was so full of adventures that all I have told you about him is only a halfpenny-worth of them. I suppose it was because Wendy knew this that her last words to him were these rather plaintive ones:

“You won’t forget me, Peter, will you, before spring cleaning time comes?”

Of course Peter promised; and then he flew away. He took Mrs. Darling’s kiss with him. The kiss that had been for no one else, Peter took quite easily. Funny. But she seemed satisfied.

[55] Of course all the boys went to school; and most of them got into Class III, but Slightly was put first into Class IV and then into Class V. Class I is the top class. Before they had attended school a week they saw what goats they had been not to remain on the island; but it was too late now, and soon they settled down to being as ordinary as you or me or Jenkins minor :the younger Jenkins. It is sad to have to say that the power to fly gradually left them. At first Nana[11] tied their feet to the bed-posts so that they should not fly away in the night; and one of their diversions[12] by day was to pretend to fall off buses; but by and by they ceased to tug at their bonds in bed, and found that they hurt themselves when they let go of the bus. In time they could not even fly after their hats. Want[13] of practice, they called it; but what it really meant was that they no longer believed.

Michael[14] believed longer than the other boys, though they jeered at him; so he was with Wendy when Peter came for her at the end of the first year. She flew away with Peter in the frock[15] she had woven from leaves and berries in the Neverland, and her one fear was that he might notice how short it had become; but he never noticed, he had so much to say about himself.

10. He was feeling cheerful and happy
11. Nana is the Darling family’s dog, who cares for and protects the children.
12. **Diversion** ***(noun):*** something that is other than, or takes attention away from, what is happening
13. **Want** ***(noun):*** lack; the state of not having enough of something
14. Michael is Wendy’s youngest brother.
15. A dress

She had looked forward to thrilling talks with him about old times, but new adventures had crowded the old ones from his mind.

"Who is Captain Hook?" he asked with interest when she spoke of the arch enemy.

"Don't you remember," she asked, amazed, "how you killed him and saved all our lives?"

[60] "I forget them after I kill them," he replied carelessly.

When she expressed a doubtful hope that Tinker Bell would be glad to see her he said, "Who is Tinker Bell?"

"O Peter," she said, shocked; but even when she explained he could not remember.

"There are such a lot of them," he said. "I expect she is no more."

I expect he was right, for fairies don't live long, but they are so little that a short time seems a good while to them.

[65] Wendy was pained too to find that the past year was but as yesterday to Peter; it had seemed such a long year of waiting to her. But he was exactly as fascinating as ever, and they had a lovely spring cleaning in the little house on the tree tops.

Next year he did not come for her. She waited in a new frock because the old one simply would not meet[16]; but he never came.

"Perhaps he is ill," Michael said.

"You know he is never ill."

Michael came close to her and whispered, with a shiver, "Perhaps there is no such person, Wendy!" and then Wendy would have cried if Michael had not been crying.

[70] Peter came next spring cleaning; and the strange thing was that he never knew he had missed a year.

That was the last time the girl Wendy ever saw him. For a little longer she tried for his sake not to have growing pains; and she felt she was untrue to him when she got a prize for general knowledge. But the years came and went without bringing the careless boy; and when they met again Wendy was a married woman, and Peter was no more to her than a little dust in the box in which she had kept her toys. Wendy was grown up. You need not be sorry for her. She was one of the kind that likes to grow up. In the end she grew up of her own free will a day quicker than other girls.

All the boys were grown up and done for by this time; so it is scarcely worth while saying anything more about them. You may see the twins and Nibs and Curly any day going to an office, each carrying a little bag and an umbrella. Michael is an engine-driver[17]. Slightly married a lady of title, and so he became a lord. You see that judge in a wig coming out at the iron door? That used to be Tootles. The bearded man who doesn't know any story to tell his children was once John.

16. Here the word "meet" means "fit"

Wendy was married in white with a pink sash. It is strange to think that Peter did not alight in the church and forbid the banns[18].

Years rolled on again, and Wendy had a daughter. This ought not to be written in ink but in a golden splash.

[75] She was called Jane, and always had an odd inquiring[19] look, as if from the moment she arrived on the mainland she wanted to ask questions. When she was old enough to ask them they were mostly about Peter Pan. She loved to hear of Peter, and Wendy told her all she could remember in the very nursery from which the famous flight had taken place. It was Jane's nursery now, for her father had bought it at the three per cents[20] from Wendy's father, who was no longer fond of stairs. Mrs. Darling was now dead and forgotten.

There were only two beds in the nursery now, Jane's and her nurse's; and there was no kennel, for Nana also had passed away. She died of old age, and at the end she had been rather difficult to get on with; being very firmly convinced that no one knew how to look after children except herself.

Once a week Jane's nurse had her evening off; and then it was Wendy's part to put Jane to bed. That was the time for stories. It was Jane's invention to raise the sheet over her mother's head and her own, thus making a tent, and in the awful darkness to whisper:

"What do we see now?"

"I don't think I see anything to-night," says Wendy, with a feeling that if Nana were here she would object to further conversation.

[80] "Yes, you do," says Jane, "you see when you were a little girl."

"That is a long time ago, sweetheart," says Wendy. "Ah me, how time flies!"

"Does it fly," asks the artful child, "the way you flew when you were a little girl?"

"The way I flew? Do you know, Jane, I sometimes wonder whether I ever did really fly."

"Yes, you did."

[85] "The dear old days when I could fly!"

"Why can't you fly now, mother?"

"Because I am grown up, dearest. When people grow up they forget the way."

"Why do they forget the way?"

17. A train engineer
18. Formal announcement of a marriage
19. **Inquiring** ***(adjective):*** curious, questioning
20. A mortgage rate

"Because they are no longer gay and innocent and heartless. It is only the gay and innocent and heartless who can fly."

[90] "What is gay and innocent and heartless? I do wish I were gay and innocent and heartless."

Or perhaps Wendy admits she does see something.

"I do believe," she says, "that it is this nursery."

"I do believe it is," says Jane. "Go on."

They are now embarked on the great adventure of the night when Peter flew in looking for his shadow.

[95] "The foolish fellow," says Wendy, "tried to stick it on with soap[21], and when he could not he cried, and that woke me, and I sewed it on for him."

"You have missed a bit," interrupts Jane, who now knows the story better than her mother. "When you saw him sitting on the floor crying, what did you say?"

"I sat up in bed and I said, 'Boy, why are you crying?'"

"Yes, that was it," says Jane, with a big breath.

"And then he flew us all away to the Neverland and the fairies and the pirates and the redskins and the mermaids' lagoon, and the home under the ground, and the little house."

[100] "Yes! which did you like best of all?"

"I think I liked the home under the ground best of all."

"Yes, so do I. What was the last thing Peter ever said to you?"

"The last thing he ever said to me was, 'Just always be waiting for me, and then some night you will hear me crowing[22].'"

"Yes."

[105] "But, alas, he forgot all about me," Wendy said it with a smile. She was as grown up as that.

"What did his crow sound like?" Jane asked one evening.

"It was like this," Wendy said, trying to imitate Peter's crow.

"No, it wasn't," Jane said gravely, "it was like this;" and she did it ever so much better than her mother.

21. A reference to earlier in the story, when Peter first arrived in the Darling household to search for his missing shadow. When he found it, he tried to keep it from disappearing again by sticking it to himself with soap.
22. **Crow** ***(verb):*** to make the sound of a crow, a type of bird

Wendy was a little startled. “My darling, how can you know?”

[110] “I often hear it when I am sleeping,” Jane said.

“Ah yes, many girls hear it when they are sleeping, but I was the only one who heard it awake.”

“Lucky you,” said Jane.

And then one night came the tragedy. It was the spring of the year, and the story had been told for the night, and Jane was now asleep in her bed. Wendy was sitting on the floor, very close to the fire, so as to see to darn[23], for there was no other light in the nursery; and while she sat darning she heard a crow. Then the window blew open as of old, and Peter dropped in on the floor.

He was exactly the same as ever, and Wendy saw at once that he still had all his first teeth.

[115] He was a little boy, and she was grown up. She huddled by the fire not daring to move, helpless and guilty, a big woman.

“Hullo, Wendy,” he said, not noticing any difference, for he was thinking chiefly of himself; and in the dim light her white dress might have been the nightgown in which he had seen her first.

“Hullo, Peter,” she replied faintly, squeezing herself as small as possible. Something inside her was crying “Woman, Woman, let go of me.”

“Hullo, where is John?” he asked, suddenly missing the third bed.

“John is not here now,” she gasped.

[120] “Is Michael asleep?” he asked, with a careless glance at Jane.

“Yes,” she answered; and now she felt that she was untrue to Jane as well as to Peter.

“That is not Michael,” she said quickly, lest a judgment should fall on her.

Peter looked. “Hullo, is it a new one?”

“Yes.”

[125] “Boy or girl?”

“Girl.”

Now surely he would understand; but not a bit of it.

“Peter,” she said, faltering, “are you expecting me to fly away with you?”

23. Meaning to mend an article of clothing

"Of course; that is why I have come." He added a little sternly, "Have you forgotten that this is spring cleaning time?"

[130] She knew it was useless to say that he had let many spring cleaning times pass.

"I can't come," she said apologetically, "I have forgotten how to fly."

"I'll soon teach you again."

"O Peter, don't waste the fairy dust on me."

She had risen; and now at last a fear assailed him. "What is it?" he cried, shrinking.

[135] "I will turn up the light," she said, "and then you can see for yourself."

For almost the only time in his life that I know of, Peter was afraid. "Don't turn up the light," he cried.

She let her hands play in the hair of the tragic boy. She was not a little girl heart-broken about him; she was a grown woman smiling at it all, but they were wet-eyed smiles.

Then she turned up the light, and Peter saw. He gave a cry of pain; and when the tall beautiful creature stooped to lift him in her arms he drew back sharply.

"What is it?" he cried again.

[140] She had to tell him.

"I am old, Peter. I am ever so much more than twenty. I grew up long ago."

"You promised not to!"

"I couldn't help it. I am a married woman, Peter."

"No, you're not."

[145] "Yes, and the little girl in the bed is my baby."

"No, she's not."

But he supposed she was; and he took a step towards the sleeping child with his dagger upraised. Of course he did not strike. He sat down on the floor instead and sobbed; and Wendy did not know how to comfort him, though she could have done it so easily once. She was only a woman now, and she ran out of the room to try to think.

Peter continued to cry, and soon his sobs woke Jane. She sat up in bed, and was interested at once.

"Boy," she said, "why are you crying?"

[150] Peter rose and bowed to her, and she bowed to him from the bed.

"Hullo," he said.

"Hullo," said Jane.

"My name is Peter Pan," he told her.

"Yes, I know."

[155] "I came back for my mother[24]," he explained, "to take her to the Neverland."

"Yes, I know," Jane said, "I have been waiting for you."

When Wendy returned diffidently[25] she found Peter sitting on the bed-post crowing gloriously, while Jane in her nighty was flying round the room in solemn ecstasy.

"She is my mother," Peter explained; and Jane descended and stood by his side, with the look in her face that he liked to see on ladies when they gazed at him.

"He does so need a mother," Jane said.

[160] "Yes, I know," Wendy admitted rather forlornly; "no one knows it so well as I."

"Good-bye," said Peter to Wendy; and he rose in the air, and the shameless Jane rose with him; it was already her easiest way of moving about.

Wendy rushed to the window.

"No, no," she cried.

"It is just for spring cleaning time," Jane said, "he wants me always to do his spring cleaning."

[165] "If only I could go with you," Wendy sighed.

"You see you can't fly," said Jane.

Of course in the end Wendy let them fly away together. Our last glimpse of her shows her at the window, watching them receding[26] into the sky until they were as small as stars.

24. Throughout the story, Peter refers to Wendy as his mother.
25. **Diffidently** ***(adverb):*** lacking confidence, in a restrained manner
26. **Receding** ***(verb):*** to withdraw or back away

As you look at Wendy, you may see her hair becoming white, and her figure little again, for all this happened long ago. Jane is now a common grown-up, with a daughter called Margaret; and every spring cleaning time, except when he forgets, Peter comes for Margaret and takes her to the Neverland, where she tells him stories about himself, to which he listens eagerly. When Margaret grows up she will have a daughter, who is to be Peter's mother in turn; and thus it will go on, so long as children are gay and innocent and heartless.

Excerpt from Peter Pan: "When Wendy Grew Up" by J.M. Barrie is in the public domain.

Text-Dependent Questions

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

1. PART A: At the beginning of the story, how does the author characterize the adults – particularly, Mr. Darling?
    A. As friendly and clever
    B. As boring and insecure
    C. As curious and protective
    D. As playful and outspoken

2. PART B: Which paragraph further supports your answer to Part A?
    A. Paragraph 16
    B. Paragraph 30
    C. Paragraph 72
    D. Paragraph 87

3. PART A: As it is used in paragraph 33, the word "repulsed" most closely means:
    A. Rejected
    B. Disgusted
    C. Laughed at
    D. Shoved

4. PART B: Which of quotation provides the best support for the answer to Part A?
    A. "I should love you"
    B. "stretched out her arms"
    C. "Keep back, lady"
    D. "make me a man"

5. Why doesn't Peter want to be adopted? Cite evidence from the text in your answer.

6. Write a sentence that states the theme of the story.

7. Why doesn't Peter notice much?
   A. He has bad eye-sight
   B. He's heartless
   C. He's too young to understand most situations
   D. He's self-centered because of his youth

8. How does Wendy feel about growing older? Cite at least two pieces of evidence from the text in your response.

9. Why does the author state that Wendy having a daughter "ought not to be written in ink but in a golden splash" (paragraph 74)?

10. Why does Jane remember Peter better than her mother, Wendy?

A. Jane spent more time with Peter.
B. Even though Jane hadn't met Peter, she was younger and understood Peter's childish nature better than her mother.
C. Jane has a better memory than he mother.
D. Wendy never actually met Peter and she only imagined their adventures.

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. Peter doesn't remember or notice much. Consider this and ask yourself: Is there a problem with staying young forever?

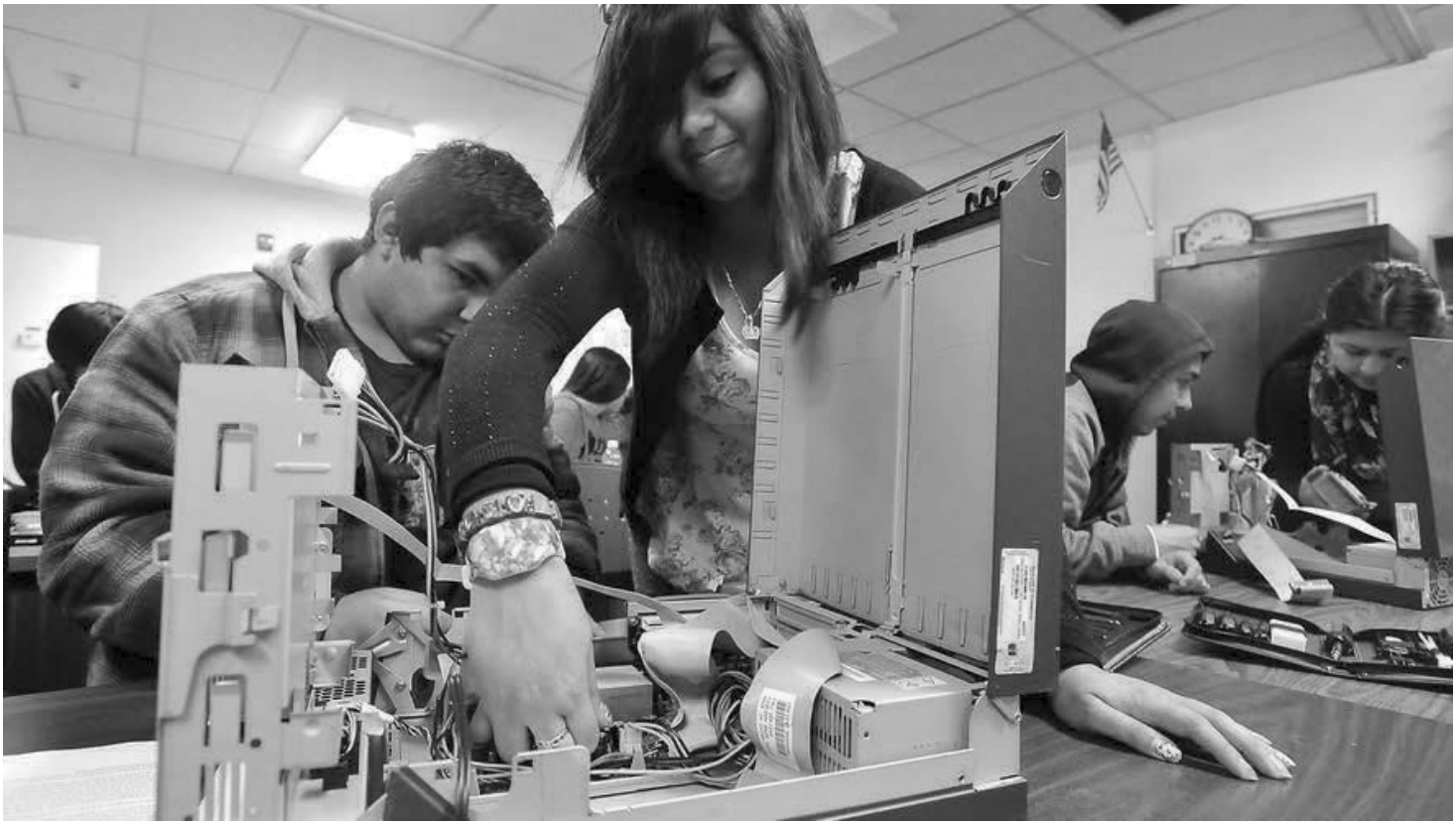
2. Wendy's friendship with Peter ends when she grows older. Consider this and ask yourself: What is a friend?

3. Should we value our youth? Why or why not?

4. Consider the relationships between Peter, the Lost Boys, and Wendy and her brothers in this story. In the context of this text, what is the meaning of family? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

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: _____

NOAA's Big Miracle Worker

By NOAA
2012

In October 1988, the world was captured by the story of three gray whales that were trapped by ice in Alaska and the efforts made to save them. The story eventually inspired the film Big Miracle *in 2012, depicting the rescue of the whales. In this interview, Dave Withrow discusses how he contributed to the whale rescue. As you read, take notes on how the whales were successfully saved.*

NOAA marine mammal biologist Dave Withrow and the event that inspired Hollywood.

Feb 1, 2012

"Gray whale, theb3672" by NOAA Office of NOAA Corps Operations is in the public domain.

How did you get involved in Operation Breakthrough?

[1] I work for NOAA[1] at the Alaska Fisheries Science Center, and anything whale-related, especially on the West Coast, comes through our office. Initially, there were no gray whale experts on the scene in Barrow. We were watching the news reports every night, and the lack of factual information would make all of us cringe. A week after the whales were found, then director of NOAA's National Marine Mammal Laboratory, Howard Braham, asked me to go work with the press and make sure they had accurate information about these incredible creatures.

Can you describe what it was like when you arrived on the scene?

It was freezing — about 30 to 40 degrees below zero every day during the rescue, so not at all like the average whale stranding at the beach. This was October in Alaska and everyone on the scene had to endure a lot of difficult conditions to be there. Meanwhile, it was a total zoo in Barrow with all the reporters there. At the time, we didn't know why this had captured the whole world's attention, but all eyes were on us. The whales were relatively young and confused. All of the other gray whales had started migrating[2] much earlier, but these three whales stayed in the feeding grounds too long. As a result, they were trapped by ice as temperatures continued to drop. Once we started moving the whales toward freedom, however, I couldn't help but think that they knew something was happening. They seemed to understand that we were there to help them along.

1. National Oceanic and Atmospheric Administration
2. to move from one region or habitat to another based on the seasons

How did you keep the whales and people safe?

It did help that the whales were located a good way from Barrow and the only route there was by a snow machine or on one of the helicopters dedicated to the rescue effort. A rotating group of TV reporters and cameramen were flown out to the whales daily. Access was limited for safety reasons and to minimize disturbance to the whales and those involved directly with the rescue effort. Most of the people who live in Barrow know the conditions out on the ice better than anyone. We followed their advice and they helped us make decisions along the way. If they said it was time to stop because it was too dangerous, we listened. The Inupiat people[3] who lived in and around Barrow did most of the hole-cutting, and their knowledge and guidance helped the operation stay safe and on track.

Did things get complicated with so many people wanted to help with the rescue?

There were so many groups — Inupiat hunters, biologists, oil companies, United States and Soviet Union government agencies, the military, non-profit organizations, and the press — on the scene and everyone wanted to play a part. There was a balancing act to include all of those who wanted to help with those that could really provide useful assistance. Aside from freeing the whales, it was the involvement of so many groups that actually became the operation's biggest success story. Groups that were usually on opposite sides of major issues all came together to free the whales from the ice. This was during the height of the Cold War. Cooperation between the United States and Soviet Union on any issue was basically unheard of, especially on something so publicized.

How did you rescue the whales?

[5] We had a lot of support. One company sent chain saws to help cut holes in the ice. Another sent portable generators to provide light and power. We cut a series of holes in the ice, hoping that whales would swim from one hole to the next but it was so cold that they kept freezing over. The owners of a Minnesota company that specialized in underwater pumps saw the TV news reports and sent us special pumps made to circulate[4] water and prevent freezing. All along, we had planned to use whale mating sounds to lure the whales from hole to hole. Quite by accident we discovered that the noise generated by the pumps attracted the whales. The pumps allowed us to coax the whales to a new breathing hole ahead. It really helped us move them along. While we were carefully moving the whales, a Soviet ice-breaker arrived. It broke through a 15-foot area at the head of the bay area and cleared a channel for a few miles. We didn't want to ice-breaker getting too close to the whales, so [we] continued cutting holes to meet the channel so the whales could swim freely.

3. a group of people native to northwestern Alaska
4. **Circulate** ***(verb):*** to cause to move continuously

Text-Dependent Questions

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

1. PART A: In paragraph 2 of "NOAA's Big Miracle Worker," what tone does the phrase "it was a total zoo" convey?
    A. urgent
    B. chaotic
    C. annoyed
    D. pleading

2. PART B: Which detail from the interview indicates a tone similar to the one identified in Part A?
    A. "All of the other gray whales had started migrating much earlier, but these three whales stayed in the feeding grounds too long." (Paragraph 2)
    B. "They seemed to understand that we were there to help them along. (Paragraph 2)
    C. "Access was limited for safety reasons and to minimize disturbance to the whales and those involved directly with the rescue effort." (Paragraph 3)
    D. "There were so many groups — Inupiat hunters, biologists, oil companies, United States and Soviet Union government agencies, the military, non-profit organizations, and the press — on the scene and everyone wanted to play a part." (Paragraph 4)

3. PART A: In what way did the people living in the area impact the whale rescue?
    A. They knew how to coordinate diverse groups of wildlife specialists.
    B. They kept rescuers safe by giving advice about conditions.
    C. They had experience working with reporters during previous whale rescues.
    D. They had connections to companies that could supply necessary equipment.

4. PART B: Which detail from the interview best supports the answer to Part A?
    A. "the lack of factual information" (Paragraph 1)
    B. "their knowledge and guidance helped the operation" (Paragraph 3)
    C. "everyone wanted to play a part." (Paragraph 4)
    D. "pumps made to circulate water and prevent freezing." (Paragraph 5)

5. PART A: Which sentence from NOAA's Big Miracle Worker includes two central ideas from the interview?
    A. "Once we started moving the whales toward freedom, however, I couldn't help but think that they knew something was happening." (Paragraph 2)
    B. "It didn't help that the whales were located a good way from Barrow and the only route there was by snow machine or on one of the helicopters dedicated to the rescue effort. (Paragraph 3)
    C. "If they said it was time to stop because it was too dangerous, we listened." (Paragraph 3)
    D. "Aside from freeing the whales, it was the involvement of so many groups that actually became the operation's biggest success story." (Paragraph 4)

6. PART B: Which additional sentence offers the best support for the central ideas in Part A?
    A. "The whales were relatively young and confused." (Paragraph 2)
    B. "We followed their advice and they helped us make decisions along the way." (Paragraph 3)
    C. "All along, we had planned to use whale mating sounds to lure the whales from hole to hole." (Paragraph 5)
    D. "While we were carefully moving the whales, a Soviet ice-breaker arrived." (Paragraph 5)

7. PART A: How does paragraph 2 contribute to the structure of the interview?
    A. It presents an explanation for the whales' stranding.
    B. It explains how the setting affected the rescue.
    C. It captures the reader's interest with a description of the whales.
    D. It provides the reader with information about the groups involved in the rescue.

8. PART B: Which detail from paragraph 2 of the interview best supports the answer to Part A?
    A. "This was October in Alaska"
    B. "a total zoo in Barrow with all the reporters there."
    C. "were relatively young and confused."
    D. "the other gray whales had started migrating"

9. PART A: What effect did the owners of a Minnesota company have on the rescue?
    A. The equipment they sent allowed breathing holes to be cut in the ice.
    B. The equipment they sent helped provide life for the workers.
    C. The equipment they sent helped the whales move forward from one hole to the next.
    D. The equipment they sent broke through the ice to create a path through the bay.

10. PART B: Which TWO details from paragraph 5 of the interview best support the answer to Part A?
    A. "chain saws to help cut holes in the ice."
    B. "circulate water and prevent freezing."
    C. "whale mating sounds to lure the whales"
    D. "noise generated by the pumps attracted the whales."
    E. "broke through a 15-foot area at the head of the bay"
    F. "cutting holes to meet the channel"

11. PART A: What made Dave Withrow uniquely qualified to join Operation Breakthrough?
    A. his experience participating in marine mammal rescues
    B. his knowledge about the behavior of marine mammals
    C. his understanding of conditions the rescuers faced
    D. his relationship with members of the news media

12. PART B: What piece of evidence from the interview best supports the answer to Part A

A. “anything whale-related, especially on the West Coast, comes through our office.” (Paragraph 1)

B. “not at all like the average whale stranding at the beach.” (Paragraph 2)

C. “we didn’t know why this had captured the whole world’s attention, but all eyes were on us.” (Paragraph 2)

D. “their knowledge and guidance helped the operation stay safe and on track.” (Paragraph 3)

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 text, Dave Withrow discusses how the world was watching the whale rescue mission. Why do you think this story captured the attention of so many people? How did this attention contribute to the successful rescue of the whales?

2. In the text, Dave Withrow describes how many different groups of people came together to save the whales. How important do you think this collaboration was to the success of the whale rescue? Can you think of any currents events that required different people to combine their talents to reach a goal? Describe a time when you needed to work with someone else to accomplish something.

A student with an idea helps America fight food waste, one click at a time

By Washington Post, adapted by Newsela staff on 01.11.16
Word Count **916**
Level **1140L**

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

One of the most profound contradictions of modern America is that more than 45 million Americans don't have enough to eat, but the country wastes an estimated 40 percent of its food.

The forces behind this inconsistency are complicated: Grocery stores think they'll be legally responsible if they donate food to food pantries and it makes people sick. Farmers allow edible, but ugly fruit to rot in fear it won't sell. Bananas blacken on all our shelves.

Frustrated Teen Has An Idea

But the reasons behind this waste didn't feel so complicated to a teenage girl named Maria Rose Belding on a chilly day five years ago.

The whole thing felt simple. It felt wrong. It felt like something had to change.

Belding, then a volunteer at a local food pantry in Pella, Iowa, had just thrown out hundreds of boxes of expired mac and cheese in front of numerous hungry 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 the American University sophomore to develop a groundbreaking advancement in the long — and often inefficient — war on hunger.

Connecting 24 States

After years of research, Belding, 20, has founded an online network that connects thousands of food pantries in 24 states, allowing them to quickly share surplus food that might have otherwise gone to waste. Pantries simply post their excess food to the program — and someone else in the network picks it up and puts it to use. So far, the database has saved an estimated two tons of food.

L'Oréal Paris, the cosmetics company, has since praised the program, last week naming Belding one of its 10 women of worth. So has Arianna Huffington of the Huffington Post. And experts agree programs like the interactive MEANS website, which stands for Matches Excess and Need for Stability, can close lapses in communication between pantries and chip away at the country's colossal problem with persistent waste.

Food Waste Hurts The Environment Too

Food waste "needs to be addressed on multiple levels," said Mathy Stanislaus, an official with the Environmental Protection Agency who works on ending food waste. "Part is wider knowledge of the problem, but also tools [like this] to reduce waste."

The stakes couldn't be higher. Food production accounts for around 10 percent of the national energy budget, uses half of the country's land and consumes around 80 percent of all the freshwater used in the United States, according to a paper published in 2012 by the National Resources Defense Council.

The study noted that Americans waste $165 billion every year on food destined for landfills. Inside these landfills, the food decomposes and emits 16 percent of the country's methane — a greenhouse gas that has an effect on global warming 25 times greater than carbon dioxide does.

Launching A Website

Even people who donate to their local pantries are contributing, to some degree, 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. The excess of product often does one of two things. It expires on the shelf and gets thrown out. Or it clutters the pantry so much that non-profits can't accept better donations that could immediately service a community.

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. She spent a year planning, researching and building program after program along with her co-founder, Grant Nelson. Then in February, the website launched.

Cool Beans!

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. "They're like the off-brand Mountain Dew in the food world," Belding said. "You'll take it only if you have no other option. . . . 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."

"We were kind of desperate," said Stephanie Shallah, an official with Washington, D.C.'s So Others Might Eat who had posted the item. "Beans come so often to me that I didn't think anyone would want them. So I said, 'I'm going to just post it and see what happens.' I said, 'I have nothing to lose.'" She said a Landover, Maryland pantry servicing a large Hispanic population took the goods.

Building On Her Success

Things then happened very quickly for MEANS. The organization now commands a staff of several computer programmers paid through grant money and even a few interns 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.

But there's still a lot of work to do, Belding said. There are still 26 states that remain untapped. There's still the world. Belding said she had more calls to make. More connections to forge.

Quiz

1 In the section "Cool Beans!" which word BEST describes Marie Rose Belding's reaction after the beans had moved?

(A) panic

(B) disappointment

(C) excitement

(D) arrogance

2 Which of the following selections from the article demonstrates irony?

(A) In May, Belding was sitting in class when she saw one of their early users had posted an item to the site.

(B) The number of members on the site has grown from around 50 larger food banks in June to more than 200.

(C) Even people who donate to their local pantries are contributing, to some degree, to the problem.

(D) The study noted that Americans waste $165 billion every year on food destined for landfills.

3 Which word can BEST replace "immediately" in this sentence from the section "Launching A Website" without changing its meaning?

> *Or it clutters the pantry so much that non-profits can't accept better donations that could immediately service a community.*

(A) eventually

(B) permanently

(C) completely

(D) readily

4 Which paragraph in the section "Frustrated Teen Has An Idea" helps you understand what Belding believes to be the main problem with food waste?

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

The surprisingly positive power of texting, according to science

By Washington Post, adapted by Newsela staff on 08.21.18
Word Count **1,066**
Level **1020L**

Three teenagers are lost in their phones while in Trafalgar Square in London, England. Photo by: In Pictures Ltd./Corbis via Getty Images

Texting gets blamed for many problems these days.

On the news it often gets blamed for reducing people's attention spans. Other days it gets blamed for making people feel more isolated. Texting has also been blamed for damaging the spine, a condition called "text neck."

Still, some experts say the negativity is unfair. Texting can and should be a positive force for people's emotional and physical health, they say, as long as it's used correctly.

Massachusetts Institute of Technology (MIT) psychologist Sherry Turkle wrote the book "Reclaiming Conversation: The Power of Talk in a Digital Age."

Texting itself isn't the problem, she says. "The trouble is what happens to face-to-face conversation if your phone is always there."

Texting Can Improve Relationships, Communications

If done well, Turkle and other experts said, texting can improve interpersonal relationships. It can also help people deal with traumatic events and connect different generations of people.

There are also medical uses, including improved communication with health experts and in medical studies.

Eric Topol is digital health expert at the Scripps Research Institute in La Jolla, California. He admitted he's not a huge fan of texting – but said even he has to acknowledge its benefits.

It all comes down to when and how you text, according to Turkle and Tchiki Davis, who holds an advanced degree in psychology and writes about well-being technology. Both said there's one key rule of texting: Don't do it when you're around other people.

Don't Use Phone At The Dinner Table

If you're out to dinner with friends, keep your phone out of sight, Turkle said. Even leaving the turned-off phone visible on the table will make conversations more trivial, and will reduce the possibility of "empathetic communication," Turkle said. She warned some people use texting to avoid difficult face-to-face interactions.

We need to feel open in relationships, Turkle said. We should ask, "'Is texting keeping me away from a necessary conversation?' If not, enjoy."

It's better to keep from texting even around total strangers, Davis said. She mentioned that when traveling home from work, people whip out their phones and disappear into their screens, ignoring their fellow passengers on the bus or the subway.

"A whole body of research shows we can improve your well-being even through just tiny interactions with strangers," Davis said.

Reach Out To Others In Need

Once you're truly alone, go ahead and break out your phone, Turkle and Davis said – but be thoughtful about who and what you text. Think of texting friends and family and consider who might be feeling lonely or dealing with a difficult situation.

If you yourself are struggling, texting a loved one is a great way to handle it, Davis said.

"Studies have shown that people who text and reach out to others experience less pain," Davis said. "It can be used to cope and just kind of deal with challenging situations."

Try not to gossip via text, Davis says. Write longer, fuller messages to reduce the chance the receiver misreads something you've sent. Text your friends memes or videos you think they'd find amusing. Use more exclamation points.

Keeping Your Parents Informed, In The Loop

Turkle said texting is an especially good way for parents to connect with their adult children. Turkle's daughter recently went shopping for a wedding dress without Turkle. So, her daughter sent pictures of different dresses.

Turkle said the messages made her feel close to her daughter.

More doctors, scientific researchers, and mental-health advocates are using texting in everyday work, Topol said.

For physicians and their patients, texting offers a quick way of getting in touch. Turkle remembered one night recently when she noticed a rash on her calf. She texted her doctor a picture of the rash and asked whether she needed to visit the emergency room.

He quickly replied, "You ate something, don't worry," Turkle said. She thinks "sending photographs is going to be a big part of the future of medicine."

Academic Research, Text-Based Support

The ease, speed, and universality of texting also makes it powerful for research, Topol said. Over the course of the past five years, texting has been used to collect information in dozens of important health studies.

About 70 percent of the world likely has cellphones, and that makes it easier for participants to get involved and respond to researchers.

Texting allows for immediate feedback. Most people are also more likely to reply to a text than an email.

Texting is also affecting the mental-health world. In recent years, advocates have started suicide and mental-health support lines that exclusively offer text-based support.

Suicides usually happen because of events and situations that make life temporarily unbearable. Mental health disorders or substance abuse are associated with most suicides. Often, family and friends do not recognize the warning signs or underlying mental health issues leading to a suicide.

People who have mental illnesses can be treated with medication and therapy.

Lean On Me Aids College Students

Lean On Me offers an all-hours service targeted to help college students. The organization, launched in 2016 by current and former MIT students, connects texters with volunteer peer supporters. Lean On Me has since expanded to seven college campuses.

"Sometimes students need a quick outlet to vent about their day, talk about a frustration, or simply hold a conversation," Lean On Me staffer Shaye Carver wrote in an email. With texting, users can "take as much time as they want to reflect on how they feel."

Museum Interacts With Patrons

Others are using text lines in more whimsical ways. The San Francisco Museum of Modern Art in summer 2017 kicked off a program called "Send Me" that allows anyone to text the museum a request to see a particular item. In return, a computer algorithm sends a piece of SFMOMA art that matches the requested item.

At the height of the craziness, the museum handled about 70,000 texts per hour, according to Jay Mollica, the museum's creative technologist.

He attributes Send Me's success to the "personal" nature of texting, a medium used mostly to stay in touch with close friends and family.

"In the morning people will say, 'Send me coffee,' he says. "And late at night they'll say things like 'Send me friends.'"

As of July 2018, the top requested terms on Send Me were "love," "hearts," "cats," "dogs," "purple" and "happiness."

Quiz

1 Which two sentences from the article include MAIN ideas of the article?

1. *Texting has also been blamed for damaging the spine, a condition called "text neck."*
2. *If done well, Turkle and other experts said, texting can improve interpersonal relationships.*
3. *There are also medical uses, including improved communication with health experts and in medical studies.*
4. *Write longer, fuller messages to reduce the chance the receiver misreads something you've sent.*

(A) 1 and 2

(B) 2 and 3

(C) 1 and 4

(D) 3 and 4

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

(A) About 70 percent of the people in the world now likely own cellphones they can use to send texts.

(B) Research shows face-to-face interactions with strangers can improve our well-being.

(C) Texting has been blamed for reducing attention spans and making people feel more isolated.

(D) Experts say texting a loved one or a special service can help people deal with pain or frustration.

3 How does the author convey the importance of texting thoughtfully?

(A) by highlighting the damage that can be done to close relationships by sending mean or gossiping texts

(B) by exploring the idea that when and how people text can affect how they feel and interact with others

(C) by describing the background and education of the experts whose opinions are featured in the article

(D) by identifying the benefits to research that come from many people now having cellphones

4 What is the author's MAIN purpose for including information about the San Francisco Museum of Modern Art?

(A) to emphasize how texting can be used in new ways to brighten someone's day

(B) to elaborate on the ways that algorithms can be used to make texting easier

(C) to illustrate which subjects people are most interested in seeing in artwork

(D) to indicate it can be hard for people to visit art museums that are far away

Name: _____ Class: _____

The Land of Story-Books

By Robert Louis Stevenson
1913

Robert Louis Stevenson (1850-1894) was a Scottish writer who is best known for Treasure Island *and* The Strange Case of Dr. Jekyll and Mr. Hyde*. The following poem was published in 1913 and describes a child at play. As you read this poem, take notes about the speaker--what can we conclude about him/her from the poem?*

At evening when the lamp is lit,
Around the fire my parents sit;
They sit at home and talk and sing,
And do not play at anything.

Now, with my little gun, I crawl
All in the dark along the wall,
And follow round the forest track
Away behind the sofa back.

There, in the night, where none can spy,
All in my hunter's camp I lie,
And play at books that I have read
Till it is time to go to bed.

These are the hills, these are the woods,
These are my starry solitudes;[1]
And there the river by whose brink
The roaring lions come to drink.

I see the others far away
As if in firelit camp they lay,
And I, like to an Indian scout,
Around their party prowled[2] about.

So when my nurse comes in for me,
Home I return across the sea,
And go to bed with backward looks
At my dear land of Story-books.

"A Story Book Comes to Life" by ClaraDon is licensed under CC BY-NC-ND 2.0

1. **Solitude** ***(noun):*** a state of being alone
2. **Prowl** ***(verb):*** to move with stealth

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 theme of the text?
    A. Imagination and play are essential parts of a happy childhood.
    B. Creativity is an excellent substitute for friendship.
    C. As we grow older, we lose the energy of our youth.
    D. How we think of ourselves can be warped through our imaginations.

2. PART B: Which of the following quotes best supports the answer to Part A?
    A. "At evening when the lamp is lit, / Around the fire my parents sit; / They sit at home and talk and sing, / And do not play at anything." (Lines 1-4)
    B. "There, in the night, where none can spy, / All in my hunter's camp I lie, / And play at books that I have read / Till it is time to go to bed." (Lines 9-12)
    C. "These are the hills, these are the woods, / These are my starry solitudes; / And there the river by whose brink / The roaring lions come to drink." (Lines 13-16)
    D. "So when my nurse comes in for me, / Home I return across the sea, / And go to bed with backward looks / At my dear land of Story-books." (Lines 21-24)

3. Which of the following best describes the relationship between the child and other members of the family?
    A. The parents ignore the child to play on his or her own, to the point of being neglectful.
    B. The parents participate in the child's play, pretending to be lions or whatever the child desires.
    C. The child ignores his or her parents for they do not play, and instead plays by him- or herself.
    D. The child resents the nurse for disrupting his or her playtime and, by extension, resents the parents as well.

4. How does stanza 4 contribute to the tone of the poem?
    A. The "starry solitudes" (Line 14) in stanza 4 contributes to the sad and lonely tone of the poem.
    B. The imagined, natural imagery (i.e. hills, woods, stars, and lions) in Stanza 4 contributes to the whimsical tone of the poem.
    C. The lions mentioned (in Stanza 4) develop the cautious tone of the poem, as if the child is pretending there is real danger;
    D. The repetition in the stanza of "These are the hills, these are the woods" (Line 13)) contributes to the stubborn tone of the poem.

5. Overall, how does the author depict childhood? Cite any symbols, images, or words that contribute to this depiction.

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 parents in this poem "do not play at anything"? What is the author's message in this line? Explain your answer.

2. In the context of this poem, is youth something that should be valued? Explain your answer using evidence from this text, your own experience, and other art, literature, 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 **2,106**
Level **1160L**

TOP: Stonehenge at sunrise, Salisbury Plain, England. Images: Big History Project

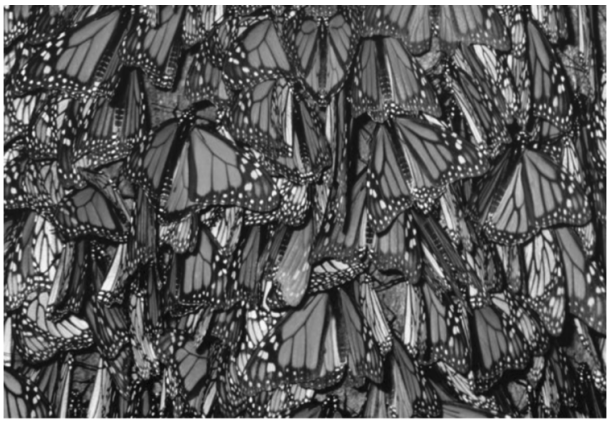
All life forms are born with some method for keeping track of time, but humans do it with greater precision and in more diverse ways than any other species.

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 have ways of tracking time. Animals must adjust to their environment as it changes. Bears know when to hibernate, and when to wake up. Plants know when to blossom and grow fruit, making seeds for the next generation. 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 built body clocks into all living organisms. Some of them are especially in tune with the differences in daylight hours caused by the change in seasons. These "circadian rhythms" are not perfectly aligned with our man-made clocks and calendars, but work well in nature. 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?

As with many other things, we humans track time differently than other creatures. We've developed many intricate ways to measure time, often with incredible precision. And, as human societies have become larger and more complex, we have gotten better and more precise about 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 may have 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. But we do have some indirect evidence based mainly on studies of modern foraging societies.

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 so that 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 societies whose members spent most of their time outdoors. You could find out all you 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 and didn't require great 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 most modern city dwellers.

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. In South Africa's Blombos Cave, which was occupied perhaps as early as 100,000 years ago, archaeologists have found chunks of ochre with strange marks on them dating to about 70,000 years ago. These are the oldest known "artworks." Though most archaeologists are cautious about interpreting them, it's tempting to think 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 should be regarded as calendars because they seem 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:

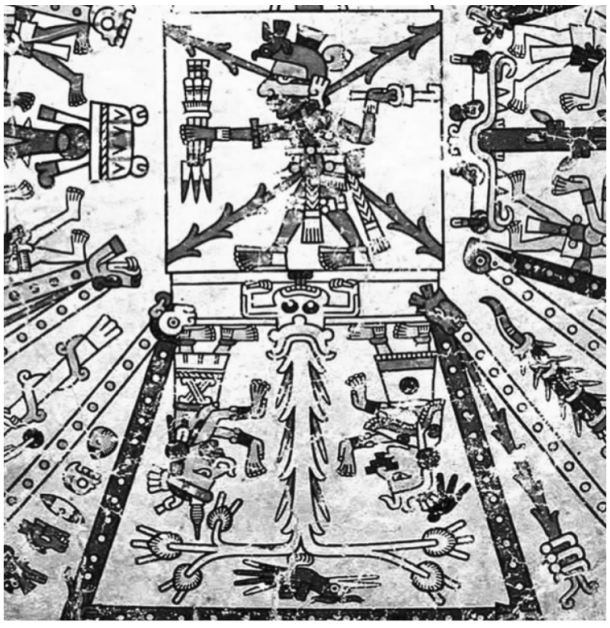
Professor Movius and I stood on the shelf looking across the valley as the Sun went slowly down behind the hills far to the right, sinking as a great red disc. As it was going down, the first crescent of the new Moon appeared in the sky as a thin silver arc, facing the sinking Sun. It was instantly apparent 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.... The visual effect of the silver first crescent, aiming its arc at the setting Sun and following the summer Sun down, was stark and dramatic. 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 new and more reliable methods of keeping time. If you wanted to sell some produce 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, so 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 sown at particular times, and the harvest collected according to seasonal calendars based on Earth's orbit around the Sun and associated climate patterns. And if you were sowing or harvesting alongside your neighbors, you all needed to agree exactly when to start.

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.



Detail from an Aztec calendar codex illustrating the 260-day Mesoamerican augural cycle

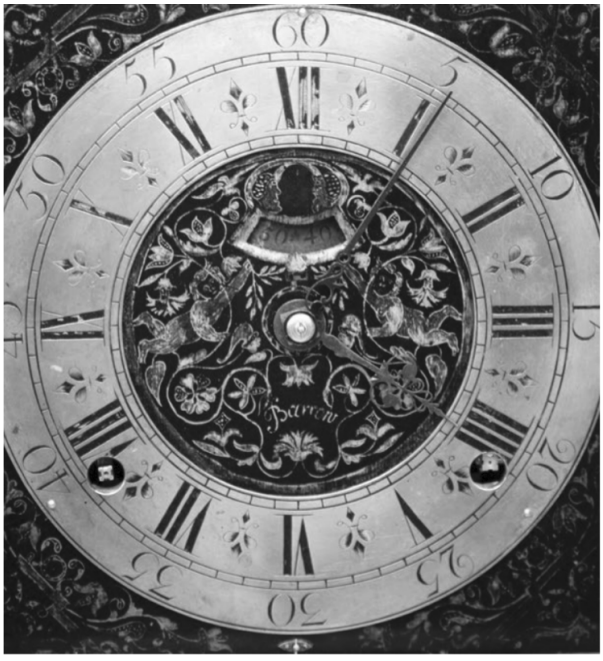
More elaborate instruments were used to track the movements of the stars and planets. It is possible that Stonehenge in England, which was constructed between 4,000 and 5,000 years ago, was designed partly to determine the exact dates of the summer and winter solstices (the days when the Sun reached its highest and lowest points in the sky).

The most elaborate and precise of all agrarian-era calendars were probably those of Mesoamerica, which appeared in the first millennium BCE. The Mayan calendars, for example, included a 260-day cycle based on biweekly rituals and a 365-day version organized around the agricultural and solar phases. The Maya also had a "long-count" calendar measuring time from the beginning of their civilization. Meanwhile, the Romans developed a calendar with 10 months, and the names they used are mostly familiar (for example, Martius is our March). Eventually, they refined their calendar, adding two more months and even including 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 better and more accurate records. This was because more and more individual schedules were getting linked together in networks of increasing complexity. As schedules began to interlace, people had to start thinking about time more precisely and 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, while 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. Once ships began to travel around the globe, from the late fifteenth century, the need for accurate timekeeping was well-recognized. Indeed, the British Royal Observatory at Greenwich was commissioned in 1675 to help solve this problem. 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 and was finally awarded the prize in 1773, three years before he died.

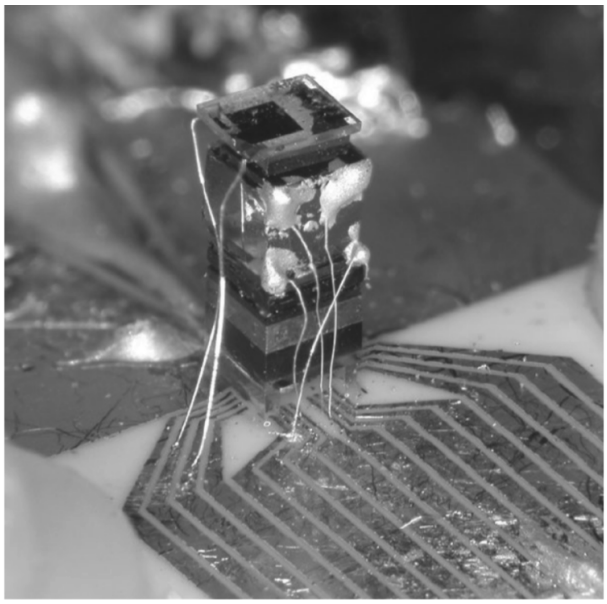
In the nineteenth century, the invention of railways and steamships — and their widespread use — required entirely new levels of precision. With so many passengers and important cargo relying on transportation lines, on-time departures, connections, and arrivals were critical to the whole network. The first English train timetable 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), the time at the Royal Observatory. 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 Himalayan mountain 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, which 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 could not be used 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: _____

Casey at the Bat

By Ernest Lawrence Thayer
1888

Ernest Lawrence Thayer (1863-1940) was an American writer and poet, best known for the following poem, which is considered a classic in sports-related literature. As you read, take notes on how the author develops the mood of the poem.

"Baseball" by Paul Lim is licensed under CC BY-ND 2.0

The outlook wasn't brilliant for the Mudville nine[1] that day:
The score stood four to two, with but one inning more to play,
And then when Cooney died at first, and Barrows did the same,
A pall-like[2] silence fell upon the patrons of the game.

A straggling few got up to go in deep despair. The rest
Clung to the hope which springs eternal in the human breast;
They thought, "If only Casey could but get a whack at that—
We'd put up even money now, with Casey at the bat."

But Flynn preceded[3] Casey, as did also Jimmy Blake,
And the former was a hoodoo,[4] while the latter was a cake;[5]
So upon that stricken multitude grim melancholy sat,
For there seemed but little chance of Casey getting to the bat.

But Flynn let drive a single, to the wonderment of all,
And Blake, the much despisèd,[6] tore the cover off the ball;
And when the dust had lifted, and men saw what had occurred,
There was Jimmy safe at second and Flynn a-hugging third.

1. The "Mudville Nine" refers to a fictional baseball team in a town called Mudville.
2. relating to a gloom or dreary fog
3. **Precede** ***(verb):*** to come before
4. The term "hoodoo" is meant to imply that this player was a jinx, or bad luck. Originally the poem referred to Flynn as a "lulu," or unskilled player.
5. The term "cake" is meant to imply that this player was also of weak or questionable skill, possibly more concerned with appearances than practice.
6. Here, the accent above the e is called a "grave accent" and is used to signify that the poet intends for the vowel to be pronounced, so as to maintain a certain meter.

Then from five thousand throats and more there rose a lusty[7] yell;
It rumbled through the valley, it rattled in the dell;
It pounded on the mountain and recoiled upon the flat,
[20] For Casey, mighty Casey, was advancing to the bat.

There was ease in Casey's manner as he stepped into his place;
There was pride in Casey's bearing and a smile lit Casey's face.
And when, responding to the cheers, he lightly doffed[8] his hat,
No stranger in the crowd could doubt 'twas Casey at the bat.

[25] Ten thousand eyes were on him as he rubbed his hands with dirt;
Five thousand tongues applauded when he wiped them on his shirt;
Then while the writhing[9] pitcher ground the ball into his hip,
Defiance flashed in Casey's eye, a sneer curled Casey's lip.

And now the leather-covered sphere came hurtling through the air,
[30] And Casey stood a-watching it in haughty[10] grandeur[11] there.
Close by the sturdy batsman the ball unheeded sped—
"That ain't my style," said Casey. "Strike one!" the umpire said.

From the benches, black with people, there went up a muffled roar,
Like the beating of the storm-waves on a stern and distant shore;
[35] "Kill him! Kill the umpire!" shouted someone on the stand;
And it's likely they'd have killed him had not Casey raised his hand.

With a smile of Christian charity great Casey's visage[12] shone;
He stilled the rising tumult;[13] he bade the game go on;
He signaled to the pitcher, and once more the dun[14] sphere flew;
[40] But Casey still ignored it and the umpire said, "Strike two!"

"Fraud!" cried the maddened thousands, and echo answered "Fraud!"
But one scornful look from Casey and the audience was awed.
They saw his face grow stern and cold, they saw his muscles strain,
And they knew that Casey wouldn't let that ball go by again.

[45] The sneer is gone from Casey's lip, his teeth are clenched in hate,
He pounds with cruel violence his bat upon the plate;
And now the pitcher holds the ball, and now he lets it go,
And now the air is shattered by the force of Casey's blow.

7. **Lusty** ***(adjective):*** hearty, full of vigor
8. to remove (an article of clothing)
9. **Writhe** ***(verb):*** to twist or squirm
10. **Haughty** ***(adjective):*** arrogantly superior; smug or self-important
11. **Grandeur** ***(noun):*** splendor and magnificence, especially of appearance or style
12. **Visage** ***(noun):*** a person's facial expression
13. **Tumult** ***(noun):*** a loud clamor or noise, especially one caused by a large mass of people
14. of a dull grayish-brown color

Oh, somewhere in this favoured land the sun is shining bright,
[50] The band is playing somewhere, and somewhere hearts are light;
And somewhere men are laughing, and somewhere children shout,
But there is no joy in Mudville—mighty Casey has struck out.

Casey at the Bat by Ernest Lawrence Thayer (1888) is in the public domain.

Text-Dependent Questions

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

1. Which of the following best states a theme in the text?
    A. It is difficult to fail when you try your hardest.
    B. Too much pride can lead to failure.
    C. Fame is not worth the responsibilities it comes with.
    D. Athletes have more fame and power than they deserve.

2. PART A: What does the term "patrons" most likely mean in line 4?
    A. spectators
    B. businessmen
    C. players
    D. murderers

3. PART B: Which phrase from the poem best supports the answer to Part A?
    A. "but one inning more to play" (Line 2)
    B. "Cooney died at first" (Line 3)
    C. "A straggling few got up to go" (Line 5)
    D. "'We'd put up even money now'" (Line 8)

4. How does the figurative language in stanza 5 contribute to the mood of the poem?
    A. The similes used in the stanza which describe Casey's physical appearance create an excited mood.
    B. The metaphor of the mountain reveals Casey's immense size and creates a fearful mood.
    C. The personification of the crowd's intense reaction creates a terrifying mood.
    D. The hyperbole describing the crowd's excited reaction creates a mood of anticipation.

5. How do stanzas 12-13 contribute to the theme of the poem?

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. What causes Casey to strike out?

2. Consider the sway and power Casey holds over the baseball fans. How did he attain this power? Why do we elevate people, such as athletes and celebrities, to such high positions of influence and respect? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

3. Does Casey utilize the power he has wisely? How does power and fame corrupt? 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/Wlkimedia.

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.

Name: _____ Class: _____

How Autism Freed Me to be Myself

By Rosie King
2014

In this transcription of a TED Talk, 16-year-old Rosie King shares her experiences with autism and how it has uniquely shaped her worldview. Additionally, King explores the desire people have to be "normal," and the effects that this desire can have. As you read, note how King describes her autism compared to how others view her.

[1] I haven't told many people this, but in my head, I've got thousands of secret worlds all going on all at the same time. I am also autistic.

"Dare to be Different-0111" by ConwaySuz is licensed under CC BY-NC-ND 2.0.

People tend to diagnose autism with really specific check-box descriptions, but in reality, it's a whole variation as to what we're like. For instance, my little brother, he's very severely autistic. He's nonverbal. He can't talk at all. But I love to talk. People often associate autism with liking maths and science and nothing else, but I know so many autistic people who love being creative. But that is a stereotype,[1] and the stereotypes of things are often, if not always, wrong. For instance, a lot of people think autism and think "Rain Man"[2] immediately. That's the common belief, that every single autistic person is Dustin Hoffman, and that's not true.

But that's not just with autistic people, either. I've seen it with LGBTQ people, with women, with POC[3] people. People are so afraid of variety that they try to fit everything into a tiny little box with really specific labels. This is something that actually happened to me in real life: I googled "autistic people are... " and it comes up with suggestions as to what you're going to type. I googled "autistic people are... " and the top result was "demons." That is the first thing that people think when they think autism. [Jokingly:] They know. (Laughter)

1. a widely held but fixed and oversimplified image or idea of a particular type of person or thing
2. This is a reference to a movie in which the main character (played by Dustin Hoffman) was an autistic man who had an incredible memory and was great at math, but struggled with basic social skills.
3. an abbreviation for person of color

One of the things I can do because I'm autistic — it's an ability rather than a disability — is I've got a very, very vivid imagination. Let me explain it to you a bit. It's like I'm walking in two worlds most of the time. There's the real world, the world that we all share, and there's the world in my mind, and the world in my mind is often so much more real than the real world. Like, it's very easy for me to let my mind loose because I don't try and fit myself into a tiny little box. That's one of the best things about being autistic. You don't have the urge to do that. You find what you want to do, you find a way to do it, and you get on with it. If I was trying to fit myself into a box, I wouldn't be here, I wouldn't have achieved half the things that I have now. There are problems, though. There are problems with being autistic, and there are problems with having too much imagination. School can be a problem in general, but having also to explain to a teacher on a daily basis that their lesson is inexplicably dull and you are secretly taking refuge[4] in a world inside your head in which you are not in that lesson, that adds to your list of problems. (Laughter) Also, when my imagination takes hold, my body takes on a life of its own. When something very exciting happens in my inner world, I've just got to run. I've got to rock backwards and forwards, or sometimes scream. This gives me so much energy, and I've got to have an outlet for all that energy. But I've done that ever since I was a child, ever since I was a tiny little girl. And my parents thought it was cute, so they didn't bring it up, but when I got into school, they didn't really agree that it was cute. It can be that people don't want to be friends with the girl that starts screaming in an algebra lesson. And this doesn't normally happen in this day and age, but it can be that people don't want to be friends with the autistic girl. It can be that people don't want to associate with anyone who won't or can't fit themselves into a box that's labeled normal. But that's fine with me, because it sorts the wheat from the chaff,[5] and I can find which people are genuine and true and I can pick these people as my friends.

[5] But if you think about it, what is normal? What does it mean? Imagine if that was the best compliment you ever received. "Wow, you are really normal." (Laughter) But compliments are, "you are extraordinary "or "you step outside the box." It's "you're amazing." So if people want to be these things, why are so many people striving to be normal? Why are people pouring their brilliant individual light into a mold? People are so afraid of variety that they try and force everyone, even people who don't want to or can't, to become normal. There are camps for LGBTQ people or autistic people to try and make them this "normal," and that's terrifying that people would do that in this day and age.

All in all, I wouldn't trade my autism and my imagination for the world. Because I am autistic, I've presented documentaries to the BBC,[6] I'm in the midst of writing a book, I'm doing this — this is fantastic — and one of the best things that I've achieved, that I consider to have achieved, is I've found ways of communicating with my little brother and sister, who as I've said are nonverbal. They can't speak. And people would often write off someone who's nonverbal, but that's silly, because my little brother and sister are the best siblings that you could ever hope for. They're just the best, and I love them so much and I care about them more than anything else. I'm going to leave you with one question: If we can't get inside the person's minds, no matter if they're autistic or not, instead of punishing anything that strays from normal, why not celebrate uniqueness and cheer every time someone unleashes their imagination?

Thank you.

(Applause)

4. **Refuge** ***(noun):*** shelter or protection from danger
5. a phrase meaning to separate things or people that are of high quality from those that are not
6. British Broadcasting Corporation

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 the central idea of the text?
    A. While autism has presented challenges for King, she views her diagnosis as a unique ability because of the imagination it has provided her.
    B. King's autism has often made her feel isolated and misunderstood; however, she is able to escape that pain through the other worlds inside her head.
    C. King doesn't often share her unique experiences with autism because she worries about people excluding her, or attempting to change her.
    D. While King believes that stereotypes are hurtful, she also believes they motivate people to challenge the expectations that others have of them.

2. PART B: Which detail from the text best supports the answer to Part A?
    A. "He's nonverbal. He can't talk at all. But I love to talk. People often associate autism with liking maths and science and nothing else, but I know so many autistic people who love being creative." (Paragraph 2)
    B. "And this doesn't normally happen in this day and age, but it can be that people don't want to be friends with the autistic girl." (Paragraph 4)
    C. "It can be that people don't want to associate with anyone who won't or can't fit themselves into a box that's labeled normal." (Paragraph 4)
    D. "All in all, I wouldn't trade my autism and my imagination for the world. Because I am autistic, I've presented documentaries to the BBC" (Paragraph 6)

3. PART A: What is the author's main purpose in this speech?
    A. King wants to encourage the audience to not use stereotypes as a means of understanding other people.
    B. King wants to encourage people to embrace their unique qualities rather than try to fit in.
    C. King wants to prove to people that the stereotypes they have of autistic people are completely wrong.
    D. King wants to warn people of the damaging effects that isolating others can have.

4. PART B: Which quote from the text best supports the answer to Part A?
    A. "But that is a stereotype, and the stereotypes of things are often, if not always, wrong. For instance, a lot of people think autism and think 'Rain Man' immediately." (Paragraph 2)
    B. "It can be that people don't want to be friends with the girl that starts screaming in an algebra lesson. And this doesn't normally happen in this day and age, but it can be that people don't want to be friends with the autistic girl." (Paragraph 4)
    C. "And people would often write off someone who's nonverbal, but that's silly, because my little brother and sister are the best siblings that you could ever hope for." (Paragraph 6)
    D. "instead of punishing anything that strays from normal, why not celebrate uniqueness and cheer every time someone unleashes their imagination?" (Paragraph 6)

5. “It can be that people don't want to be friends with the girl that starts screaming in an algebra lesson. And this doesn't normally happen in this day and age, but it can be that people don't want to be friends with the autistic girl” (Paragraph 4). How does the quoted passage contribute to the development of ideas in the text?

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. What is something unique about yourself that you value? Do you let other people know about this unique quality? Why or why not?

2. In the context of the text, why do people succeed? What does King attribute her success to? How can others achieve similar success and happiness? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

3. What experiences and qualities have contributed to making King who she is? In the context of the text, what makes you who you are? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

4. In the context of the text, what are the effects of following the crowd? What do people run the risk of doing if they value normality over difference? Cite evidence from this 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 to recognize the faces shown during the scan.

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.

Quiz

1 Which of the following MOST accurately characterizes a curious person?

(A) They are motivated by external rewards or by fear of being punished.

(B) They are motivated by inner rewards when they get positive feedback.

(C) They are motivated by immediate gratification when left to their own devices.

(D) They are motivated by a personal satisfaction that comes from within.

2 What is the MOST LIKELY reason the author included information about emotions?

(A) The research on emotions shows which information is most likely to be remembered.

(B) Emotions, unlike curiosity, always influence which events we remember.

(C) The research on emotions helps explain what motivates most people.

(D) Emotions, like curiosity, influence how people remember different events.

3 Read the selection from the section "The Curious Mind Is A Vortex For Information."

> *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."*

Which two words would BEST replace "engaged" and "relevant" in the selection above?

(A) attentive; memorable

(B) enthusiastic; urgent

(C) absorbed; pertinent

(D) occupied; correct

4 Read the paragraph from the section "Motivations Matter."

> *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.*

Which phrase from the paragraph helps explain what motivation is?

(A) behavior that is driven

(B) promise of a reward

(C) from inside a person

(D) naturally satisfying

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

Equal Groups

Multiplying and Dividing Integers

WARM UP

Determine each sum.

1. $-2\frac{3}{4} + \left(-2\frac{3}{4}\right)$
2. $-9.502 - 4.239$
3. $-3 + 8 + (-2)$
4. $5 - 16 + 7 + (-1)$

LEARNING GOALS

- Multiply integers using models.
- Develop rules for multiplying integers.
- Develop rules for dividing integers.

You know the reasoning and rules to add and subtract integers. How do you multiply and divide integers?

Addition or Multiplication?

Consider the addition problem $(-8) + (-8) + (-8) + (-8)$.

1. **Rewrite the addition problem as a multiplication problem.**

2. **Is the product from Question 1 positive or negative? Explain your reasoning.**

Consider the addition problem $(-1) + (-1) + (-1) + (-1) + (-1)$.

3. **Rewrite the addition problem as a multiplication problem.**

4. **Is the product from Question 3 positive or negative? Explain your reasoning.**

5. **What relationship helped you answer Questions 2 and 4?**

ACTIVITY
1.1 Modeling the Multiplication of Integers

NOTES

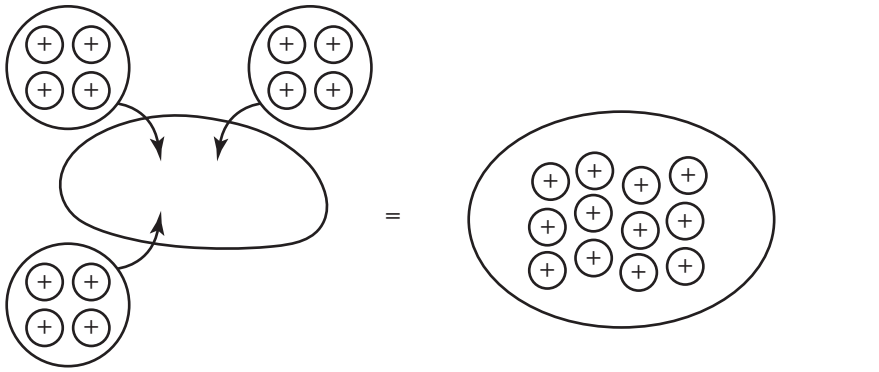
When thinking about multiplying integers, remember that multiplication can be represented as repeated addition.

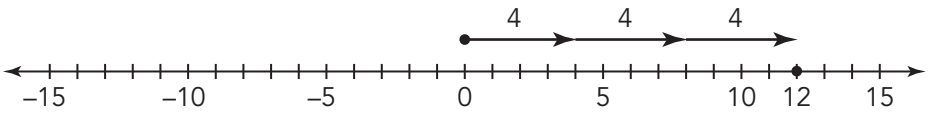
WORKED EXAMPLE 1

Consider the expression 3×4.

As repeated addition, it is representented as $4 + 4 + 4$.

You can think of 3×4 as three groups of 4.



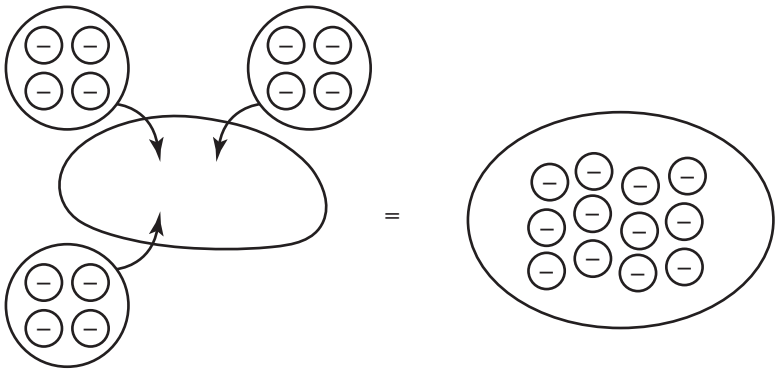


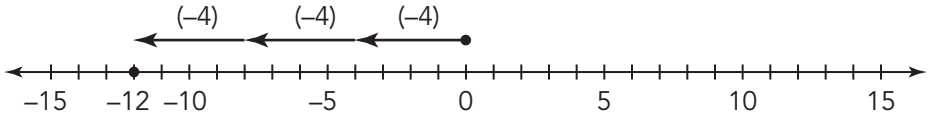
1. Explain how the number line in Worked Example 1 illustrates 3×4.

WORKED EXAMPLE 2

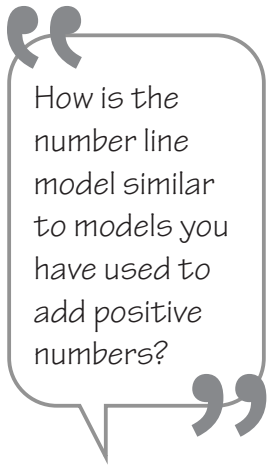
Consider the expression $3 \times (-4)$. As repeated addition, it is represented as $(-4) + (-4) + (-4)$.

You can think of $3 \times (-4)$ as three groups of (-4).



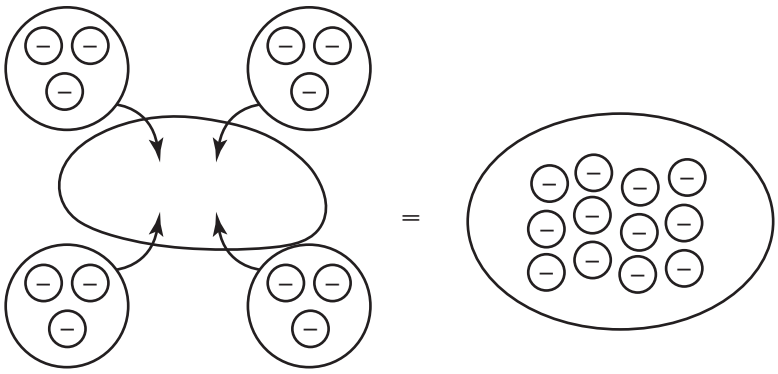


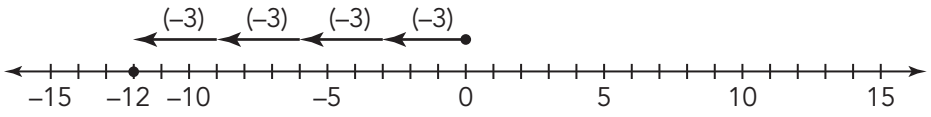
2. Explain how each model in Worked Example 2 can be interpreted as three groups of *the opposite of 4*.



WORKED EXAMPLE 3

Consider the expression $4 \times (-3)$.



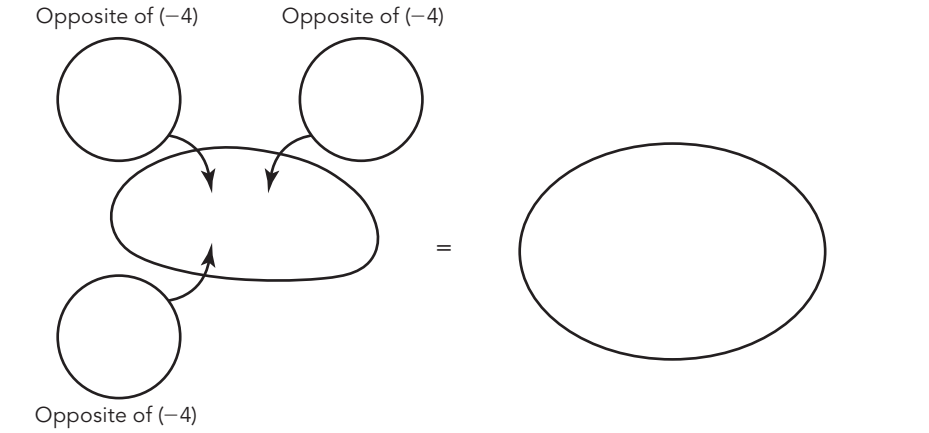


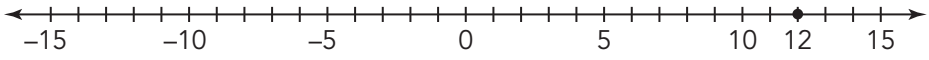
3. Interpret each model in Worked Example 3.

WORKED EXAMPLE 4

Consider the expression $(-3) \times (-4)$.

You know that $3 \times (-4)$ means "three groups of (-4)" and that -3 means "the opposite of 3." So, $(-3) \times (-4)$ means "the opposite of 3 groups of (-4)."





Think about how the 4 worked examples are alike and how they are different.

4. Complete the model by drawing in the appropriate counters and the appropriate rays in Worked Example 4.

a. Determine the product and explain how your models illustrate this product.

b. This expression can be written as $-((-4) + (-4) + (-4))$. Rewrite the expression as the opposite of a number: $-(\_\_\_\_\_)$.

c. How does the expression you wrote in part (b) relate to the product? Explain why this makes sense.

Use the examples if you need help.

5. **Draw either a number line or two-color counter model to determine each product. Describe the expression in words.**

   a. 2×3

   b. $2 \times (-3)$

   c. $(-2) \times 3$

   d. $(-2) \times (-3)$

6. **Complete the table.**

Expression	Description	Addition Sentence	Product
3×5	Three groups of 5	$5 + 5 + 5 = 15$	15
$(-3) \times 5$			
$3 \times (-5)$			
$(-3) \times (-5)$			

7. **What do you notice about the products and their signs across the problems in this activity?**

ACTIVITY
1.2 Signed Multiplication Facts

Analyze the sequence of products with 4.

$4 \times 5 = 20$
$4 \times 4 = 16$
$4 \times 3 = 12$
$4 \times 2 = 8$
$4 \times 1 = 4$
$4 \times 0 = 0$

1. What pattern do you notice in the products as the numbers multiplied by 4 decrease?

2. Continue the pattern to determine each product.

a. $4 \times (-1) =$ _____ **b.** $4 \times (-2) =$ _____

c. $4 \times (-3) =$ _____

3. Describe the pattern(s) that you notice in the new products.

Analyze the sequence of products with -5.

$-5 \times 5 = -25$
$-5 \times 4 = -20$
$-5 \times 3 = -15$
$-5 \times 2 = -10$
$-5 \times 1 = -5$
$-5 \times 0 = 0$

4. Describe the pattern and then extend it by writing the next three number sentences.

5. How do these products change as the numbers multiplied by -5 decrease?

Look back at the products you have determined in this lesson to answer each question.

6. Describe the sign of the product of two integers when:

a. they are both positive.

b. they are both negative.

c. one is positive and one is negative.

d. one is zero.

7. If you know that the product of two integers is negative, what can you say about the two integers? Give examples.

8. Describe a rule that will help you multiply any two integers.

9. Use your rule to evaluate each expression.

a.

$6 \times 5 =$ _____

$6 \times (-5) =$ _____

$-6 \times 5 =$ _____

$-6 \times (-5) =$ _____

b.

$-8 \times 7 =$ _____

$-8 \times (-7) =$ _____

$8 \times (-7) =$ _____

$8 \times 7 =$ _____

c.

$-3 \times 2 \times (-4) =$ _____

$-3 \times (-2) \times (-4) =$ _____

$3 \times (-2) \times 4 =$ _____

$-3 \times (-2) \times 4 =$ _____

$3 \times 2 \times (-4) =$ _____

$-3 \times 2 \times 4 =$ _____

10. **Describe the sign of each product and how you know.**

    a. **the product of three negative integers**

    b. **the product of four negative integers**

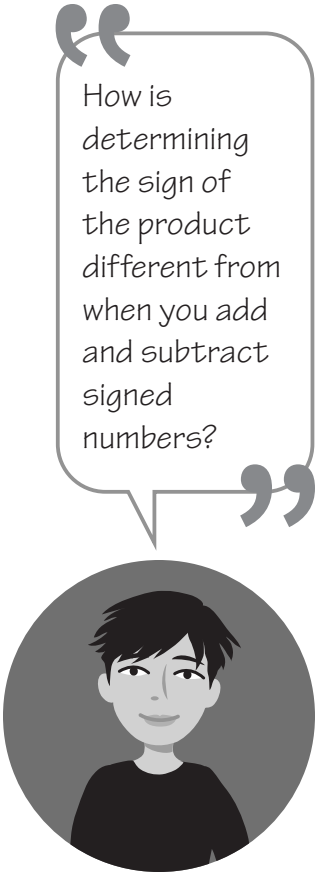
    c. **the product of seven negative integers**

    d. **the product of ten negative integers**

Create some examples to test if you are not sure how to answer these questions.

11. **What is the sign of the product of any odd number of negative integers? Explain your reasoning.**

12. **What is the sign of the product of three positive integers and five negative integers? Explain your reasoning.**



NOTES

ACTIVITY
1.3 Signed Fact Families

When you studied division in elementary school, you learned that multiplication and division were inverse operations. For every multiplication fact, you can write a corresponding division fact.

WORKED EXAMPLE

Consider the fact family for 4, 5, and 20.

$$4 \times 5 = 20$$
$$5 \times 4 = 20$$
$$20 \div 4 = 5$$
$$20 \div 5 = 4$$

Similarly, you can write fact families for integer multiplication and division.

EXAMPLES:

$-7 \times 3 = -21$ $\qquad$ $-8 \times (-4) = 32$

$3 \times (-7) = -21$ $\qquad$ $-4 \times (-8) = 32$

$-21 \div (-7) = 3$ $\qquad$ $32 \div (-8) = -4$

$-21 \div 3 = -7$ $\qquad$ $32 \div (-4) = -8$

1. What pattern(s) do you notice in each fact family?

2. Write a fact family for −6, 8, and −48.

3. **Fill in the unknown numbers to make each number sentence true.**

   a. $56 \div (-8) =$ _____ b. $28 \div (-4) =$ _____

   c. $-63 \div$ _____ $= -7$ d. $24 \div$ _____ $= -8$

   e. _____ $\div (-8) = -4$ f. $-105 \div$ _____ $= -5$

   g. _____ $\div (-8) = 0$ h. $-26 \div$ _____ $= -1$

Use fact families to help you determine each answer.

4. **Describe the sign of the quotient of two integers when:**

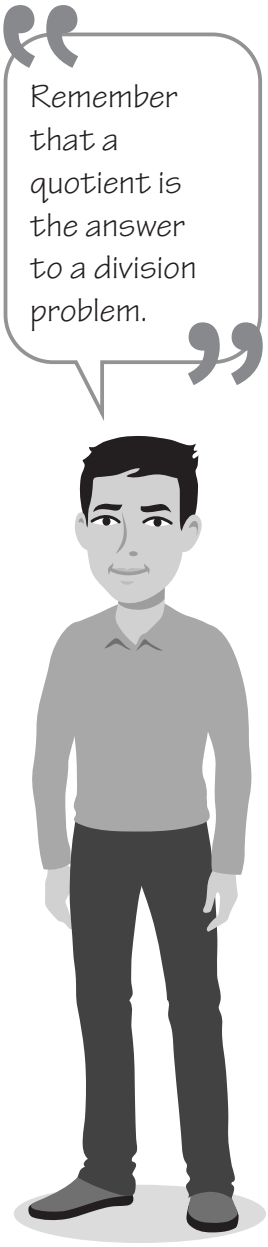
   a. **both integers are positive.**

   b. **one integer is positive and one integer is negative.**

   c. **both integers are negative.**

   d. **the dividend is zero.**

5. **How do the answers to Question 4 compare to the answers to the same questions about the multiplication of two integers? Explain your reasoning.**



NOTES

TALK the TALK

What's Your Sign?

Think about patterns in the signs of sums, differences, products, and quotients of integers.

1. **Determine two different sets of single-digit integers that make each number sentence true.**

   a. ____ × ____ = −42

   b. ____ × ____ = 56

   c. ____ × ____ = 63

   d. ____ × ____ = −48

2. **Complete the table by writing the sign (+, −, or +/−) to describe each sum, difference, product, or quotient.**

Description of Integers	Addition (Sum)	Subtraction (Difference)	Multiplication (Product)	Division (Quotient)
two positive integers				
two negative integers				
one positive and one negative integer				

3. **Create a true multiplication or division number sentence that meets the given condition.**

   a. positive product

   b. negative product

   c. positive quotient

   d. negative quotient

Assignment

Write

Explain how you determine the sign of the product or quotient of three of integers.

Remember

To multiply and divide integers, perform the usual multiplication and division algorithms and then apply the correct sign to the product or quotient.

Practice

Draw a two-color counter model to determine each product. Describe the expression in words.

1. $6 \times (-3)$
2. -2×5
3. $-4 \times (-2)$

Complete a number line model to determine each product.

4. -2×7
5. $-5 \times (-3)$
6. $3 \times (-3)$

Determine each product.

7. 5×11
   $5 \times (-11)$
   -5×11
   $-5 \times (-11)$

8. $3 \times 4 \times 5$
   $-3 \times (-4) \times 5$
   $-3 \times 4 \times 5$
   $-3 \times (-4) \times (-5)$
   $3 \times 4 \times (-5)$
   $3 \times (-4) \times (-5)$

Determine the integer that makes each number sentence true.

9. _____ $\times (-9) = -36$
10. $3 \times$ _____ $= -24$
11. $14 \times$ _____ $= 56$
12. _____ $\times (-6) = 30$
13. $9 = (-63) \div$ _____
14. $-40 \div$ _____ $= -8$
15. $16 \div$ _____ $= -8$
16. _____ $\div (-6) = -4$

Stretch

Multiplication can be represented as repeated addition. Repeated multiplication leads to exponents. Use what you know about multiplying signed numbers to evaluate each expression.

1. $(-3)^3$
2. $(-4)^2$
3. $(-2)^5$
4. $\left(-\frac{1}{2}\right)^2$

What do you notice?

Review

1. The Baby Shop sells baby supplies for new families. They offer different brands of the same items. James and his mom are shopping for his new baby brother. It is James' job to make sure that his mom is making wise purchases. Their first item to purchase is diapers. There are 3 different options for newborn-sized diapers.

   Stay-Dry: 108 diapers for $25.18
   UberSoft: 180 diapers for $39.14
   Cuddlies: 160 diapers for $38.77

   a. What is a unit rate for the Stay-Dry diapers?
   b. What is a unit rate for the UberSoft diapers?
   c. What is a unit rate for the Cuddlies diapers?
   d. Which kind of diapers should James advise his mom to purchase?

2. Calculate each sum.

   a. $2\frac{1}{2} + \left(-3\frac{3}{4}\right) + 5\frac{2}{5}$
   b. $5\frac{1}{3} + \left(-4\frac{1}{6}\right) + \left(-2\frac{1}{2}\right)$

3. Determine each unit rate.

   a. $1\frac{1}{4}$ teaspoons baking powder per $\frac{3}{8}$ cup flour
   b. $2\frac{2}{5}$ parts ammonia per $1\frac{1}{3}$ parts vinegar

Be Rational!

Quotients of Integers

2

WARM UP

Classify each number into as many categories as it belongs: natural number, whole number, integer, rational number.

1. -3
2. $\frac{1}{2}$
3. 0
4. 5

LEARNING GOALS

- Know that the decimal form of a rational number terminates in 0s or eventually repeats.
- Represent rational numbers as terminating or repeating decimals.
- Use long division to represent quotients of integers as rational numbers.
- Write equivalent forms of signed rational numbers.
- Determine that every quotient of integers is a rational number, provided the divisor is not zero.

KEY TERMS

- terminating decimals
- non-terminating decimals
- repeating decimals
- bar notation
- non-repeating decimals

You have learned the rule to determine the sign of a quotient. Does a quotient change if the negative sign is on the divisor instead of the dividend?

Are You a Terminator?

1. For each pair of numbers, use long division to calculate the quotient. Write quotients in fractional and decimal form.

   a. 5 ÷ 8

   b. 5 ÷ 11

   c. 7÷ 9

   d. 6 ÷ 2

2. What types of numbers are the quotients in Question 1? Use the definitions of the different number classifications to explain why this makes sense.

3. How many decimal places did you need to go to in the long division for each quotient? Why?

ACTIVITY
2.1 Classifying Decimals

Decimals can be classified into two categories: *terminating* and *non-terminating*.

A **terminating decimal** has a finite number of digits, meaning that after a finite number of decimal places, all following decimal places have a value of 0. Terminating decimals are rational numbers.

A **non-terminating decimal** is a decimal that continues on infinitely without ending in a sequence of zeros.

1. **Classify the decimals in Question 1 as terminating or non-terminating decimals.**

2. **Determine which unit fractions are terminating and which are non-terminating? Explain your reasoning for each.**

$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{5}$ $\frac{1}{6}$ $\frac{1}{7}$ $\frac{1}{8}$ $\frac{1}{9}$ $\frac{1}{10}$

Pi (π) is one of the most well-known non-repeating decimals.

Non-terminating decimals can be further divided into two categories: *repeating* and *non-repeating*.

A **repeating decimal** is a decimal in which a digit, or a group of digits, repeat(s) infinitely. Repeating decimals are rational numbers.

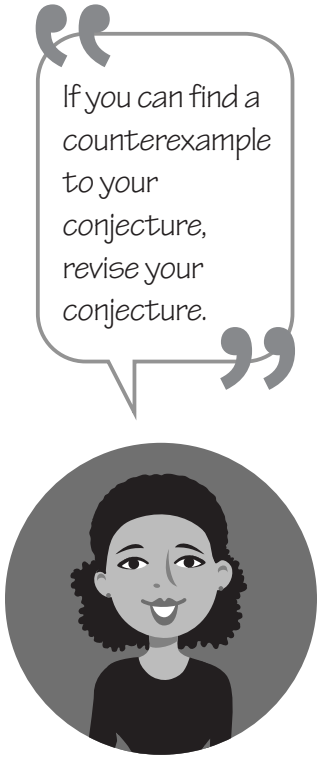
Bar notation is used to indicate the digits that repeat in a repeating decimal. In the quotient of 3 and 7, the sequence 428571 repeats. The numbers that lie underneath the bar are the numbers that repeat.

The bar is called a vinculum.

$$\frac{3}{7} = 0.4285714285714\ldots = 0.\overline{428571}$$

A **non-repeating decimal** continues without terminating and without repeating a sequence of digits. Non-repeating decimals are not rational numbers.

3. **Classify the non-terminating decimals in Question 1 as repeating or non-repeating decimals. If they are repeating decimals, rewrite them using bar notation.**

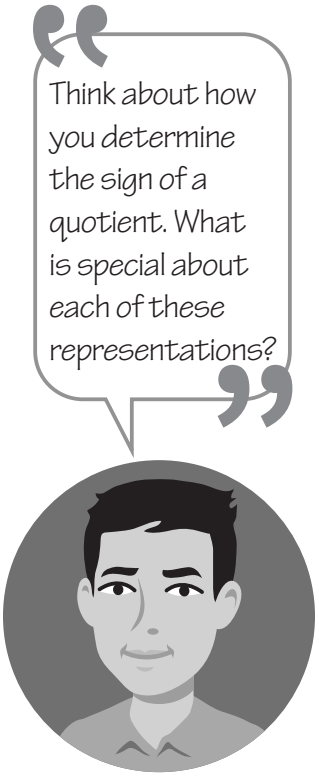


4. **Use your results in Question 2 to make a conjecture about other fractions. Which fractions will have repeating decimal representations? Use examples to support your conjecture.**

ACTIVITY
2.2 Equivalent Rational Numbers

Cut out the numbers at the end of the lesson. There are four possible representations of each rational number, but not all of the rational numbers have all four representations provided.

1. **Sort the numbers into their equivalent representations. For any numbers that do not have four representations, create the missing representation using the blank cards. Tape or glue the sets of representations in the space provided.**



Consider how you can use positive and negative signs to write an equivalent form of $\frac{3}{5}$.

2. **What do you notice about the negative sign in the fraction form of the representations?**

NOTES

TALK the TALK

It's All the Same to Me

Any quotient of two integers is a rational number, so long as the divisor is not 0.

For each rational number,

- write two equivalent representations in fractional form,
- convert to a decimal,
- classify the decimal as terminating or non-terminating and, if applicable, repeating or non-repeating.

1. $\frac{-11}{25}$

2. $\frac{-1}{6}$

3. $\frac{27}{-50}$

4. $\frac{-3}{7}$

$-\frac{2}{3}$	$\frac{-4}{5}$	$\frac{11}{-4}$	$\frac{-13}{15}$
$\frac{-39}{60}$	$\frac{-7}{22}$	$\frac{2}{-3}$	$-0.8\overline{6}$
$-\frac{11}{4}$	$\frac{4}{-5}$	$\frac{13}{-15}$	$-0.\overline{6}$
$-\frac{39}{60}$	$\frac{7}{-22}$	$\frac{-2}{3}$	$-\frac{4}{5}$

Assignment

Write

Explain how the three different fractional representations of a rational number are related to determining the sign of the quotient of two integers.

Remember

The sign of a negative rational number in fractional form can be placed in front of the fraction, in the numerator of the fraction, or in the denominator of the fraction.

Practice

Convert each fraction to a decimal. Classify the decimal as *terminating*, *non-terminating*, *repeating*, or *non-repeating*. If the decimal repeats, rewrite it using bar notation.

1. $\frac{3}{8}$
2. $\frac{5}{6}$
3. $\frac{7}{25}$
4. $\frac{2}{11}$
5. $\frac{5}{12}$

Write each rational number as an equivalent fraction by changing the placement of the negative sign(s).

6. $-\frac{4}{7}$
7. $\frac{-5}{3}$
8. $\frac{1}{2}$
9. $\frac{9}{-2}$
10. $-\frac{8}{5}$

Stretch

Use what you know about multiplying signed numbers to evaluate each expression.

1. $\left(-\frac{1}{2}\right)^2$
2. $-\left(\frac{1}{2}\right)^2$
3. $\left(-\frac{1}{2}\right)^3$
4. $-\left(\frac{1}{2}\right)^3$

What do you notice?

Review

Represent each scenario as a multiplication or division problem. Then, solve the problem.

1. The temperature changed $-2°$ per hour for 5 hours. How many degrees did the temperature drop during that time period.
2. Lina missed 8 questions on her science final, which changed her final score by -32 points. If each question is weighted equally, how many points did she lose for each question?

Determine each product.

3. $2\frac{1}{2} \times \left(-3\frac{3}{4}\right)$
4. $-5\frac{1}{3} \times \left(-2\frac{1}{2}\right)$

Determine an 18% gratuity for each restaurant bill.

5. \$29.50
6. \$56.70

3

Building a Wright Brothers' Flyer

Simplifying Expressions to Solve Problems

WARM UP

Simplify each expression.

1. $-20 \div 2\left(7\frac{2}{3}\right)$
2. $-20 - 2\left(-7\frac{2}{3}\right)$
3. $-7\left(\frac{-\frac{3}{4}}{-\frac{2}{3}}\right)$

LEARNING GOALS

- Model situations using expressions with rational numbers.
- Evaluate expressions with rational numbers and variables.
- Solve real-world problems using operations with signed rational numbers.

KEY TERM

- percent error

You have learned how to operate with signed numbers, including integers and other rational numbers. How can you use what you know to solve problems?

Orville and Wilbur

In the middle of December 1903, two brothers—Orville and Wilbur Wright—became the first two people to make a controlled flight in a powered plane. They made four flights on December 17, the longest covering only 852 feet and lasting just 59 seconds.

The table shows information about the flights made that day.

	Pilot	Flight Time (s)	Distance (ft)
A	Orville	12	120
B	Wilbur	13	175
C	Orville	15	200
D	Wilbur	59	852

1. **Determine the approximate speed of all four flights, in miles per hour.**

Human flight progressed amazingly quickly after those first flights. In the year before Orville Wright died, Chuck Yeager had already piloted the first flight that went faster than the speed of sound: 767.269 miles per hour!

2. **What is the speed of sound in feet per second?**

ACTIVITY
3.1

Operating with Rational Numbers to Solve Problems

In order to build a balsa wood model of the Wright brothers' plane, you would need to cut long lengths of wood spindles into shorter lengths for the wing stays, the vertical poles that support and connect the two wings. Each stay for the main wings of the model needs to be cut $3\frac{1}{4}$ inches long.

Show your work and explain your reasoning.

1. **If the wood spindles are each 10 inches long, how many stays could you cut from one spindle?**

2. **How many inches of the spindle would be left over?**

3. **If the wood spindles are each 12 inches long, how many stays could you cut from one spindle?**

4. **How many inches of the spindle would be left over?**

You also need to cut vertical stays for the smaller wing that are each $1\frac{5}{8}$ inches long.

5. **If the wood spindles are each 10 inches long, how many of these stays could you cut from one spindle?**

6. **How many inches of the spindle would be left over?**

7. **If the wood spindles are each 12 inches long, how many stays could you cut from one spindle?**

8. **How many inches of the spindle would be left over?**

9. **Which length of spindle should be used to cut each of the different stays so that there is the least amount wasted?**

ACTIVITY
3.2

Using Rational Numbers in Equations

There are longer spindles that measure 36 inches.

1. **How much of a 36-inch-long spindle would be left over if you cut one of the stays from it?**

2. **How much of this spindle would be left over if you cut two of the stays from it?**

3. **Define variables and write and equation for the number of $3\frac{1}{4}$-inch stays and the amount of the 36-inch spindle left over.**

4. **Use your equation to calculate the amount of the spindle left over after cutting 13 stays.**

ACTIVITY
3.3 Calculating Percent Error

Airline travel has come a long way since the days of Orville and Wilbur Wright. In 2015, there were approximately 9.1 million flights that took off from U.S. airports carrying approximately 895.5 million passengers. To transport this many passengers to and from their destinations, airlines have to make good estimations about the number of flights passengers will book, the size of the airplanes to use for a given route, and the approximate arrival time for each flight.

Tracking the accuracy of these estimations is important for airlines. Calculating **percent error** is one way to compare an estimated value to an actual value. To compute percent error, determine the difference between the estimated and actual values and then divide by the actual value.

$$\text{Percent Error} = \frac{\text{actual value} - \text{estimated value}}{\text{actual value}}$$

When planning which airplanes to use for a given route, airlines have to estimate how many people they think will book that particular flight. They want to be able to have enough seating to meet the demand but not have too big of a plane and waste the extra fuel needed.

1. **An airline estimates that they will need an airplane that sits 224 passengers for the 6 A.M. flight from Washington, D.C., to Boston. Calculate the percent error for each number of actual passengers booked. Show your work.**

   a. **186 booked tickets**

   b. **250 booked tickets**

Another challenge is accurately estimating the travel time for each flight. Having minimal error in these estimations allows airlines to keep their schedules accurate and passengers happy.

Airlines use historical data on how long the flight has taken in the past, but these estimates are often impacted by weather issues, airport traffic, and earlier flight delays.

2. An airline estimates that the flight from Washington, D.C., to Boston takes 1 hour and 27 minutes. Calculate the percent error for each actual flight time. Show your work.

a. 1 hour and 11 minutes

b. 2 hours

3. What does a negative value for percent error indicate?

4. Vernice is told that the DC to Boston flight took 10 minutes longer than estimated. She calculated the percent error and got 10.3%. She later learns that she had been given the wrong information. The flight took 10 minutes *less* than estimated. Vernice thinks that the percent error should just be −10.3%. Is she correct? Explain why or why not.

NOTES

ACTIVITY 3.4

Evaluating Expressions with Rational Numbers and Variables

Recall that to evaluate an expression with a variable, substitute the value for the variable and then perform the operations.

WORKED EXAMPLE

Evaluate the expression $-12\frac{1}{2} - 3v$ for $v = -5$.

Estimate:

$$-12 - 3(-5) = -12 + 15 = 3$$

Substitute -5 for v and solve:

$$-12\frac{1}{2} - 3(-5) = -12\frac{1}{2} - (-15)$$

$$= -12\frac{1}{2} + 15$$

$$= 2\frac{1}{2}$$

1. Evaluate the expression for $v = -\frac{6}{7}$.

Evaluate each expression for the given value.

2. Evaluate $-3.25 - 2.75z$ for $z = -4$.

3. Evaluate $\left(-1\frac{1}{4}\right)x - 8\frac{7}{8}$ for $x = -\frac{2}{5}$.

4. Evaluate $-0.75(p - 1.2)$ for $p = 2$.

5. Evaluate $\frac{m}{-\frac{6}{5}}$ for $m = 6\frac{3}{4}$.

NOTES

TALK the TALK

Rational Thinking

Write each problem as a product or quotient of rational numbers and then solve. Show your work.

1. **Carey and Patrick both borrowed money from Melinda. Carey owes Melinda $25.00. Patrick owes Melinda $\frac{3}{4}$ the amount that Carey owes. How much does Patrick owe Melinda?**

2. **Therese is measuring how fast water evaporates in a bucket in her backyard. In 6 hours in direct sunlight, the water level changes $-\frac{3}{8}$ inch. How fast is the water level changing per hour?**

3. **A meteorologist forecasts that the temperature is going to change $-1\frac{1}{2}^{\circ}$ per hour from 11:00 P.M. to 7:00 A.M. What is the total expected temperature change over the time period?**

Assignment

Write

Write the steps you would follow to evaluate an expression for a variable. Use an example in your description.

Remember

Percent error is one way to report the difference between estimated values and actual values.

$$\text{Percent error} = \frac{\text{actual value} - \text{estimated value}}{\text{actual value}}$$

Practice

Write an expression with rational numbers to represent each situation and then solve. Show your work.

1. Jaxon's start-up business makes a profit of $450 during the first month. However, the company records a profit of −$60 per month for the next four months and profit of $125 for the final month. What is the total profit for the first six months of Jaxon's business?
2. A diver is exploring the waters of the Great Barrier Reef.
   a. She is currently −5 feet from the surface of the water and plans to explore a shipwreck that is at −75 feet from the surface. If she moves at a rate of −8 feet per minute, how many minutes does it take the diver to reach the shipwreck?
   b. When she is done exploring the reef, she ascends at a rate of 5 feet per minute. Once she reaches a height of −30 feet, she must rest for 15 minutes to allow her body to adapt to the changing water pressure. She then continues to the surface at the same rate. How long will it take the diver to reach the surface?
3. The drain in your 45-gallon bathtub is partially clogged, but you need to take a shower. The showerhead had a flow rate of 2.25 gallons per minute, but the bathtub only drains at a rate of −0.5 gallons per minute. What is the longest shower you can take?
4. Tesha withdrew $22.75 each week for four weeks from her savings account to pay for her piano lessons. By how much did these lessons change her savings account balance?

Calculate the percent error.

5. Jerri estimated that 30 people would attend the dinner event, but only 25 people attended.
6. Gene estimated the length of the fence to be 150 feet, but the actual measurement was 142 feet.

Evaluate each expression for the given value.

7. $\frac{5}{6}x$ for $x = -8$
8. $9\frac{1}{3} - m$ for $m = -1\frac{2}{3}$
9. $t \div \frac{3}{4}$ for $t = 9\frac{3}{4}$
10. $\frac{2}{5}k - 3\frac{1}{2}$ for $k = 15$

Stretch

Solve each equation.

1. $x + 4.5 = 9.125$
2. $\frac{4}{5}(p + 1) = 1$
3. $\frac{g}{8} - 5 = 1\frac{1}{2}$

Review

Convert each fraction to a decimal. Classify the decimal as terminating or non-terminating and, if applicable, repeating or non-repeating.

1. $\frac{11}{12}$
2. $\frac{11}{14}$

Determine each absolute value. Show your work.

3. $|-5 - (-7)|$
4. $\left|-\frac{3}{8} + \frac{1}{6}\right|$

Determine each quotient.

5. $\frac{3}{4} \div \frac{4}{3}$
6. $\frac{1}{8} \div \frac{1}{5}$

4 Properties Schmoperties

Using Number Properties to Interpret Expressions with Signed Numbers

WARM UP

Use the Order of Operations to simplify each expression.

1. $18 + 6 \times (-3) - 4$

2. $5 \div (1 - 6) \times 10$

3. $8 + (-3) \times 9 \times 0$

LEARNING GOALS

- Use the Commutative, Associative, and Distributive Properties, Additive and Multiplicative Inverses, Identity, and Zero Properties to rewrite numeric expressions with signed numbers in order to interpret their meanings and solve problems.
- Apply the properties of operations to add, subtract, multiply, and divide with rational numbers.
- Use number properties to solve mathematical problems involving signed numbers and other rational numbers more efficiently.

You have learned how to add, subtract, multiply, and divide with signed numbers and other rational numbers. How can you use number properties with rational numbers to solve problems?

Getting Started

All in Your Head

You have used mental math before to solve problems without calculating on paper. Now try it with signed numbers!

1. **Determine each sum or difference using mental math.**

   a. $-8 + 5 + 8$

   b. $-\frac{1}{2} + \frac{3}{5} + -\frac{1}{2}$

   c. $\frac{3}{8} + \left(\frac{5}{8} + \left(-\frac{5}{6}\right)\right)$

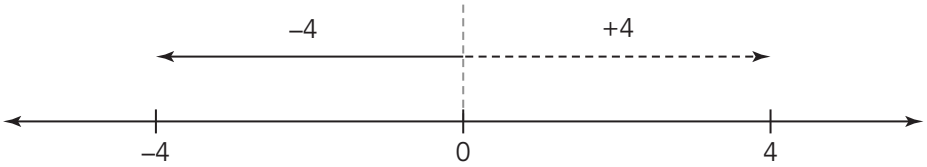
2. **Explain how you can use the Commutative and Associative Properties to help you solve the problems in your head.**

The Commutative Property says that you can add or multiply in any order without changing the sum or product.

The Associative Property says that you can group addends or factors without changing the sum or product.

ACTIVITY
4.1 Distributing and Factoring with −1

When first learning about negative numbers, you reflected a positive value across 0 to determine the opposite of the value.

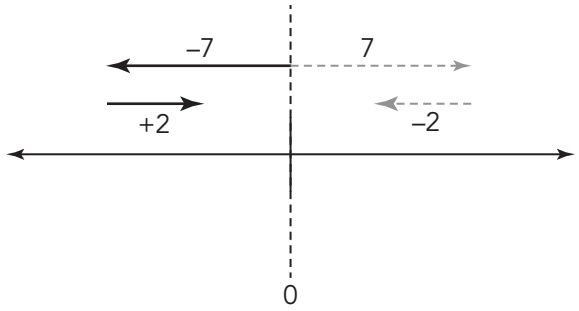


This illustrates that the opposite of 4 is -4, or $(-1)(4) = -4$.

In the same way, you can use reflections across 0 on the number line to determine the opposite of an expression.

WORKED EXAMPLE

Consider the expression $-7 + 2$. When the model of $-7 + 2$ is reflected across 0 on the number line, the result is $7 - 2$.



So, $(-7 + 2)$ is the opposite of $(7 - 2)$.

This means that $-7 + 2 = -(7 - 2)$.

1. Draw models like the ones in the worked example to show the opposite of each expression. Rewrite each as an opposite of a different expression.

a. $-1 - 6$ **b. $2 + (-3)$** **c. $-4 + 5$**

How would your answer be different if the expression were -4×5?

Adam

To reflect an expression across 0 on the number line, multiply the expression by -1.

$$-1(2 + 3) = (-1)(2) + (-1)(3)$$
$$= -2 + -3$$

2. **What property did Adam use to show his reasoning?**

3. **Does Adam's expression, $-1(2 + 3)$, mean the same thing as $-(2 + 3)$? Draw a model and explain your reasoning.**

4. **Rewrite each expression as an addition or subtraction expression using a factor of -1.**

   a. $-2 + (-4) = -1(\_\_\_\_\_)$

   b. $-5 - 8 = -1(\_\_\_\_\_)$

   c. $-9 - (-9) = -1(\_\_\_\_\_)$

Rewriting an expression as a product with -1 is also called *factoring out a* -1.

5. **Use the Distributive Property to show that your expressions in Question 4 are correct.**

ACTIVITY
4.2 Subtraction as Adding the Opposite

You know that subtracting a number is the same as adding the opposite of that number. Rewriting subtraction as addition allows you to apply the Commutative Property to any expression involving addition and subtraction.

For example, $-4.5 - 3 + 1.5 = -4.5 + 1.5 + (-3)$. Rewriting expressions helps you to see patterns and use mental math to make solving simpler.

You can use what you know about adding opposites to help you solve problems more efficiently.

1. **Simplify each expression.**

   a. $10.5 + 6 + 2 - 0.5$

   b. $-\frac{1}{2} + \left(\frac{1}{2} - \frac{4}{5}\right)$

   c. $3\frac{7}{8} - 4\frac{1}{2}$

2. **Explain how you can use the Commutative, Associative, and Distributive Properties to help you simplify the expressions in Question 1.**

NOTES

ACTIVITY
4.3 Practice with the Properties

1. For each equation, identify the number property or operation used.

Equation	Number Property
a. $-3\frac{1}{2} + 5 = 5 + \left(-3\frac{1}{2}\right)$	
b. $\left(3\frac{1}{2}\right)\left(2\frac{1}{5}\right)5 = 3\frac{1}{2}\left(2\frac{1}{5}\right)(5)$	
c. $-3\frac{1}{2} + \left(-2\frac{1}{2} + 5\right) = \left(-3\frac{1}{2} + \left(-2\frac{1}{2}\right)\right) + 5$	
d. $-\left(-3\frac{1}{2} + 2\frac{1}{4}\right) = -1\left(-3\frac{1}{2}\right) + -1\left(2\frac{1}{4}\right)$	
e. $\frac{-3\frac{1}{2} - 2\frac{1}{4}}{4} = \frac{-3\frac{1}{2}}{4} - \frac{2\frac{1}{4}}{4}$	
f. $(-7.02)(-3.42) = (-3.42)(-7.02)$	

NOTES

Evaluate each expression. Describe your strategy.

2. $-2\left(2\frac{1}{4}\right) + -2\left(-\frac{3}{4}\right)$

3. $\left(-3\frac{1}{4} - 2\frac{1}{5}\right) + \left(-6\frac{3}{5}\right)$

4. $\frac{7}{8}\left(-\frac{4}{5}\right)\left(-\frac{8}{7}\right)$

5. $\frac{\frac{8}{9} + \left(-\frac{4}{5}\right)}{4}$

6. $(-11.4)\,(6.4) + (-11.4)(-12.4)$

NOTES

TALK the TALK

What's It All About?

When you rewrite addition and subtraction expressions using a factor of −1, you are "factoring out" a −1. Here are some other examples.

$-8 + 5 = -1(8 - 5)$ $-2 - 9 = -1(2 + 9)$ $3 - (-4) = -1(-3 - 4)$

1. **Describe how you can factor out a −1 from any addition or subtraction expression.**

2. **How is factoring out a negative 1 from an addition or subtraction expression different from factoring out a negative 1 from a multiplication or division expression?**

3. **Demonstrate using words and models why the product of −1 and any expression is the opposite of that expression.**

Assignment

Write

Describe in your own words how to factor a −1 out of an addition or subtraction expression.

Remember

When you multiply any expression by −1, the result is the opposite of that expression.

Practice

Factor out a negative 1 from each expression.

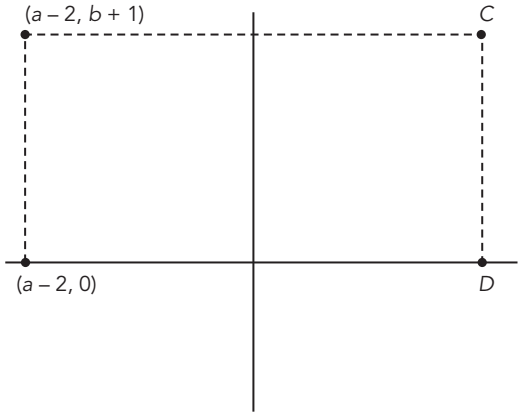
1. $7 + (-6)$
2. $-4 - (5 + 3)$
3. $-9 - 1$
4. Use the Distributive Property to show that your answers to Questions 1 through 3 are correct.

Use a number property to solve each problem efficiently. Show your work and list the property or properties used.

5. $-9.9 + 5.2 + 3.9 + 1$
6. $-\frac{3}{5} + \left(\frac{1}{5} - \frac{3}{2} + 0\right)$

Stretch

The rectangle shown is formed by a reflection of points *C* and *D* across the *y*-axis of the coordinate plane. Point *C* has the coordinates (4, 4). Determine *a* and *b* and then calculate the perimeter of the rectangle.



Review

1. Carl and Joe recorded how fast they ran 1 mile and 2 miles. Carl recorded his times using fractions, and Joe recorded his times using decimals.

Distance	Carl	Joe
1 mi	$10\frac{1}{2}$ min	10.4 min
2 mi	$22\frac{1}{4}$ min	22.3 min

   a. Who ran the mile faster, Carl or Joe? How much faster?

   b. Who ran 2 miles faster, Carl or Joe? How much faster?

2. A small submarine is at an elevation of -30 feet compared to sea level. What is its elevation after it ascends 9 feet?
3. On Tuesday, Marissa was \$45 short of her fundraising goal. The next day, she was \$5 over her goal. Write an equation to show how much she raised in one day.
4. What is 12% of 350?
5. What is 35% of 120?

Topic 2

Multiplying and Dividing Rational Numbers

Name _____ Date _____

I. Multiplication and Division Fact Families

A. Complete each fact family.

1. $-8 \times (-7) =$ _____

$-7 \times (-8) =$ _____

_____ $\div (-8) = -7$

$56 \div$ (_____) $= -8$

2. $4 \times$ (_____) $= -4$

_____ $\times 4 = -4$

$-4 \div$ (_____) $= 4$

$-4 \div 4 =$ _____

3. _____ $\times 5 = -35$

_____ $\times (-7) = -35$

_____ $\div 5 = -7$

$-35 \div$ (_____) $= 5$

4. $-8 \times$ (_____) $= 32$

$-4 \times$ (_____) $= 32$

$32 \div -8 =$ _____

$32 \div -4 =$ _____

5. $-7 \times 3 =$ _____

$3 \times (-7) =$ _____

_____ $\div (-7) = 3$

$-21 \div 3 =$ _____

6. _____ $\times (-5) = -50$

$-5 \times 10 =$ _____

$-50 \div$ (_____) $= 10$

$-50 \div 10 =$ _____

7. $-12 \times (-4) =$ _____

$-4 \times (-12) =$ _____

$48 \div (-12) =$ _____

_____ $\div (-4) = -12$

8. _____ $\times (-2) = -12$

_____ $\times 6 = -12$

$-12 \div 6 =$ _____

$-12 \div$ _____ $= 6$

Name _____ Date _____

9. $-3 \times$ _____ $= -9$

$3 \times$ (_____) $= -9$

_____ $\div (-3) = 3$

_____ $\div 3 = -3$

10. _____ $\times (-9) = 54$

$-9 \times$ _____ $= 54$

$54 \div$ (_____) $= -6$

_____ $\div -6 = -9$

11. $10 \times$ (_____) $= -20$

_____ $\times 10 = -20$

$-20 \div$ _____ $= -2$

_____ $\div -2 = 10$

12. $-11 \times 4 =$ _____

$4 \times$ (_____) $= -44$

$-44 \div -11 =$ _____

$-44 \div$ _____ $= -11$

II. Multiplying and Dividing Negative Integers

A. Determine each product.

1. $2 \times (-9)$

2. $-1 \times (-6)$

3. -12×11

4. $7 \times (-6)$

5. $-3 \times (-10)$

6. -4×3

7. $11 \times (-5)$

8. $-4 \times (-9)$

9. $8 \times (-8)$

10. -25×4

11. -2×30

12. $-5 \times (-80)$

B. Determine each quotient.

1. $90 \div (-9)$

2. $-30 \div (-5)$

3. $-7 \div 7$

4. $81 \div (-9)$

5. $-88 \div (-8)$

6. $-48 \div 12$

7. $16 \div (-2)$

8. $24 \div (-6)$

9. $-42 \div 6$

10. $-540 \div (-9)$

11. $100 \div (-5)$

12. $-640 \div 80$

C. Determine each product or quotient.

1. $1 \times (-4)$

2. $36 \div (-9)$

3. $-10 \times (-7)$

4. $-40 \div (-5)$

5. $-45 \div 9$

6. -12×2

7. $11 \times (-3)$

8. $18 \div (-6)$

9. $-28 \div 4$

10. $-5 \times (-12)$

11. -9×8

12. $-121 \div (-11)$

Name _____ Date _____

III. Simplify Expressions Using Number Properties and the Order of Operations

A. Simplify each expression.

1. $-3 - 4(-2) + 3$

2. $(2 \div 3) \div 8$

3. $-8 + 9(-2)\ -6$

4. $\frac{5}{-5}\ (-4)$

5. $-6 + 8 - 9(-5)$

6. $\frac{(-8 + 4)}{(-9)}$

7. $3 - 2(-6) + 9$

8. $-2(2 + 5 \cdot 3)$

9. $-3 + 7(-2 + 4)$

10. $-4(8 - 2 \cdot 2)$

11. $(-5 + 4) \div 6$

12. $-5(2 + 8 \div 2)$

B. Simplify each expression. Explain how you can use the Commutative, Associative, or Distributive Property to simplify.

1. $-10(-0.32 - 0.2)$

2. $18\frac{3}{4} + 9 - 3 + 1\frac{1}{4}$

3. $-8.17 + (8.17 + 6.54)$

4. $-3(3\frac{2}{3}) + -3(-1\frac{1}{3})$

5. $(-5\frac{2}{5} + 2\frac{1}{2}) + (-4\frac{1}{2})$

6. $(-4.2)(8.6) + (-4.2)(-4.6)$

7. $\frac{5}{12} \times (-\frac{8}{9}) \times (-\frac{12}{5})$

8. $-48.23 - 8 + 20 + 2.23$

9. $94.45 - (4.45 + 9.87)$

10. $-2(\frac{7}{2} - \frac{1}{4})$

11. $(18 - 9.9) + 12.9$

12. $-\frac{5}{8} \times 7 \times 16$

1

No Substitute for Hard Work

Evaluating Algebraic Expressions

WARM UP

Perform each operation.

1. $(-3)(6.6)$
2. $-3 + 6.6$
3. $-3 - 6.6$
4. $6.6 \div (-3)$

LEARNING GOALS

- Compare unknown quantities on a number line.
- Define linear expressions.
- Evaluate algebraic expressions.
- Solve real-life and mathematical problems using algebraic expressions.

KEY TERMS

- variable
- algebraic expression
- linear expression
- constraint
- evaluate an algebraic expression

You have written and evaluated algebraic expressions with positive rational numbers. How do you evaluate algebraic expressions over the set of rational numbers?

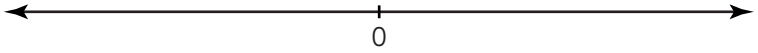
In algebra, a **variable** is a letter or symbol that is used to represent an unknown quantity.

The Empty Number Line

Consider the list of six *variable* expressions:

x $\quad 2x \quad$ $3x$ $\quad \frac{1}{2}x \quad$ $-x$ $\quad -\frac{1}{2}x$

1. With your partner, think about where you would place each expression and sketch your conjecture.



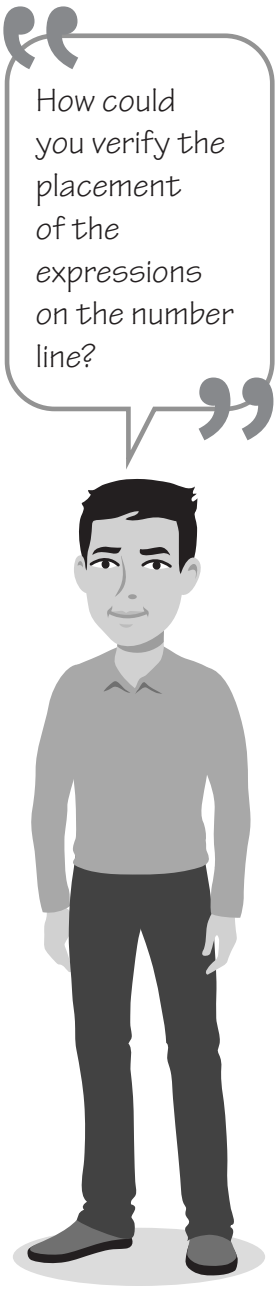
2. Compare your number line with another group's number line. What is the same? What is different?

3. Your teacher will select students to place an index card representing each expression on the number line on the board. Record the locations agreed upon by the class.

ACTIVITY
1.1 Algebraic Expressions

In this lesson, you will explore the relationship between unknown quantities by writing and evaluating *algebraic expressions*. An **algebraic expression** is a mathematical phrase that has at least one variable, and it can contain numbers and operation symbols.

Each of the expressions in the *Empty Number Line* activity is an algebraic expression. They are also *linear expressions*. A **linear expression** is any expression in which each term is either a constant or the product of a constant and a single variable raised to the first power.



Additional examples of linear expressions include:
$\frac{1}{2}x + 2$, $-3 + 12.5x$, $-1 + 3x + \frac{5}{2}x - \frac{4}{3}$, or $4y$.

The expressions $3x^2 + 5$ and $-\frac{1}{2}xy$ are examples of expressions that are not linear expressions.

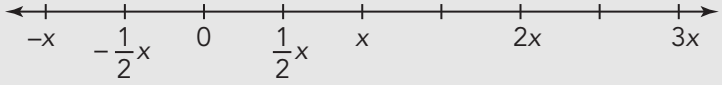
1. **Provide a reason why each expression does not represent a linear expression.**

Let's revisit how you may have plotted the expressions in the previous activity. The directions did not specify the possible values for x. When you graphed each expression, did you think about the set of all possible values of x or just the set of positive x-values?

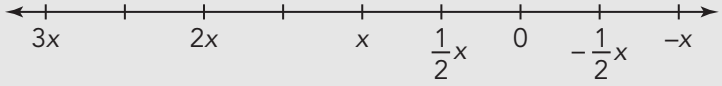
In mathematics, it is sometimes necessary to set *constraints* on values. A **constraint** is a condition that a solution or problem must satisfy. A constraint can be a restriction set in advance of solving a problem or a limit placed on a solution or graph so the answer makes sense in terms of a real-world scenario.

Analyze the number lines created by Bella and Tito using the expressions from the *Empty Number Line* activity.

Bella



Tito



2. Compare and contrast each representation.

a. What are the constraints on each representation? Identify the set of *x*-values that make each number line true.

b. Select a value for *x* from your set of possible values and substitute that value for *x* in each expression to verify the plotted locations are correct.

One strategy to verify your placement of the cards is to substitute values for the variable *x* into each expression.

c. Compare your values from part (b) with your classmates. Do you have the same values? If not, what does that mean?

ACTIVITY
1.2 Substitution with Rational Numbers

To earn money for a summer mission trip, Levi is working as a handyman around his neighborhood. Levi has been hired to build a wooden fence. He plans to use a post hole digger to dig the holes for the posts.

Levi starts the project on Saturday morning but because of the type of soil, he only starts the holes, fills them with water, and then plans to return Sunday to finish the job. When Levi starts on Sunday, each hole is 3 inches deep. Each time he uses the post hole diggers, he extracts 2 inches of soil. The height of the soil in the hole with respect to ground level can be modeled by the linear expression $-3 - 2n$, where n is the number of times Levi extracted soil with the post hole diggers.

A depth of 3 inches is equivalent to a height of -3 inches.

1. Determine the height of the soil in the hole as Levi works.

Number of Soil Extractions	Height of the Soil (inches)
0	
1	
2	
5	
10	
15	
20	

Use the Order of Operations to evaluate the expressions.

2. **From his research about digging post holes, Levi knows that each pole must be placed at a depth that is 2 feet below the frost level, and the frost level is 16 inches beneath ground level.**

   a. **How deep must Levi dig each hole?**

   b. **Determine the minimum number of soil extractions for each hole.**

Cable drilling, also known as percussion drilling, is a method used to drill a borehole.

Levi's mom, Maggie, uses a cable tool rig to dig wells during the mission trip. Her rig can dig 12.4 meters of hard rock per day. When Maggie starts working on one well, the hole is already 33 meters deep.

3. **Write a linear expression for the height of the hole with respect to ground level for the number of days that Maggie runs the rig.**

4. **Use your expression to determine the height of the hole after each number of days.**

   a. **2 days after Maggie starts**

   b. **5 days after Maggie starts**

   c. **2 days before Maggie started**

ACTIVITY
1.3 Evaluating Expressions

Previously, you evaluated algebraic expressions with positive rational numbers. Now you can evaluate expressions with negative rational numbers. To **evaluate an algebraic expression**, you replace each variable in the expression with a number or numeric expression and then perform all possible mathematical operations.

1. Evaluate each algebraic expression.

a. $x - 7$
- for $x = -8$
- for $x = -11$
- for $x = 16$

b. $-6y$
- for $y = -3$
- for $y = 0$
- for $y = 7$

c. $3b - 5$
- for $b = -2$
- for $b = 3$
- for $b = 9$

d. $-1.6 + 5.3n$
- for $n = -5$
- for $n = 0$
- for $n = 4$

Sometimes, it is more convenient to use a table to record the results when evaluating the same expression with multiple values.

2. Complete each table.

a.

h	$-2h - 7$
2	
−1	
8	
−7	

b.

a	−12	−10	−4	0
$\frac{a}{4} + 6$				

c.

x	$x^2 - 5$
1	
3	
6	
−2	

d.

y	−5	−1	0	15
$-\frac{1}{5}y + 3\frac{2}{5}$				

3. Evaluate each algebraic expression for $x = 2, -3, 0.5$, and $-2\frac{1}{3}$.

   a. $-3x$

   b. $5x + 10$

   c. $6 - 3x$

   d. $8x + 75$

4. Evaluate each algebraic expression for $x = 23.76$ and $-21\frac{5}{6}$.

   a. $2.67x - 31.85$

   b. $11\frac{3}{4}x + 56\frac{3}{8}$

NOTES

TALK the TALK

Strategies

Write a 1–2 paragraph summary of this lesson. Be sure to address each question.

1. **Describe your basic strategy for evaluating any algebraic expression.**

2. **How are tables helpful when evaluating expressions?**

Assignment

Write

Explain the difference between an algebraic expression and a linear expression.

Remember

To evaluate an algebraic expression, replace each variable in the expression with a number or numeric expression and then perform all possible mathematical operations.

Practice

Evaluate each algebraic expression.

1. $64 - 9p$ for $p = 4, 9, -3$
2. $-w + 8.5$ for $w = 12, -1.5, 5.3$
3. $46 + (-2k)$ for $k = 3, 23, -2$

Complete each table.

4.

b	$3b + 14$
-5	
-3	
0	
4	

5.

v	1	2	5	−3.25
$6.75 - 6v$				

6.

f	4	8	−12	−1
$\frac{f}{4} + 3f$				

Evaluate each algebraic expression for the given quantity.

7. $-6.2x + 1.4x$, $x = -9.3$

8. $3\frac{1}{2}x - 5\frac{1}{3}x$, $x = \frac{2}{5}$

Stretch

Evaluate each algebraic expression for the given quantity.

1. $-3(2.1x - 7.9)$ for $x = -18.1, -0.3, 14.4$
2. $-9.8t^2 + 20t + 8$ for $t = -2, 0, 3.5$

Review

Rewrite each numeric expression by factoring out (−1).

1. $-7 + 5$
2. $3 + 8$

Determine each quotient.

3. $-8.9 \div -0.1$
4. $-4\frac{1}{3} \div \frac{2}{5}$

Write two unit rates for each given ratio.

5. $\frac{3}{4}$ inch : $\frac{1}{2}$ hour
6. $\frac{4}{5}$ gallon : $\frac{1}{4}$ cup

Mathematics Gymnastics

2

Rewriting Expressions Using the Distributive Property

WARM UP

Write a numeric expression for the opposite of each given expression.

1. $-7 - 2$
2. $3 - 9$
3. $-3 + 2$
4. $3 - (-7)$

LEARNING GOALS

- Write and use the Distributive Property.
- Apply the Distributive Property to expand expressions with rational coefficients.
- Apply the Distributive Property to factor linear expressions with rational coefficients.

KEY TERMS

- factor
- coefficient
- common factor
- greatest common factor (GCF)

You have used the Distributive Property to expand and factor algebraic expressions with positive numbers. How can you apply the property to all rational numbers?

Where Are They?

Consider the list of linear expressions.

$x + 1$ $2x + 2$ $3x + 3$ $4x + 4$

1. **On the empty number line, plot each algebraic expression by estimating its location.**

2. **Explain your strategy. How did you decide where to plot each expression?**

3. **What assumptions did you make to plot the expressions? Does everyone's number line look the same? Why or why not?**

ACTIVITY
2.1 Algebraic Expressions on the Number Line

Consider the four expressions plotted in the previous activity. How can you prove that you are correct?

To **factor** an expression means to rewrite the expression as a product of factors.

Graham

I can use an example by evaluating all four expressions at the same value of x and plot the values.

Let $x = 4$.

$x + 1 = 4 + 1 = 5$

$2x + 2 = 2(4) + 2 = 10$

$3x + 3 = 3(4) + 3 = 15$

$4x + 4 = 4(4) + 4 = 20$

I can plot the expressions at 5, 10, 15, and 20.

Meaghan

The expressions look similar. I can factor out the coefficient of each expression.

$x + 1$

$2x + 2 = 2(x + 1)$

$3x + 3 = 3(x + 1)$

$4x + 4 = 4(x + 1)$

So, I can plot $x + 1$ and use that expression to plot the other expressions.

1. **Use Graham's strategy with a different positive value for x to accurately plot the four expressions.**

A **coefficient** is a number that is multiplied by a variable in an algebraic expression.

2. **Use Graham's strategy with a negative value for x to accurately plot the four expressions. How is your number line different from the number line in Question 1?**

Often, writing an expression in a different form reveals the structure of the expression. Meaghan saw that each expression could be rewritten as a product of two factors.

Meaghan's expressions

$x + 1$

$2x + 2 = 2(x + 1)$

$3x + 3 = 3(x + 1)$

$4x + 4 = 4(x + 1)$

3. What are the two factors in each of Meaghan's expressions? What is common about the factors of each expression?

4. Use Meaghan's work to accurately plot the four expressions. Explain your strategy.

If a variable has no coefficient, the understood coefficient is 1.

5. Meaghan noticed that the expressions formed a sequence. Write and plot the next two terms in the sequence. Explain your strategy.

6. What property did Meaghan use when she factored out the coefficient of the expressions?

ACTIVITY
2.2 Applying the Distributive Property

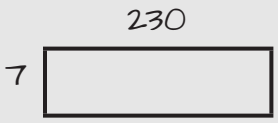
NOTES

Recall that the Distributive Property states that if a, b, and c are any real numbers, then $a(b + c) = ab + ac$. The property also holds if addition is replaced with subtraction, then $a(b - c) = ab - ac$.

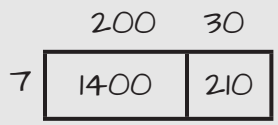
Dominique remembers that the Distributive Property can be modeled with a rectangle. She illustrates with this numeric example.

Dominique

Calculating 230 × 7 is the same as determining the area of a rectangle by multiplying the length by the width.



But I can also decompose the rectangle into two smaller rectangles and calculate the area of each. I can then add the two areas to get the total.



1400 + 210 = 1610

So, 7(230) = 1610.

1. **Write Dominique's problem in terms of the Distributive Property.**

You can also use area models with algebraic expressions.

2. Draw a model for each expression, and then rewrite the expression with no parentheses.

a. $6(x + 9)$

b. $7(2b - 5)$

c. $-2(4a + 1)$

d. $\frac{x + 15}{5}$

3. Use the Distributive Property to rewrite each expression in an equivalent form.

a. $3(4y + 2)$

b. $12(x + 3)$

c. $-4a(3b - 5)$

d. $-7(2y - 3x + 9)$

e. $\frac{6m + 12}{-2}$

f. $\frac{22 - 4x}{2}$

4 Simplify each expression. Show your work.

a. $-6(3x + (-4y))$

b. $-4(-3x - 8) - 34$

c. $\frac{-7.2 - 6.4x}{-0.8}$

d. $\left(-2\frac{1}{2}\right)\left(3\frac{1}{4}\right) + \left(-2\frac{1}{2}\right)\left(-2\frac{1}{4}\right)$

e. $\frac{\left(-7\frac{1}{2}\right) + 5y}{2\frac{1}{2}}$

5. Evaluate each expression for the given value.
   Then, use properties to simplify the original expression.
   Finally, evaluate the simplified expression.

   a. $2x(-3x + 7)$ for $x = -1\frac{2}{3}$

   b. $\frac{4.2x - 7}{1.4}$ for $x = 1.26$

   c. Which form—simplified or not simplified—did you prefer to evaluate? Why?

6. **A student submitted the following quiz. Grade the paper by marking each correct item with a √ or incorrect item with an X. Correct any mistakes.**

Name Alicia Smith

Distributive Property Quiz

a. $2(x + 5) = 2x + 10$

b. $2(3x - 6) = 6x - 6$

c. $-3x(4y - 10) = -12xy + 30$

d. $5x(3x + 2y) = 15x + 10xy$

e. $\frac{15x + 10}{5} = 3x + 2$

f. $\frac{8x - 4}{4} = 2x + 1$

g. $12x + 4 = 3(4x + 1)$

h. $-2x + 8 = -2(x - 4)$

ACTIVITY
2.3 Factoring Linear Expressions

You can use the Distributive Property to expand expressions, as you did in the previous activity, and to factor linear expressions, as Meaghan did. Consider the expression:

$$7(26) + 7(14)$$

Since both 26 and 14 are being multiplied by the same number, 7, the Distributive Property says you can add 26 and 14 together first, and then multiply their sum by 7 just once.

$$7(26) + 7(14) = 7(26 + 14)$$

You have factored the original expression.

The number 7 is a *common factor* of both 7(26) and 7(14).

A **common factor** is a number or an algebraic expression that is a factor of two or more numbers or algebraic expressions.

1. Factor each expression using the Distributive Property.

a. $4(33) - 4(28)$ **b. $16(17) + 16(13)$**

The Distributive Property can also be used to factor algebraic expressions. For example, the expression $3x + 15$ can be written as $3(x) + 3(5)$, or $3(x + 5)$. The factor, 3, is the *greatest common factor* to both terms.

The **greatest common factor (GCF)** is the largest factor that two or more numbers or terms have in common.

When factoring algebraic expressions, you can factor out the greatest common factor from all the terms.

WORKED EXAMPLE

Consider the expression $12x + 42$.

The greatest common factor of $12x$ and 42 is 6. Therefore, you can rewrite the expression as $6(2x + 7)$.

How can you check to make sure you factored correctly?

It is important to pay attention to negative numbers. When factoring an expression that contains a negative leading coefficient it is preferred to factor out the negative sign.

WORKED EXAMPLE

Consider the expression $-2x + 8$. You can think about the greatest common factor as being the coefficient of -2.

$$-2x + 8 = (-2)x + (-2)(-4)$$
$$= -2(x - 4)$$

2. Rewrite each expression by factoring out the greatest common factor.

a. $7x + 14$

b. $9x - 27$

c. $10y - 25$

d. $8n + 28$

e. $-3x - 27$

f. $-6x + 30$

So, when you factor out a negative number all the signs will change.

Often, especially in future math courses, you will need to factor out the coefficient of the variable, so that the variable has a coefficient of 1.

3. Rewrite each expression by factoring out the coefficient of the variable.

a. $10x - 45$

b. $-2x + 3$

c. $-x + 4$

d. $-x - 19$

NOTES

4. Rewrite each expression by factoring out the GCF.

   a. $-24x + 16y$

   b. $-4.4 - 1.21z$

   c. $-27x - 33$

   d. $-2x - 9y$

   e. $4x + (-5xy) - 3x$

5. Evaluate each expression for the given value. Then factor the expression and evaluate the factored expression for the given value.

   a. $-4x + 16$ for $x = 2\frac{1}{2}$

   b. $30x - 140$ for $x = 5.63$

   c. Which form—simplified or not simplified—did you prefer to evaluate? Why?

NOTES

TALK the TALK

Flexible Expressions

As you have seen, you can rewrite expressions by factoring out a GCF or by factoring out the coefficient of the variable. You can also rewrite expressions by factoring out any value. For example, some of the ways $6x + 8$ can be rewritten are provided.

$2(3x + 4)$ $\quad 6\left(x + \frac{4}{3}\right)$ $\quad -2(-3x - 4)$

$-6\left(-x - \frac{4}{3}\right)$ $\quad \frac{1}{2}(12x + 16)$ $\quad -\frac{1}{2}(-12x - 16)$

Rewrite each expression in as many ways as you can by factoring the same value from each term.

1. $4x - 12$

2. $-3x + 15$

3. $10 - 20y$

4. $-8y + 9$

Assignment

Write

Match each term to the correct example.

1. factor	a. the 6 in $6(x) + 6(3)$
2. coefficient	b. $-6x - 18 = -6(x + 3)$
3. common factor	c. the 4 in $4x + 3$

Remember

The Distributive Property states that if a, b, and c are any real numbers, then $a(b + c) = ab + ac$.

The Distributive Property makes it possible to write numeric and algebraic expressions in equivalent forms by expanding and factoring expressions.

Practice

Use the Distributive Property to rewrite each expression in its equivalent form.

1. $4(x + 3)$
2. $-7(4 - y)$
3. $6(3x + 5y - 4)$
4. $\frac{9a - 3}{3}$
5. $\frac{0.4(0.3m + 0.6n)}{1.2}$
6. $-9\frac{2}{3}(-2\frac{1}{4}a + b + 8\frac{1}{4})$

Rewrite each linear expression by factoring out the greatest common factor.

7. $64x + 24$
8. $-5y - 35$
9. $36 - 8z$
10. $54n - 81$

Rewrite each linear expression by factoring out the coefficient of the variable.

11. $-2x + 5$
12. $3x - 8$
13. $\frac{-1}{2}x + 6$
14. $-x - 10$

Stretch

1. Jack decides to grow and sell bean plants. Let p represent the number of plants he will grow and sell. After considering his expenses, the expression $-3p(p - 10) - 6p(p - 10)$ represents his profit.
   a. Rewrite and simplify the profit expression by factoring out the greatest common factor.
   b. Rewrite the expression in simplest form with no parentheses.

Review

Evaluate each expression for the given value.

1. $-20a - 65$ for $a = 2.7$

2. $-6x + 52$ for $x = 1\frac{1}{6}$

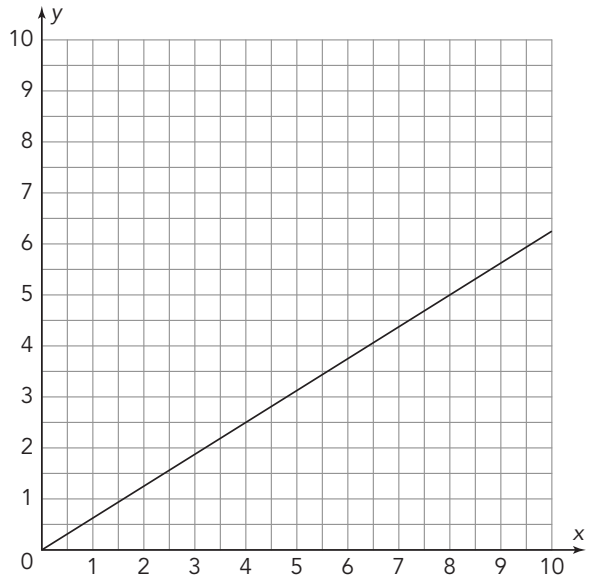
Determine each product.

3. $(-3.472)(0.89)$

4. $\left(-2\frac{7}{8}\right)\left(-4\frac{4}{5}\right)$

Identify the constant of proportionality in each graph and use it to write an equation in the form $y = kx$.

5.



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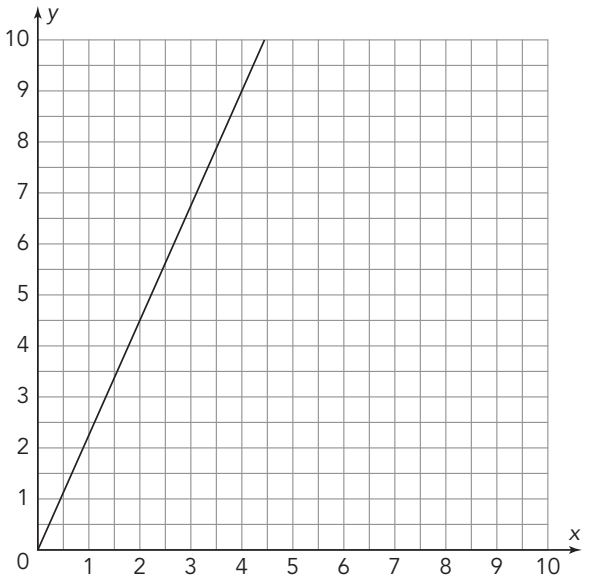


All My Xs

Combining Like Terms

3

WARM UP

Simplify each expression using the Order of Operations.

1. $10 + 8 \div 2(4 + 3)$
2. $21 \div (1)(3) + 0 - 14$
3. $18.2 + 6.1(5) - 3.5$
4. $\frac{3}{4} - \frac{4}{5}(2 - 10)$

LEARNING GOALS

- Model adding and subtracting linear expressions on the number line.
- Determine sums and differences of linear algebraic expressions with rational coefficients.
- Combine like terms to simplify linear expressions and determine sums and differences.
- Write and evaluate algebraic expressions to model situations.
- Rewrite expressions in different forms in context to shed light on how quantities in a problem are related.

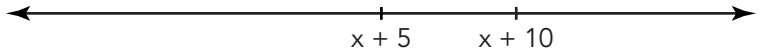
KEY TERMS

- like terms

You have evaluated algebraic expressions and determined equivalent expressions using the Distributive Property. How can you add and subtract algebraic expressions?

Find X

The number line shows the locations of two values, represented by linear algebraic expressions.



1. **Draw and label a tick mark on the number line to locate each expression given. Explain the reasoning you used to determine the location.**

   a. x

   b. $x + 15$

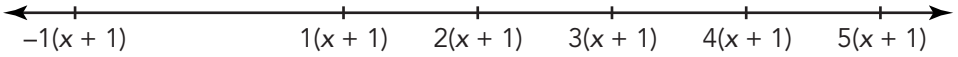
   c. $x - 5$

ACTIVITY
3.1

Combining Like Terms in Linear Expressions

NOTES

The number line shows the locations of six values, represented by linear expressions.



1. **Determine the distance between 3(x + 1) and 1(x + 1) on the number line. Describe the reasoning you used to determine the distance.**

Like terms are parts of an algebraic expression that have the same variable expression. For example, in the expression $5(x + 2) + 3 - 2(x + 2)$, the terms $5(x + 2)$ and $2(x + 2)$ are like terms. The coefficients, 5 and 2, are different, but the variable expression is the same $(x + 2)$.

NOTES

When you operate with like terms, you can combine like terms before doing other operations.

WORKED EXAMPLE

Rewrite the expression $5(x + 2) + 3 - 2(x + 2)$ by combining like terms.

$3 + 5(x + 2) - 2(x + 2)$	You can rewrite the expression using the Commutative Property of Addition.
$3 + 3(x + 2)$	Combine the like terms.

2. Use the worked example to answer each question.

a. How is the Commutative Property used to rewrite the expression?

b. How are the like terms in the expression combined?

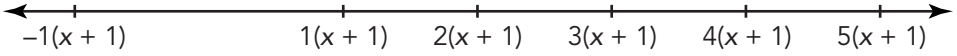
3. Consider the expressions $3(x + 1)$ and $1(x + 1)$ from Question 1.

a. Explain how these two expressions can be "like terms."

b. How did you combine like terms to determine the distance between the expressions? Use the number line to explain your reasoning.

4. **First, use the number line to determine the distance between the given expressions. Then write an expression and show how combining like terms produces the same result.**

The number line given is separated into intervals of $(x + 1)$.



   a. **Determine the distance between $5(x + 1)$ and $2(x + 1)$.**

   b. **Determine the distance between $1(x + 1)$ and $-1(x + 1)$.**

5. **Explain why Kaitlyn's reasoning is incorrect. Then rewrite the expression correctly.**

Kaitlyn

$7 - 5(x + 1)$ is the same as $2(x + 1)$, because $7 - 5 = 2$.

6. **Simplify each expression by combining like terms.**

   a. $5(x + 2) + 2(x + 2)$

   b. $5(x + 2) - 2(x + 2)$

ACTIVITY
3.2

Combining Like Terms with Decimal and Fractional Coefficients

You can combine like terms to determine prices with discounts and with sales tax.

For example, suppose a new toy that is regularly priced at $26.99 is on sale for $\frac{3}{4}$ off.

1. **Write an expression to represent the price of the toy, *p*, minus $\frac{3}{4}$ of the price. Then, combine like terms to simplify the expression.**

2. **Explain what the simplified expression means in terms of the original price of the toy.**

A new shirt costs $18.99. The sales tax is 5%.

3. **Write an expression to represent the cost of the shirt, *s*, plus 5% of the cost. Then, combine like terms to simplify the expression.**

4. **Explain what the simplified expression means in terms of the original cost of the shirt.**

5. **Write and simplify an algebraic expression to represent each situation.**

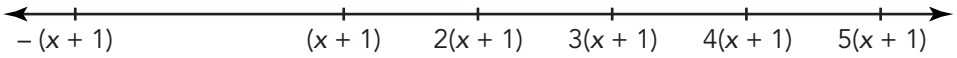
   a. **An 18% tip is given for a meal. What expression represents the total cost with tip?**

   b. **A pair of shoes is advertised as $\frac{1}{4}$ off. What expression represents the total cost after the discount?**

   c. **A new bike is discounted 35%. What expression represents the total cost?**

ACTIVITY
3.3 Adding the Opposite to Subtract

Sasha was able to combine like terms to determine the distance between $3(x + 1)$ and $(x + 1)$ on the number line. She knew that the distance was $2(x + 1)$.



But when she showed her work using the Distributive Property, she got the wrong answer.

Sasha

$3(x + 1) - (x + 1)$

$3x + 3 - x + 1$

$3 + 3x - x + 1$

$3 + 2x + 1$

$2x + 4 = 2(x + 2)$

1. **Julian said that Sasha made a mistake when subtracting $(x + 1)$. He said that subtracting $(x + 1)$ is the same as adding the opposite of $(x + 1)$.**

   a. **What is the opposite of $(x + 1)$? Write your answer without parentheses.**

   b. **Show Sasha how adding the opposite produces the correct answer.**

Simplify each expression. Use the Order of Operations.

2. $30x - 140 - (x - 4)$

3. $10 - 5(-2r - 13) - 7r$

4. $-4x - 5(2x - y) - 3y$

5. $7.6p - 3.2(3.1p - 2.4)$

6. $3\frac{2}{3}p - 1\frac{3}{4}(4p - 2\frac{1}{7})$

2x and 2y are not like terms because they don't have the same variable.

NOTES

TALK the TALK

Business Extras

Katie is starting a limousine rental company. As part of her research, Katie discovers that she must charge a 7% sales tax to her customers in addition to her rental fees.

1. **Write an algebraic expression that represents how much tax Katie should collect for any amount of rental fee.**

Katie also discovers that most limousine rental companies collect a flat gratuity from customers in addition to the rental fee. Katie decides to collect a gratuity of $35 from her customers.

2. **Write an expression that represents the total amount of additional money to be collected for tax and gratuity.**

3. **Write an expression that represents the total cost of any rental.**

4. **Use one of your expressions to calculate the amount of tax and gratuity Katie should collect if the rental fee is $220.**

5. **Use one of your expressions to calculate the total cost of a rental if the rental fee is $365.**

Assignment

Write

Write a definition of *like terms* in your own words. Use an example to illustrate your definition.

Remember

Use the Order of Operations to simplify expressions.

1. Simplify expressions in parentheses.
2. Simplify powers.
3. Multiply and divide from left to right.
4. Add and subtract from left to right.

Practice

Simplify each expression by combining like terms.

1. $6x + 4x$
2. $-5y + 2y$
3. $-3m - 8(m + 1)$
4. $-8(r - 2) + 6(r - 2)$
5. $9m - 7m + 13$
6. $4a + 8b$
7. $2(x + 3) + 4(x - 3)$
8. $6 - 2(3x + 4)$
9. $4.5x + 2.5(x - 4)$
10. $3.1 - 4.9(x + 1)$

11. Identify the expression or expressions equivalent to $-5 + 4(-2x + 6) - 3x$.
    a. $-8x + 19 - 3x$
    b. $5x - 29$
    c. $-11x + 19$
    d. $-5x - 19$

Stretch

Sonya is renting a car. She pays a fee of $50 for the rental plus $20 each day she has the car. Suppose she pays a total of $130. For how many days did she rent the car?

Review

Rewrite each expression using the Distributive Property.

1. $5x + 11x$
2. $-2(x - 5)$

Determine each product or quotient.

3. $-\frac{2}{3} \times \frac{1}{5}$
4. $-\frac{1}{8} \div 4$

Solve for the unknown in each proportion. Round to the nearest tenth.

5. $\frac{4.1}{42} = \frac{x}{12}$
6. $\frac{9.7}{1.4} = \frac{5.2}{y}$

Topic 1

Algebraic Expressions

Name _____ Date _____

I. Evaluating Algebraic Expressions

A. Define a variable and write an algebraic expression for each problem. Evaluate the expression for the given values.

1. The charge for ice skating is $3 for the skate rental and $2 per hour to skate. How much will you pay if you skate for:

a. 2 hours?

b. 4 hours?

c. 3 1/2 hours?

2. A birthday party at the skating rink costs $60 to reserve a party area and $2.50 per guest for skating and skate rental. How much will a party cost if you invite:

a. 8 guests?

b. 15 guests?

c. 40 guests?

3. You have $20 to spend at the snack bar. All of the snacks at the snack bar cost $1.25. How much money will you have left if you buy:

a. 2 snacks?

b. 7 snacks?

c. 12 snacks?

4. The zamboni can resurface 1200 square feet per minute. How many minutes will it take the zamboni to resurface the entire rink if its dimensions are:

a. 80 ft $\times$ 300 ft?

b. 75 ft $\times$ 160 ft?

c. 100 ft $\times$ 210 ft?

5. The skating rink is running a promotion on skating lessons. For every twelve lessons you take, you get one free lesson. If you have already taken 7 lessons, how many free lessons will you get if you take:

a. 5 more lessons?

b. 29 more lessons?

c. 53 more lessons?

6. One lap around the skating rink is about 500 feet and the length is 175 feet. How far will you skate if you skate:

a. the length 4 times plus 10 laps?

b. the length 3 times plus 16 laps?

c. the length 6 times plus 25 laps?

7. A taxicab company charges $4.50 for each trip plus an additional $2.50 per mile traveled. How much will the company charge if the trip is:

a. 5 miles?

b. 16 miles?

c. 12.5 miles?

8. Colleen has a prepaid phone card with $40 on it. It costs her $0.09 for each minute she spends on the phone. How much money will be left on the card if Colleen speaks for:

a. 15 minutes?

b. 60 minutes?

c. 150 minutes?

9. Ty puts 9 sports cards each on the front and back page of each page in his card album. How many pages are in Ty's album if he has:

a. 90 cards?

b. 144 cards?

c. 180 cards?

10. There are 5 gallons of lemonade in a container. Sylvia fills glasses with $\frac{1}{8}$ of a gallon of lemonade from the container. How many gallons of lemonade are left in the container if Sylvia fills:

a. 7 glasses?

b. 20 glasses?

c. 32 glasses?

11. A county fair costs $8 to enter plus an additional $1.50 per ticket for rides and food. What is the total cost for a visit to the fair if you purchase:

a. 8 tickets?

b. 25 tickets?

c. 40 tickets?

12. The temperature when you got up this morning was −4 degrees Celsius. The temperature is predicted to increase by 2 degrees every hour. What will the temperature be after:

a. 2 hours?

b. 5 hours?

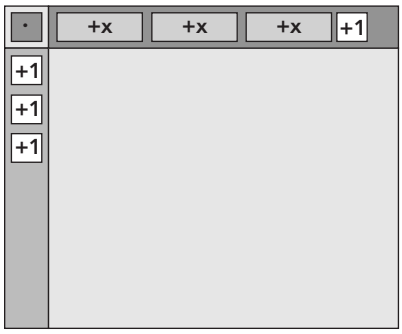
c. 8 hours?

Name _____ Date _____

II. Multiplying and Factoring Linear Expressions

A. For each model, write the two factors that are multiplied. Then, write the product.

1.



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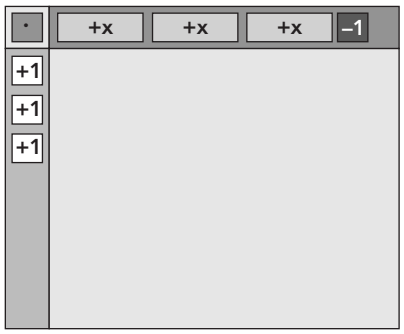

3.

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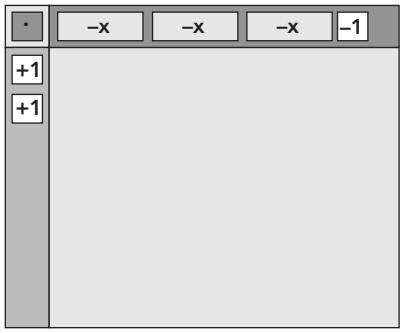

7.


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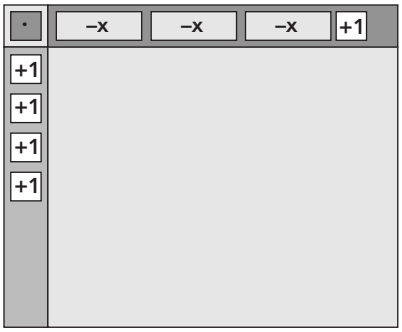
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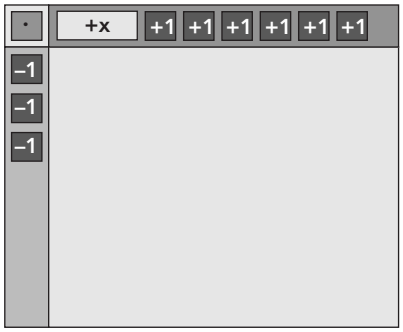
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Name _____ Date _____

B. Complete each statement to generate equivalent expressions.

1. $12 + 6x =$ _____ $(4 +$ _____$)$

2. $-10x - 15 =$ _____ (_____ $+ 3)$

3. $-6 - 6x =$ _____ $(2 +$ _____$)$

4. $4x - 20 =$ _____ (_____ $- 5)$

5. $-18 - 12x =$ _____ $(3 +$ _____$)$

6. $-24x + 15 =$ _____ (_____ $- 5)$

7. $24 + 64x =$ _____ $(3 +$ _____$)$

8. $54x - 81 =$ _____ (_____ $- 3)$

9. $-5x - 35 =$ _____ (_____ $+ 7)$

10. $36 - 8x =$ _____ $(9 -$ _____$)$

11. $-60x + 35 =$ _____ (_____ $- 7)$

12. $33 - 3x =$ _____ $(11 -$ _____$)$

III. Simplifying Algebraic Expressions

A. Simplify each expression completely by combining like terms, using number properties, and using the Order of Operations.

1. $-4x - 4 \div 9$

2. $2 - (4(-2)x \div -2)$

3. $-3 + 1(-6)x - 7x$

4. $-2x + 9x \cdot 7 + 36$

5. $5x + (6x \div -9)$

6. $-2x(8 + 3 \cdot 4)$

7. $-3x \cdot 9 + 4 \div 4 - 8$

8. $5x + 8(-8x - 3)$

9. $5x - 3x \cdot 3 - 25$

10. $3x + 8x(-6 + 1)$

11. $-2x(-25) - 3 \div 2^2 + 1$

12. $9x - \frac{9 \cdot 6x}{18}$

1

Picture Algebra

Modeling Equations as Equal Expressions

WARM UP

Write each phrase as a mathematical expression.

1. the sum of 6 less than a number and 3
2. the distance between a number and 2 on the number line
3. half as many as 7 more than a number
4. an amount, shared equally with 5 people

LEARNING GOALS

- Create and interpret pictorial models to represent equal expressions.
- Write an equation to represent a situation and interpret the parts of the equation.
- Solve word problems leading to equations of the form $px + q = r$.

KEY TERM

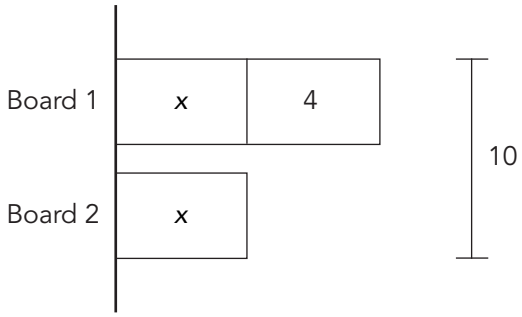
- equation

You have learned about both numeric expressions and algebraic expressions. How can you model situations using equal algebraic expressions?

In the Dog House

To build a dog house, you and your friends cut a 10-foot board into two boards. One of the boards is 4 feet longer than the other. How long is each board?

You can draw a bar model to represent a situation like this.



1. **Explain what each part of the model represents in terms of this situation.**

   a. **What does the number 4 represent?**

   b. **What does the variable *x* represent?**

   c. **What does the number 10 represent?**

2. **Use the model to explain what each expression means in terms of this situation.**

   a. **What does the expression 2*x* represent?**

   b. **What does the expression 2*x* + 4 represent?**

3. **How long is each board?**

ACTIVITY
1.1 Creating a Model to Represent Equal Expressions

Fido and Jet are two small dogs. Fido weighs exactly 10 pounds more than Jet. Together, they weigh exactly 46 pounds.

1. **Draw a bar model to represent this situation. Let *j* equal Jet's weight.**

2. **Use your model to explain what each expression represents in terms of the situation.**

   a. **What does the expression 46 represent?**

   b. **What does the expression $2j$ represent?**

   c. **What does the expression $j + 10$ represent?**

   d. **What does the expression $2j + 10$ represent?**

3. **How much does each dog weigh? Use the model to help you solve the problem.**

ACTIVITY
1.2 Creating a Model to Solve an Equation

You and your friends Jamal and Carla decide to make some money during summer vacation by building and selling dog houses. To get the business started, Jamal contributes $25.55, and Carla contributes $34.45 to buy equipment and materials. You all agree that each person will earn the same amount of money after Jamal and Carla get back what they invested. Your business earns a total of $450.

1. **Draw a bar model to represent this situation.**

2. **Compare your models with your classmates' models.**

   a. **What unknown quantity or quantities are represented in the model?**

   b. **What algebraic expressions can you write to represent different parts of the situation?**

You can represent the model you drew as a mathematical sentence using operations and an equals sign. An **equation** is a mathematical sentence created by placing an equals sign (=) between two expressions.

3. **Write an equation to show that the total amount that you, Carla, and Jamal earn, including the amounts Carla and Jamal invested, is equal to $450.**

4. **Describe how the different parts of the equation are represented in the model and in the situation.**

5. **How much money does each person get at the end of the summer? Use your model to solve the problem.**

6. **Explain how the solution is represented in the equation.**

Remember, the solution to an equation is a value for the unknown that makes the equation true.

ACTIVITY
1.3 Solving Addition Equations

In a small town, there are two main sections called the Hill Section and the Lake Section. The town has a population of 3496. The number of people who live in the Hill Section is 295 more than twice the number of people who live in the Lake Section.

1. **Draw a bar model to represent this situation.**

2. **Use your model to write an equation that represents the situation.**

3. **How many people live in each section of town? Use your model to help you solve the problem.**

4. **Explain how the solution is represented in the equation.**

The members of a small town's local arts council are selling raffle tickets. The art council decides that the top three raffle ticket sellers will share a portion of the profits. The second-place seller will receive twice as much as the third-place seller. The first-place seller will receive $20 more than the second-place seller. The profit portion they will share is $200.

5. **Draw a bar model to represent this situation.**

6. **Use your model to write an equation that represents the situation.**

7. **How much will each of the top three sellers receive? Use your model to help you solve the problem.**

8. **Explain how the solution is represented in the equation.**

ACTIVITY
1.4
Solving a Subtraction Equation

Drew is 3 years younger than his brother, Jimmy. The sum of the brothers' ages is 21.

1. **Draw a bar model to represent this situation.**

2. **Use your model to write an equation that represents the situation.**

3. **How old are Jimmy and Drew? Use your model to help you solve the problem.**

4. **Explain how the solution is represented in the equation.**

NOTES

TALK the TALK

Consider the Possibilities!

Think about all the equations you modeled and solved in this lesson.

- $2x + 4 = 10$
- $2j + 10 = 46$
- $3x + 60 = 450$
- $3p + 295 = 3496$
- $5p + 20 = 200$
- $2j - 3 = 21$

1. How are all of these equations similar in structure?

2. What does it mean to solve an equation?

Assignment

Write

Write a definition for *equation* in your own words. Use an example to illustrate your definition.

Remember

The solution to an equation is a value for the unknown that makes the equation true.

Practice

1. The Sharks Aquatic Club recently held a fundraiser to raise money for a local charity. The swimmers received money for each lap that they swam during a one-week period. The three swimmers who raised the most money were Rita, John, and Rodell. Together they swam a total of 2125 laps. John swam three times as many laps as Rita, and Rodell swam 25 more laps than John. How many laps did each swimmer swim?
   a. Draw a picture to represent the situation. Label the unknown parts with variables and the known parts with their values.
   b. Determine the number of laps each person swam using the picture you created. Explain your reasoning.
   c. Write an expression for the number of laps each person swam. Let L represent the number of laps swum by Rita.
   d. Write an equation to represent this situation.
   e. If the swimmers received \$2 for every lap they swam, how much did each swimmer earn for charity?

Stretch

Describe how to solve any equation in the form $ax + b = c$ for the variable x.

Review

1. Simplify each expression by combining like terms.
   a. $3b + 2 + b$
   b. $\frac{1}{2}(h + 4) - \frac{1}{8}(h + 4)$

2. Rewrite each linear expression by factoring out the GCF.
   a. $25x - 5$
   b. $9n + 36$

3. A salesperson receives 12% commission on all the sales that she makes. Calculate the commission on each sale.
   a. A quarter-page ad for \$250.00
   b. A full-page ad for \$800.00

Topic 1

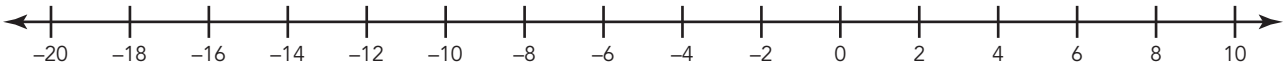
Adding and Subtracting Rational Numbers

Name _____ Date _____

I. Using Number Lines to Add and Subtract Integers

A. Represent each sum or difference on the number line. Then, write the sum or difference.

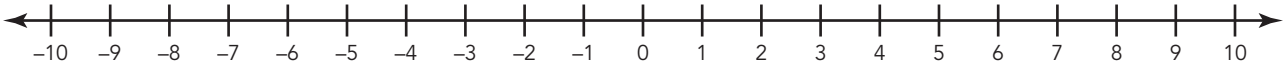
1. $-13 + 1$



2. $11 - (-3)$

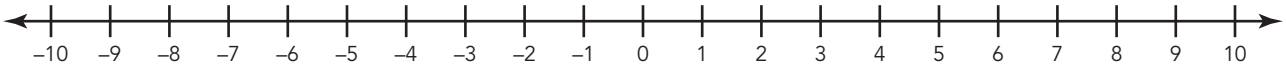
3. $4 + (-4)$

4. $-6 + 3$

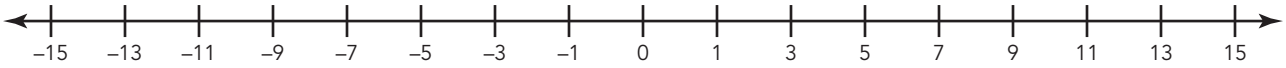


5. $11 + (-5)$

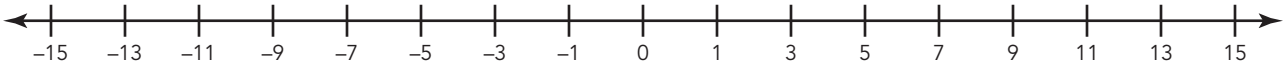
6. $4 + (-5)$



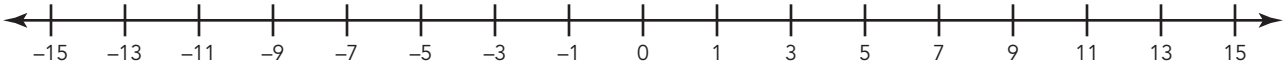
7. $-7 - 4$



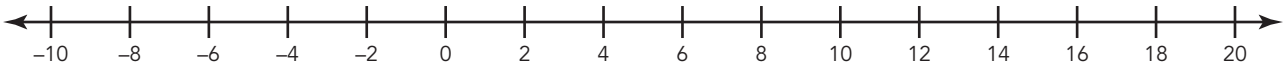
8. $2 - (-10)$



9. $-9 - (-2)$

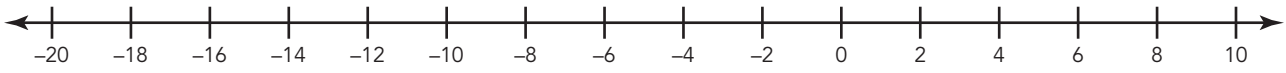


10. $8 - 12$

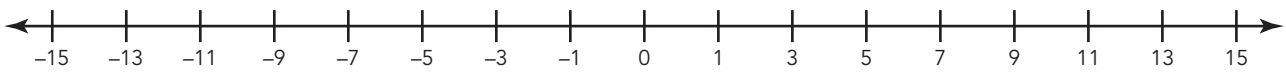


Name _____ Date _____

11. −5 + (−9)



12. −5 − 7



II. Adding and Subtracting Negative Integers

A. Determine each sum.

1. 0 + (−5)

2. −5 + (−4)

3. −1 + (−10)

4. 7 + (−2)

5. 18 + (−20)

6. 6 + (−6)

7. −10 + 4

8. −2 + 16

9. −11 + (−6)

10. 4 + (−6)

11. 20 + (−10)

12. −5 + (−3)

B. Determine each difference.

1. $0 - (-7)$

2. $-2 - (-12)$

3. $7 - (-2)$

4. $-3 - (-3)$

5. $-10 - (-5)$

6. $10 - (-6)$

7. $12 - (-8)$

8. $-8 - 14$

9. $-10 - 4$

10. $6 - (-9)$

11. $-1 - (-8)$

12. $3 - 15$

C. Complete each number sentence with $+$ or $-$.

1. $7 \_\_\_\_ (-7) = 0$

2. $-4 \_\_\_\_ (-4) = 0$

3. $2 \_\_\_\_ (-2) = 0$

4. $13 \_\_\_\_ (-13) = 0$

5. $-9 \_\_\_\_ (-9) = 0$

6. $-1 \_\_\_\_ (-1) = 0$

D. Determine each sum or difference.

1. $1 + (-4)$

2. $-4 + (-1)$

3. $-3 - (-11)$

4. $11 + (-1)$

Name _____ Date _____

5. $6 + (-10)$

6. $5 + (-12)$

7. $8 - (-14)$

8. $-8 - (-5)$

9. $-8 + (-5)$

10. $-19 - 3$

11. $-4 + (-3)$

12. $17 - (-1)$

III. Adding and Subtracting Rational Numbers to Solve Problems

A. Sketch a model to estimate. Then, determine each solution and write an equation.

1. The temperature in Chattanooga, Tennessee, is $-3°C$. The temperature in Sam's hometown is 18 degrees colder than that. What is the temperature in Sam's hometown?

2. Catherine owes $22.50 on her lunch account balance. She pays $15 toward her balance. What is the status of her lunch account balance now?

3. The Subterranean roller coaster rises up to 50.6 feet above the ground before dropping 100.7 feet into an underground cavern. Describe the height of the roller coaster at the bottom of the cavern.

4. To qualify to compete in the high jump finals, athletes must jump a certain height in the semi-finals. Jon jumped $1\frac{5}{8}$ inches below the qualifying height, but his friend Anthony made it to $2\frac{1}{4}$ inches over the qualifying height. How much lower was Jon's semi-final jump compared with Anthony's?

5. A drilling crew dug to a height of $-32\frac{3}{4}$ feet during their first day of drilling. On the second day, the crew dug down $19\frac{2}{3}$ feet more than on the first day. Describe the height of the bottom of the hole after the second day.

6. The freezing point of helium is -458 degrees Fahrenheit. If you increase that temperature by 569.7 degrees Fahrenheit, you reach the freezing point of phosphorus. What is the freezing point of phosphorus?

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 should be incorporated into the design. Roller coasters

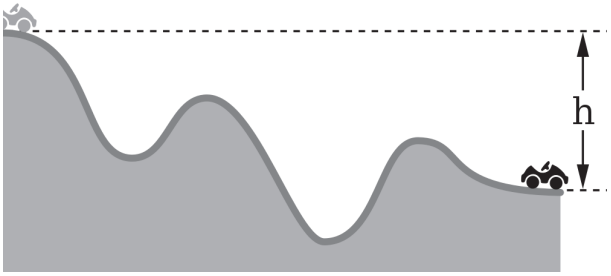
take up a lot of space, and a new coaster might have to be threaded around the existing rides and landscaping in an established park.

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

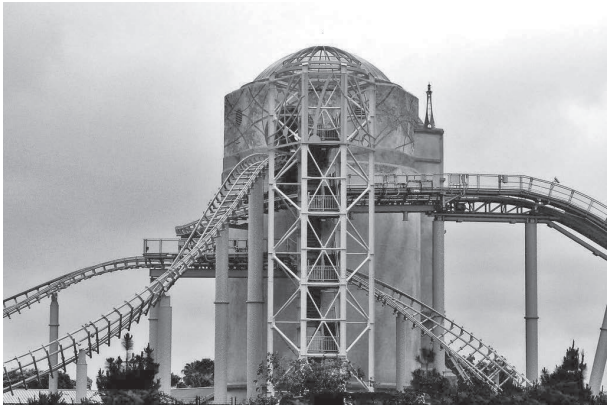
If you enjoy studying physics (and who doesn't), there are few more exhilarating classrooms than roller coasters. Roller coasters are driven almost entirely by basic inertial, gravitational and centripetal forces. All these are manipulated in the service of a great ride. Amusement parks keep upping the 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

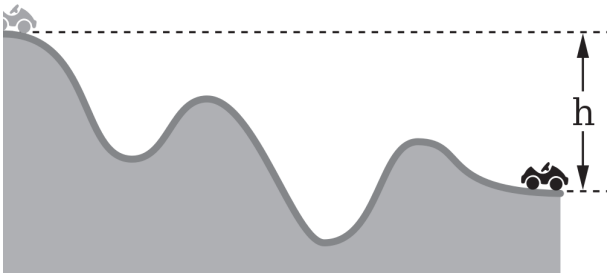
this phenomenon all the time. Think about driving your car, riding your bike or pulling your sled to the top of a big hill. The potential energy you build going up the hill can be released as kinetic energy — the energy of motion that takes you down the hill.



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

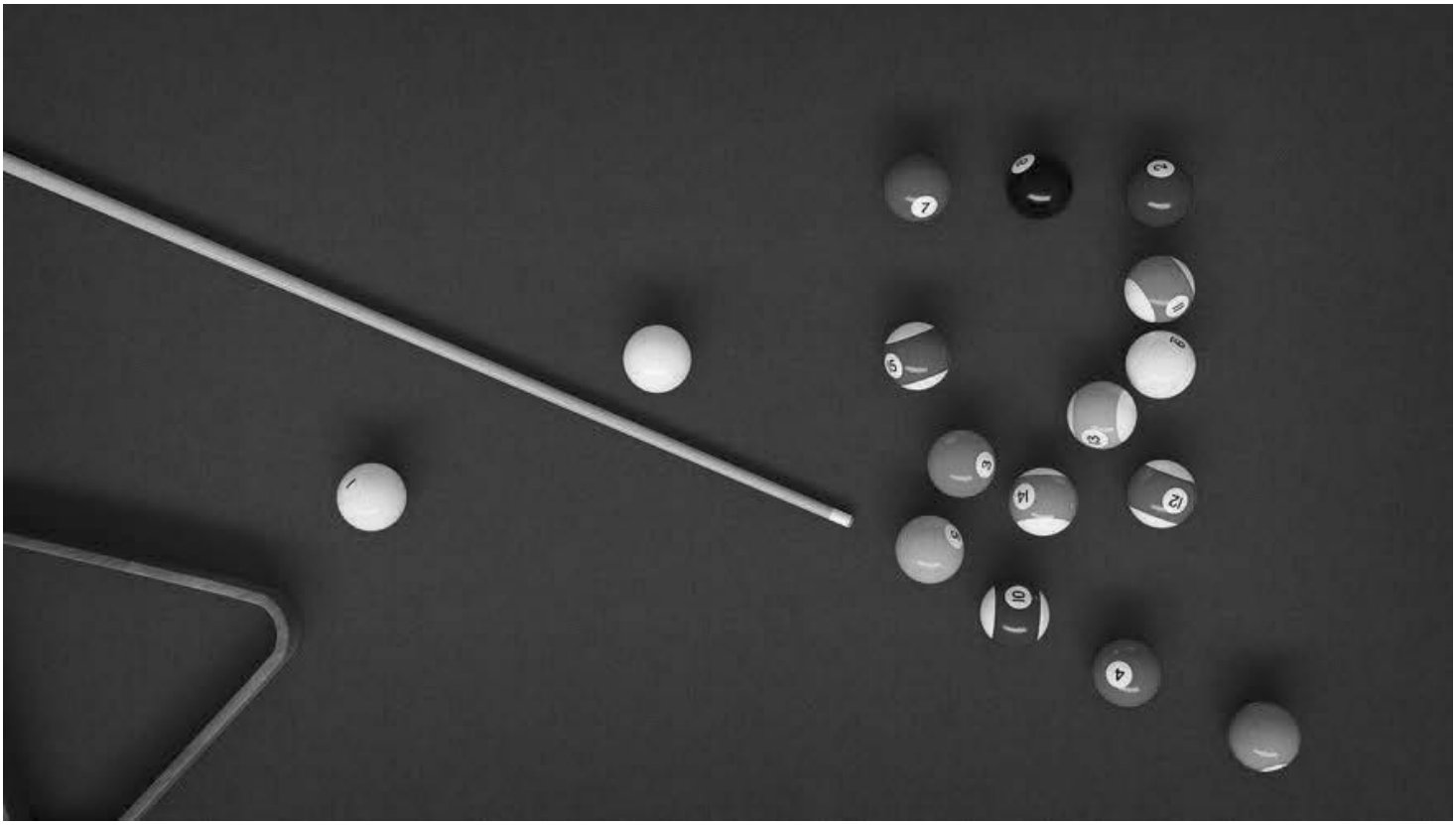
(B) the initial ascent of the coaster is not as important as the other ascents on the ride

(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

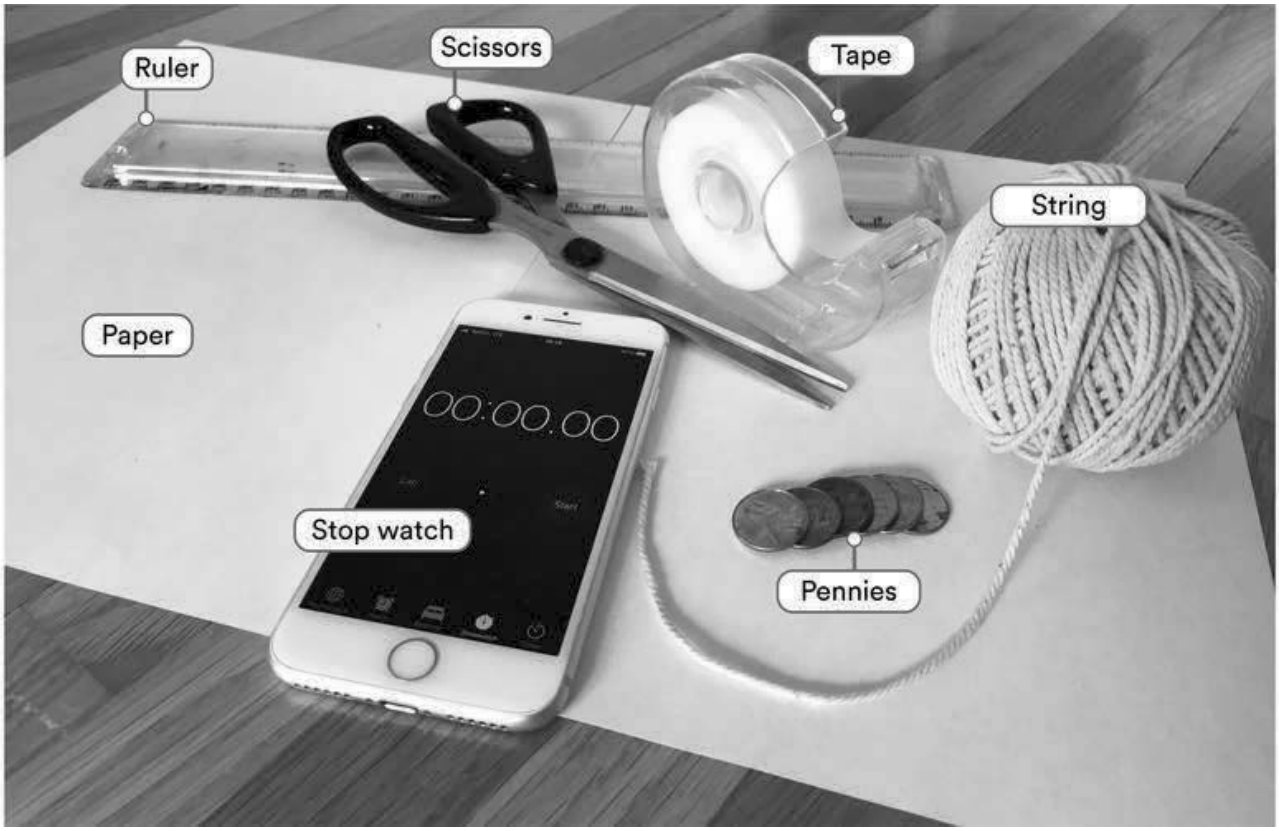
(B) to provide an example of chemical energy

(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

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.

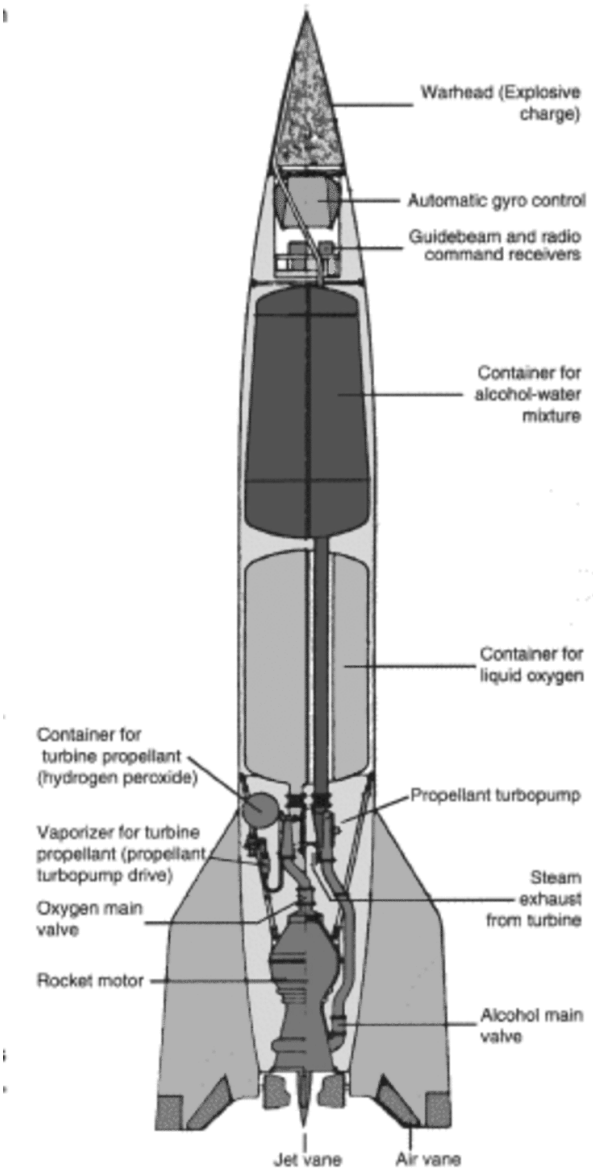
Goddard's experiments continued for many years. He developed a parachute system to return rockets and instruments safely after flight. For his achievements, Goddard has been called the father of modern rocketry.

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.

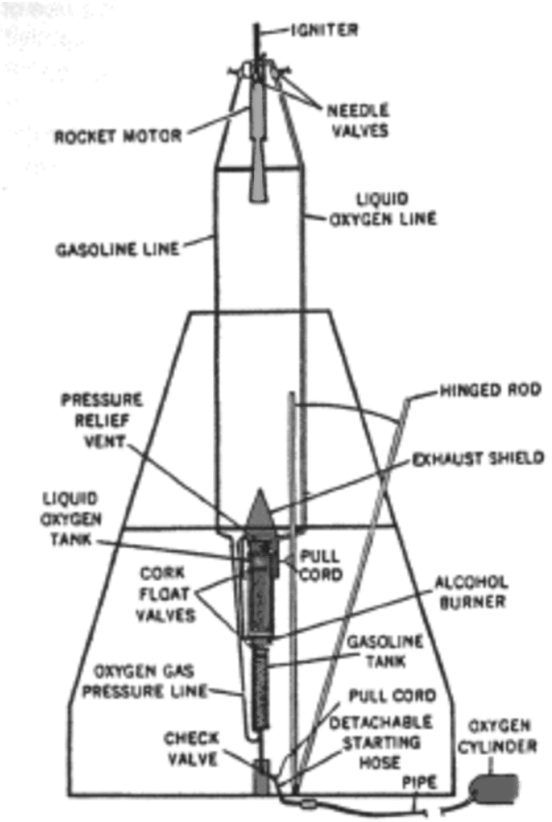
The V-2 rocket was small, but it could destroy entire city blocks. Fortunately, the V-2 came too late in the war to help the Germans win. With the fall of Germany, many German rocket scientists moved to the United States or to the Soviet Union. What followed was an intense period of competition between 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

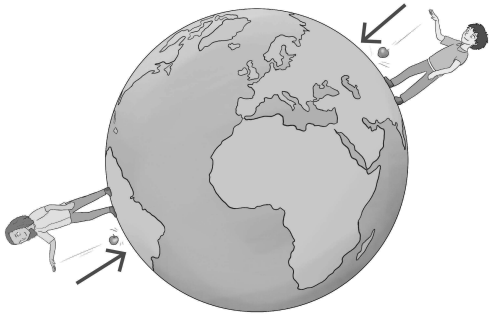
Gravity is a force, which means that it pulls on things. But the Earth isn't the only thing which has gravity. In fact, everything in the universe, big or little, has its own pull because of gravity – even you.

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

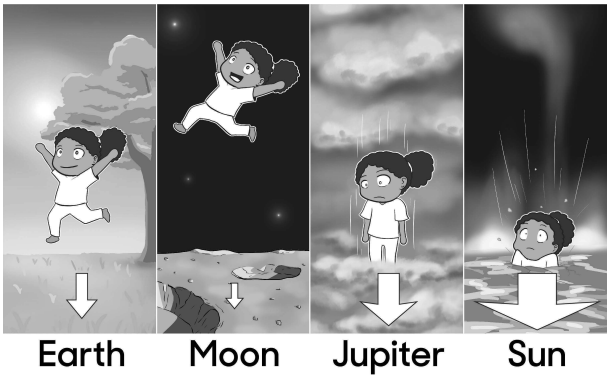
the football – so it's unaffected by the pull of the football, while the football itself is pulled back down to Earth.



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 moon – 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

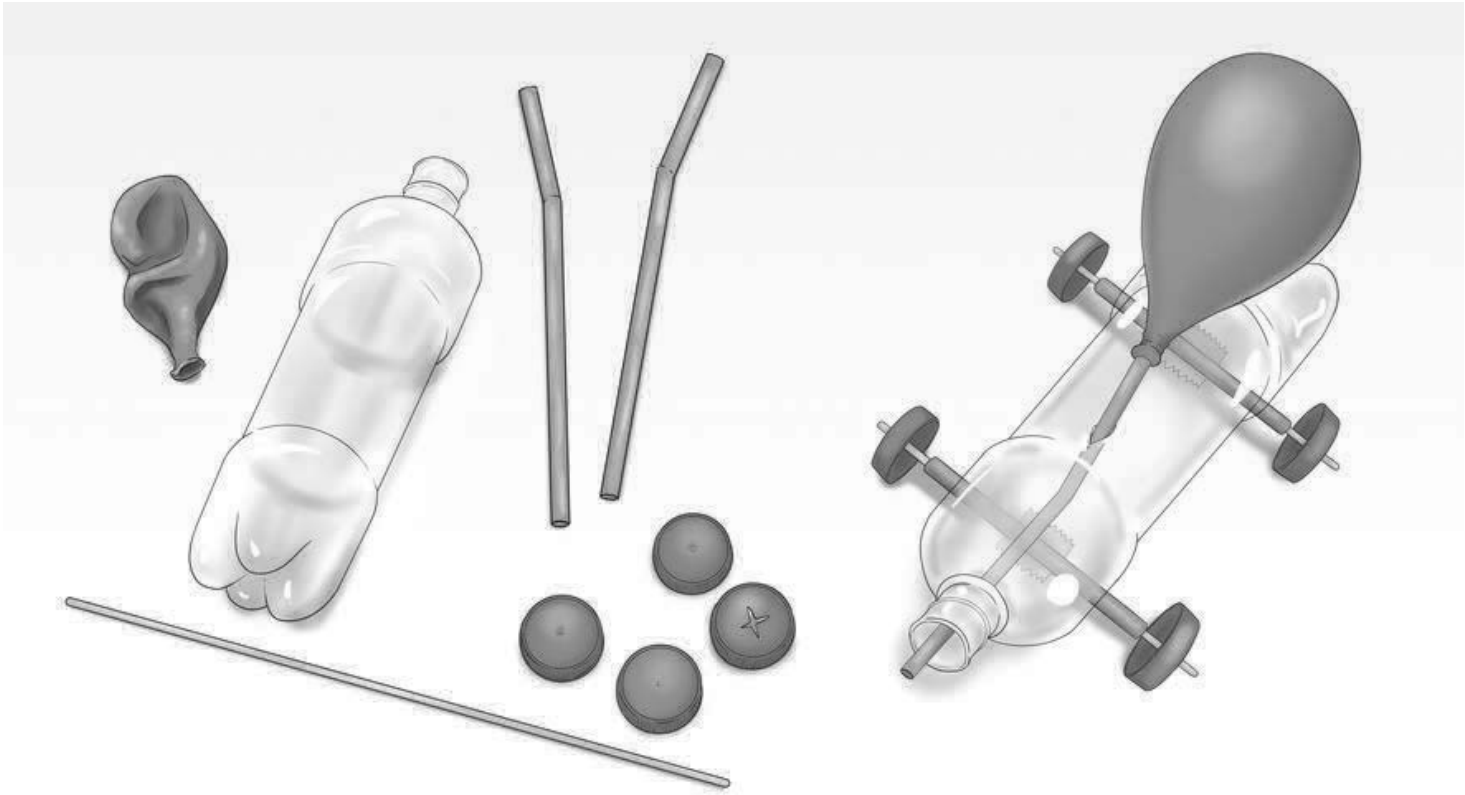
(B) slowly; really

(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.

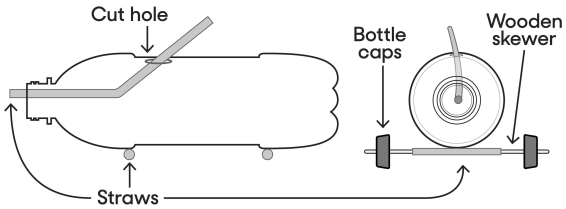
2. Tape both pieces of the straw to one side of the water bottle.

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

Explaining energy transfer and transformation

By National Geographic Society, adapted by Newsela staff on 09.12.19

Word Count **769**
Level **940L**

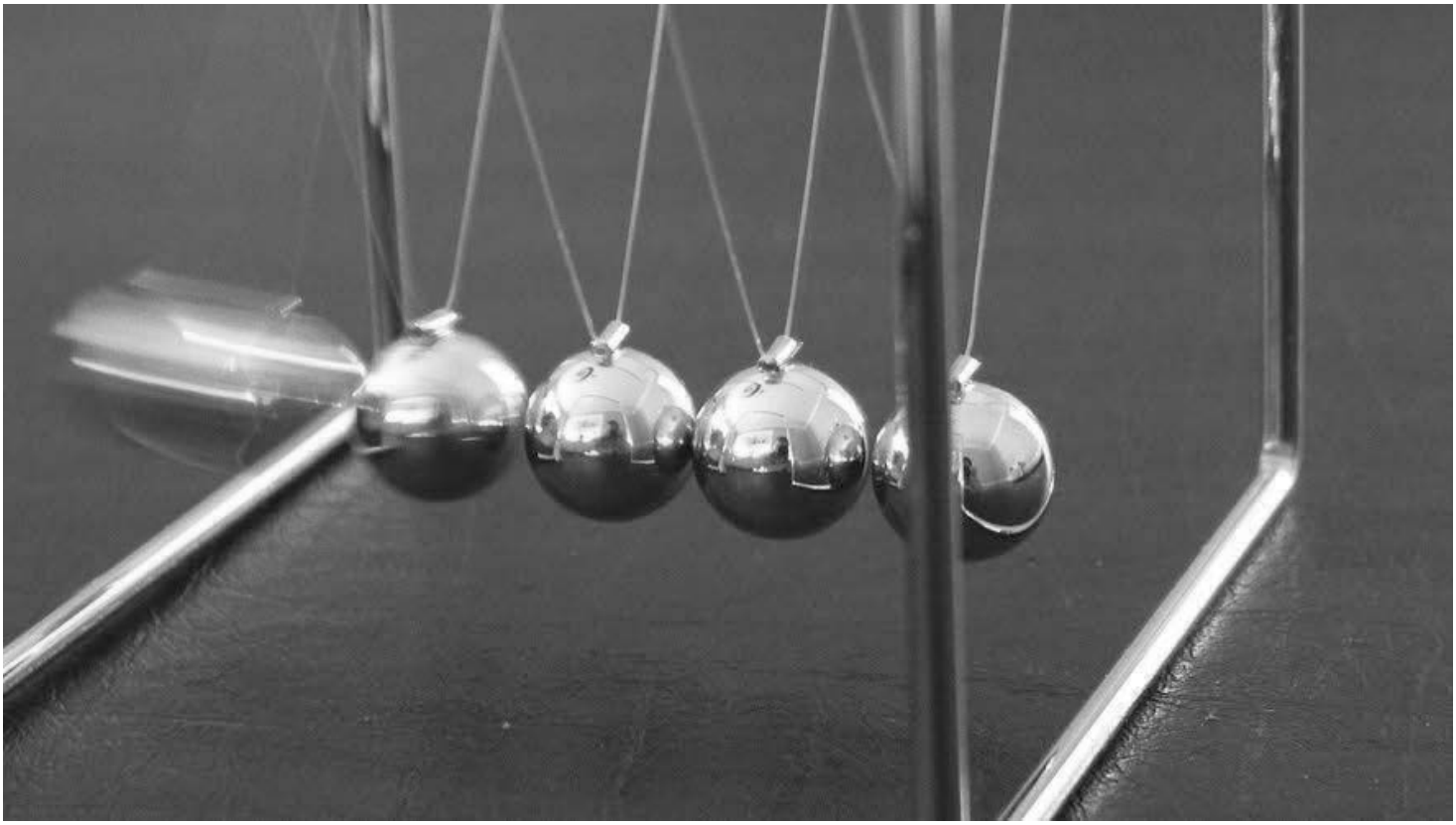


Image 1. Newton's cradle is a device that demonstrates the transfer of kinetic energy. Photo from: Wikimedia Commons

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.

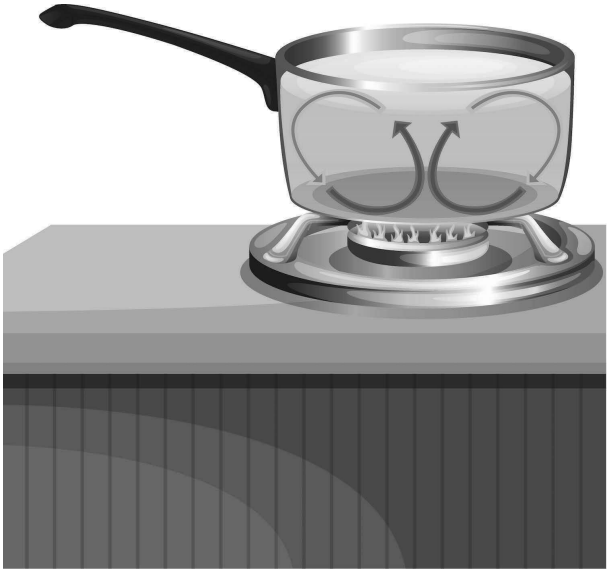
Solids, liquids and gases can all conduct heat. Conduction happens when particles bump into each other. Consider a cold metal spoon in a hot cup of coffee: The molecules in the coffee move freely and the metal molecules in the spoon vibrate. Since the coffee is hotter than the spoon, its molecules move 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.

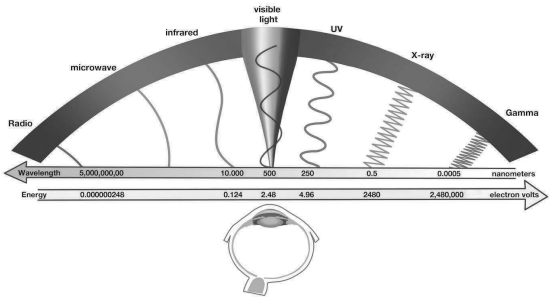
Hotter, less-dense water begins to rise and takes the place of colder, denser water at the top. The colder, denser water sinks to the bottom. There, it is heated and the cycle gets repeated. The repeated movements of water are called convection currents. As time goes on, more of these convection currents 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

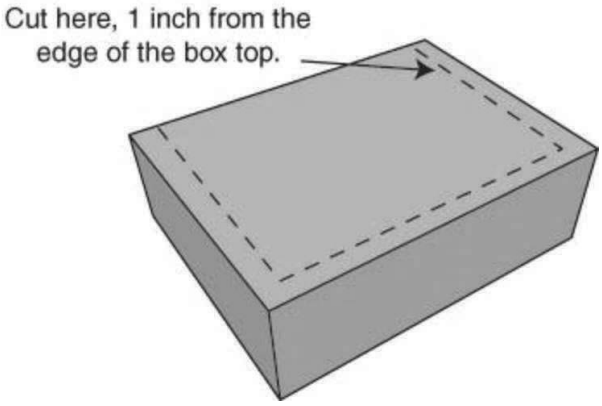
Large marshmallows

Plain chocolate bars (thin)

Aluminum pie pan

Napkins!

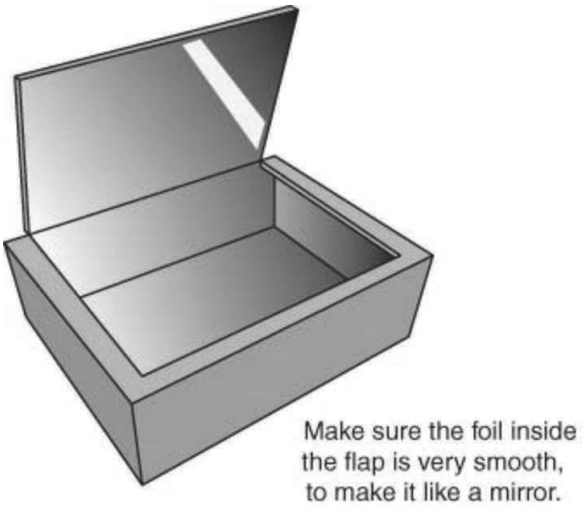
How To Make It



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.

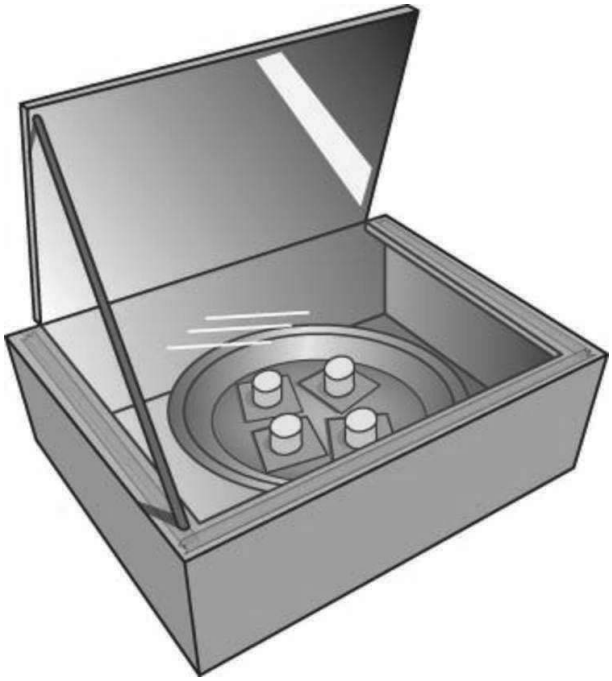
8. Place the pan in the pre-heated solar oven.

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.

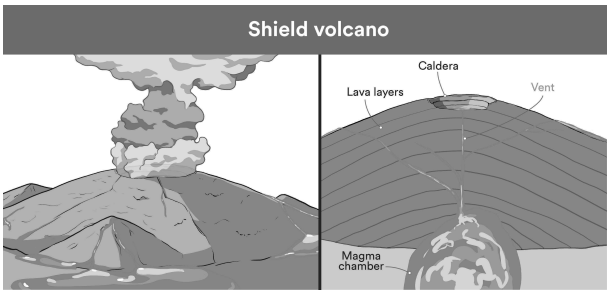
Submarine volcanoes erupt into water instead of air. For this reason, they behave quite differently than volcanoes on land. For example, it is uncommon for submarine volcanoes to have explosive eruptions. The weight of the water above them creates very high pressure. Instead of explosive eruptions, the 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.

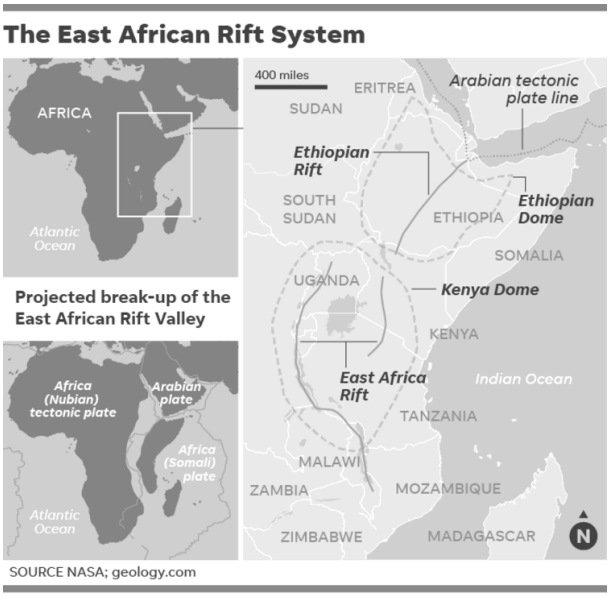
The tear continues to grow. It collapsed part of a highway. Lucia Perez Diaz is a postdoctoral researcher on tectonic plates. She works at the Royal Holloway, University of London. The crack "was accompanied by seismic activity in the area," said Lucia Perez Diaz.

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

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?

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 Forests

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, they'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

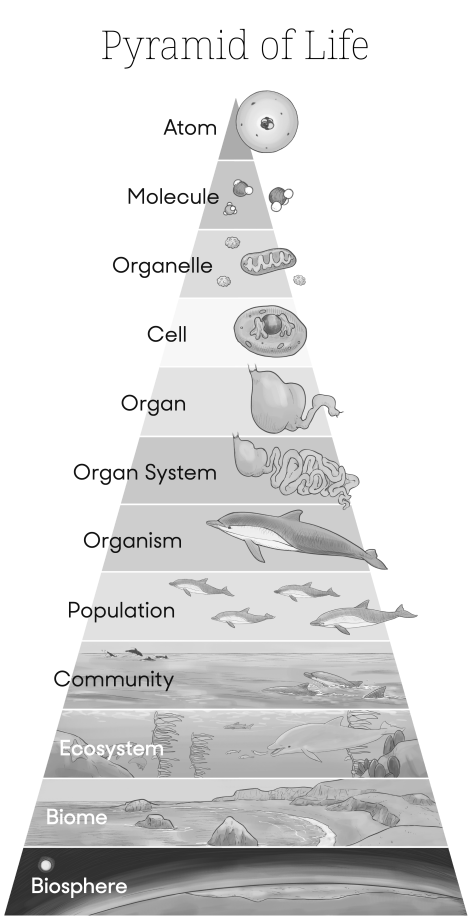
When you look at a pyramid, you'll notice that its broad base gradually narrows as it extends upward. The same holds true for the organization of life on Earth. At the base of this hierarchical structure is the most inclusive level of organization, the biosphere. As you climb the pyramid, the levels 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.

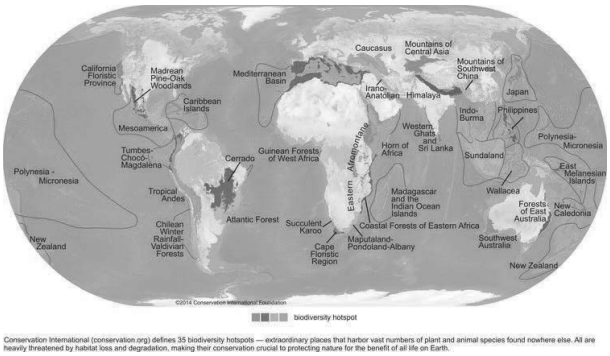
Atom: Finally, there is the ever-so-tiny atom. It takes extremely powerful microscopes to view these units of matter (anything that has mass and takes up space). Elements such as carbon, oxygen and hydrogen are composed of atoms. Atoms bonded together to make molecules. For example, a water molecule 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.



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.

Scientists think about biodiversity in three ways. First, it is all the plants and animals living in an area.

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.

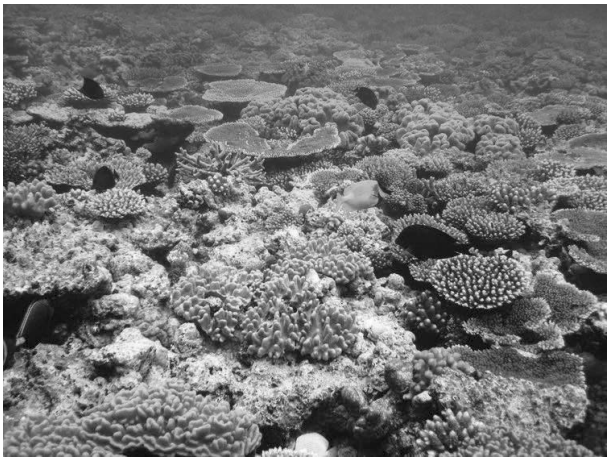
Pollution is the fifth reason. Exhaust from automobiles is a kind of pollution. So are chemicals that factories dump into rivers. Even fertilizers, pesticides and manures from farms can pollute the soil and water.

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 p cted 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.

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**

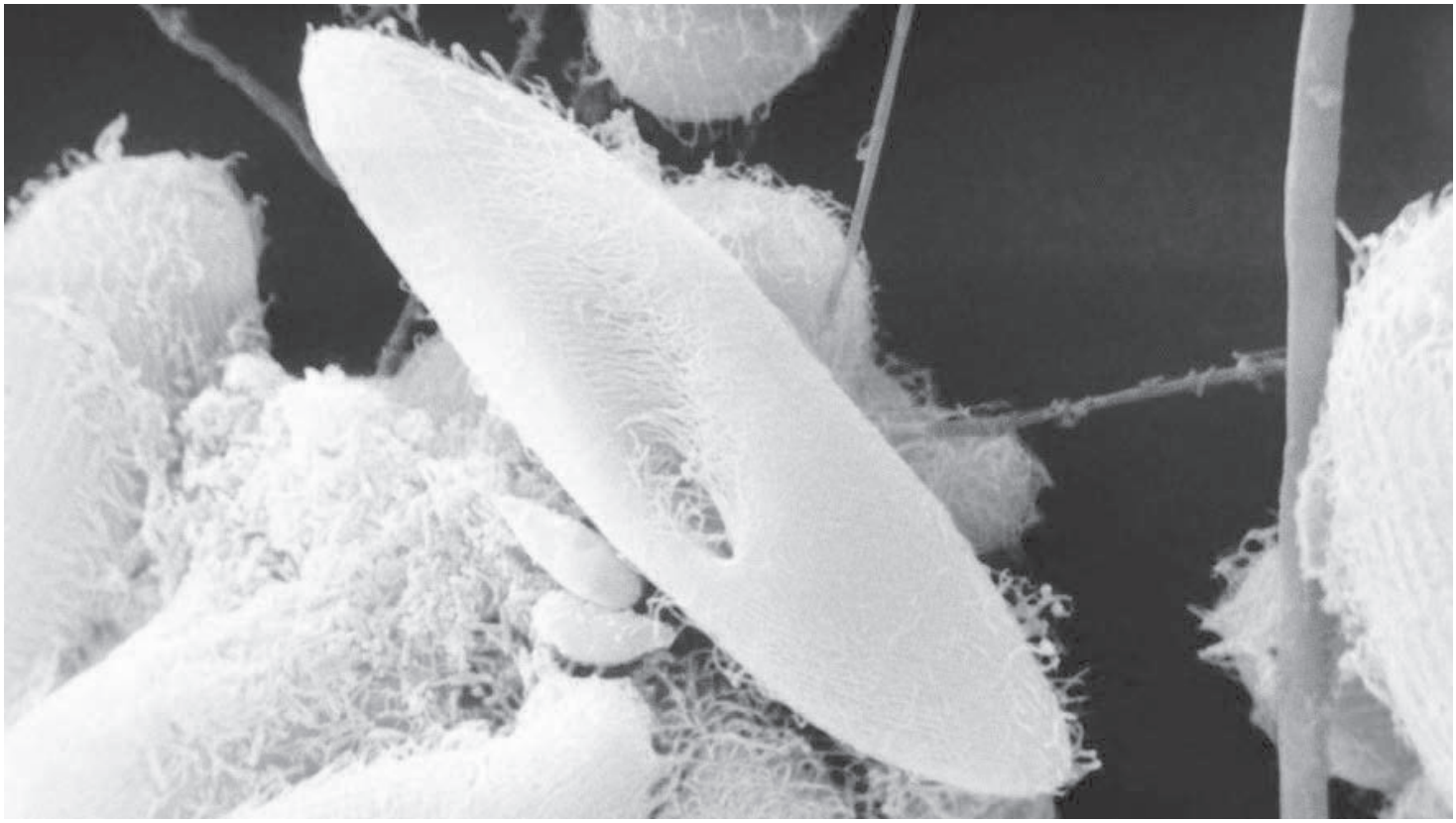


Image 1. Microscopic view of paramecia, single-celled organisms often found in ponds. Paramecia feed on other small organisms, such as bacteria. Each component of these tiny creatures, from the genetic material in its nucleus to the cilia it uses to swim, performs special functions that allow it to survive. 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.

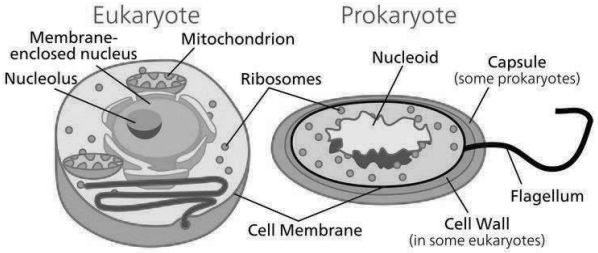
Cells get rid of waste. They help repair tissues. They generate the energy that keeps us alive. These are just some of the many tasks that cells carry out.

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.

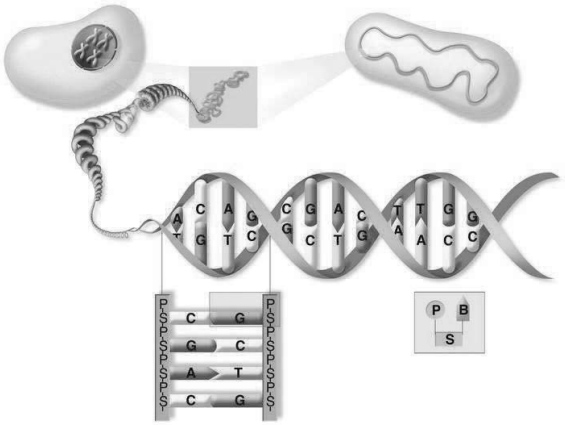
Bacteria mainly consist of these most basic parts of a cell. They may be small, but bacteria can cause human illnesses, from mild food poisoning to deadly tuberculosis. Other bacteria help keep us healthy. Many bacteria live in the human gut They help us digest and absorb nutrients.

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.

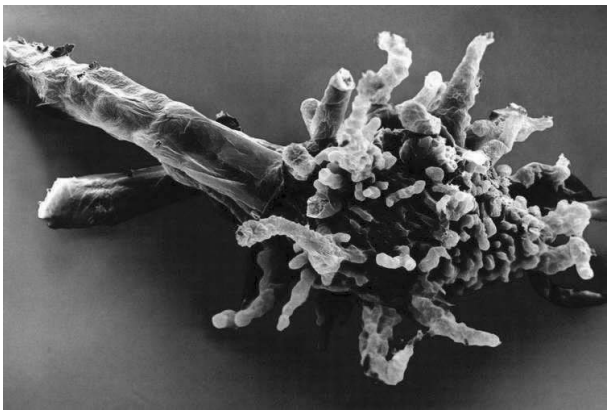
Horizontal gene transfer is more common in single-celled organisms. These organisms are called prokaryotic. They don't have a nuclear membrane, which would protect the organism's DNA from outside DNA.

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



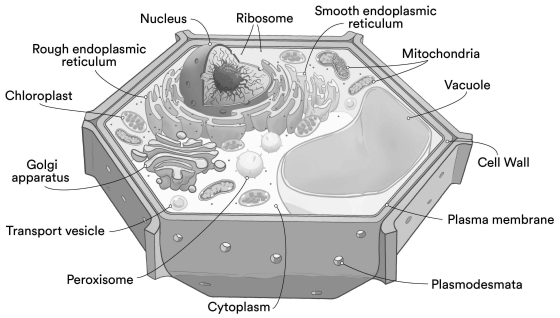
Other single-celled organisms can combine to form a multicellular structure. One example is the cellular slime mold, a type of amoeba. When there aren't many nutrients in the environment, these cells band together in a slug-like form. Together, they migrate to find food. The cellular communication between 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

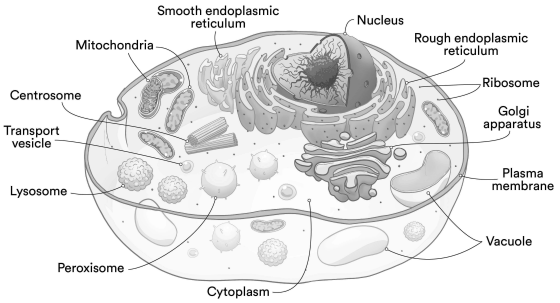
within stalk cells as they go through cell death and form a column. In this process, spore cells are lifted and then scattered to a new location.

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.

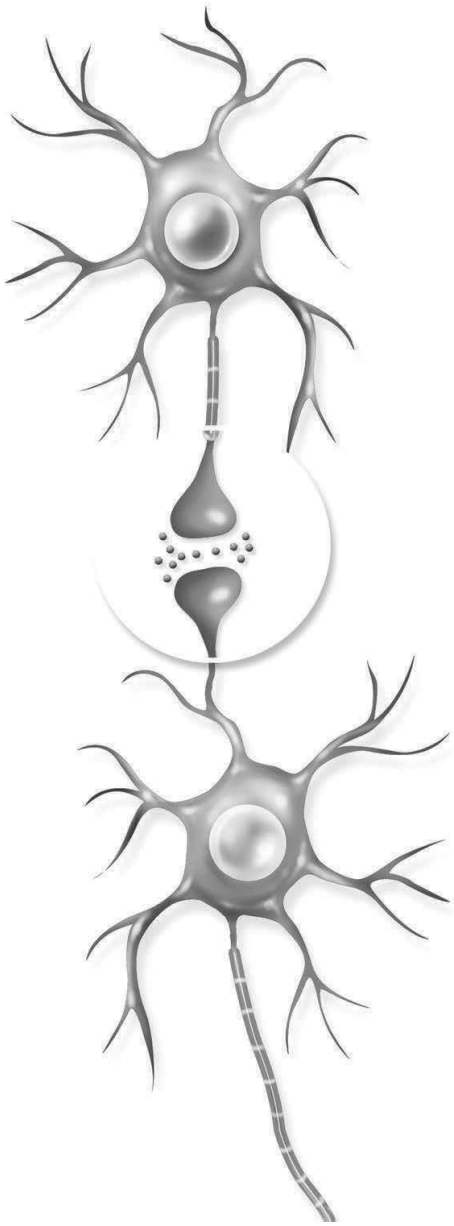
White blood cells are part of the body's immune system. The immune system is a group of cells and organs that fight to protect the body. White blood cells use lysosomes to smother and destroy bacteria. This helps prevent infection and disease.

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.

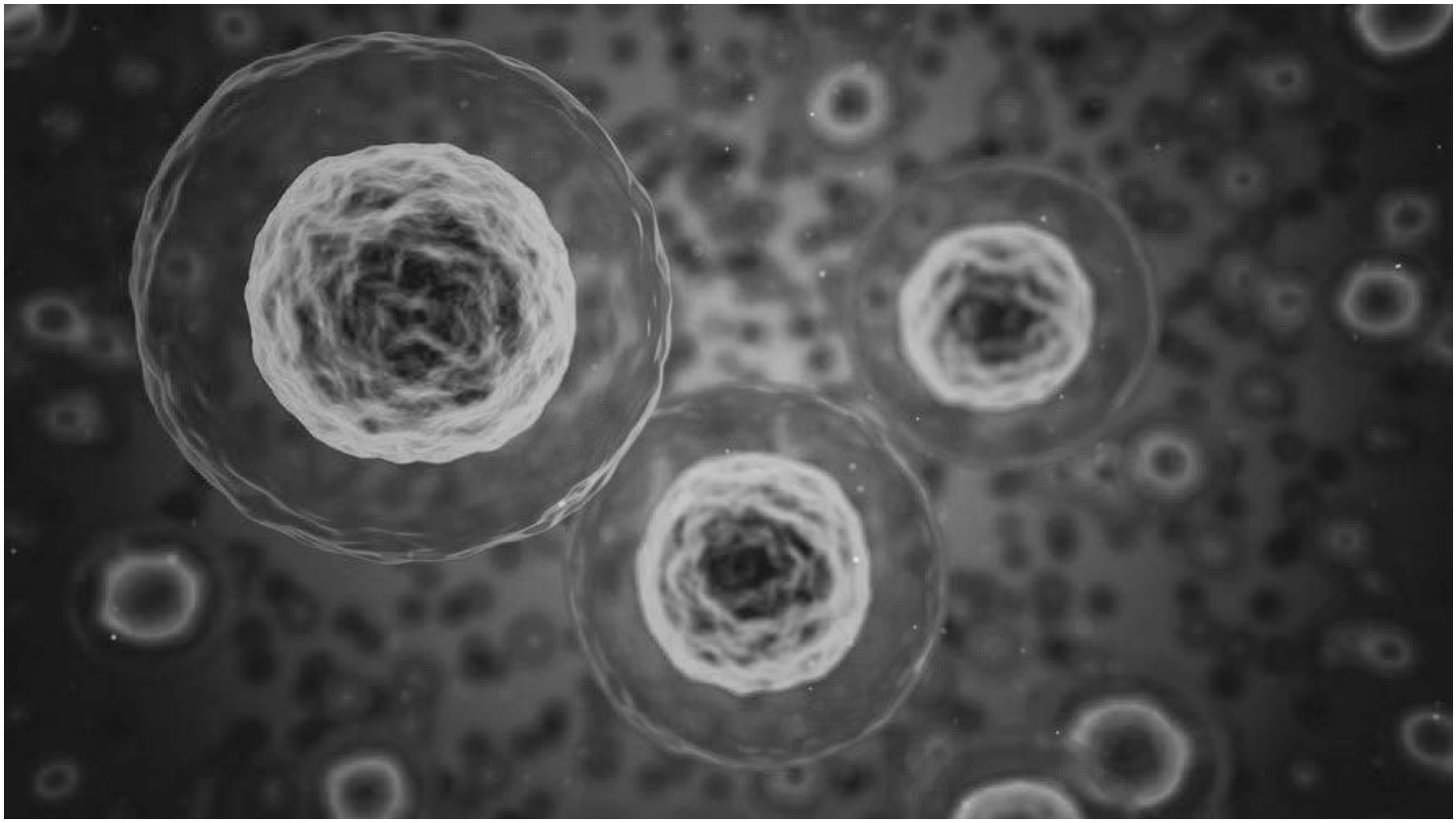
(B) Paramecia is an organism that contains multiple cells and lives in ponds.

(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.

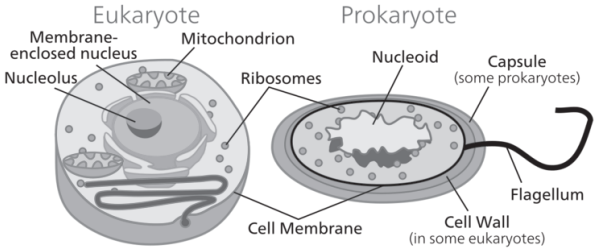
Below are 10 facts about cells, some of which are well-known while others may surprise you.

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.

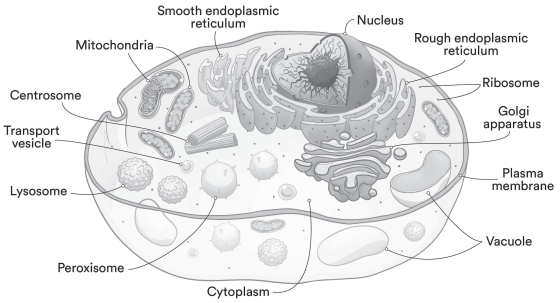
5. Cells contain genetic material.

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.

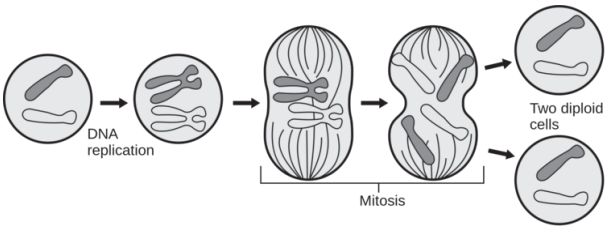
• The endoplasmic reticulum creates carbohydrates, like sugar, and fats.

• 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

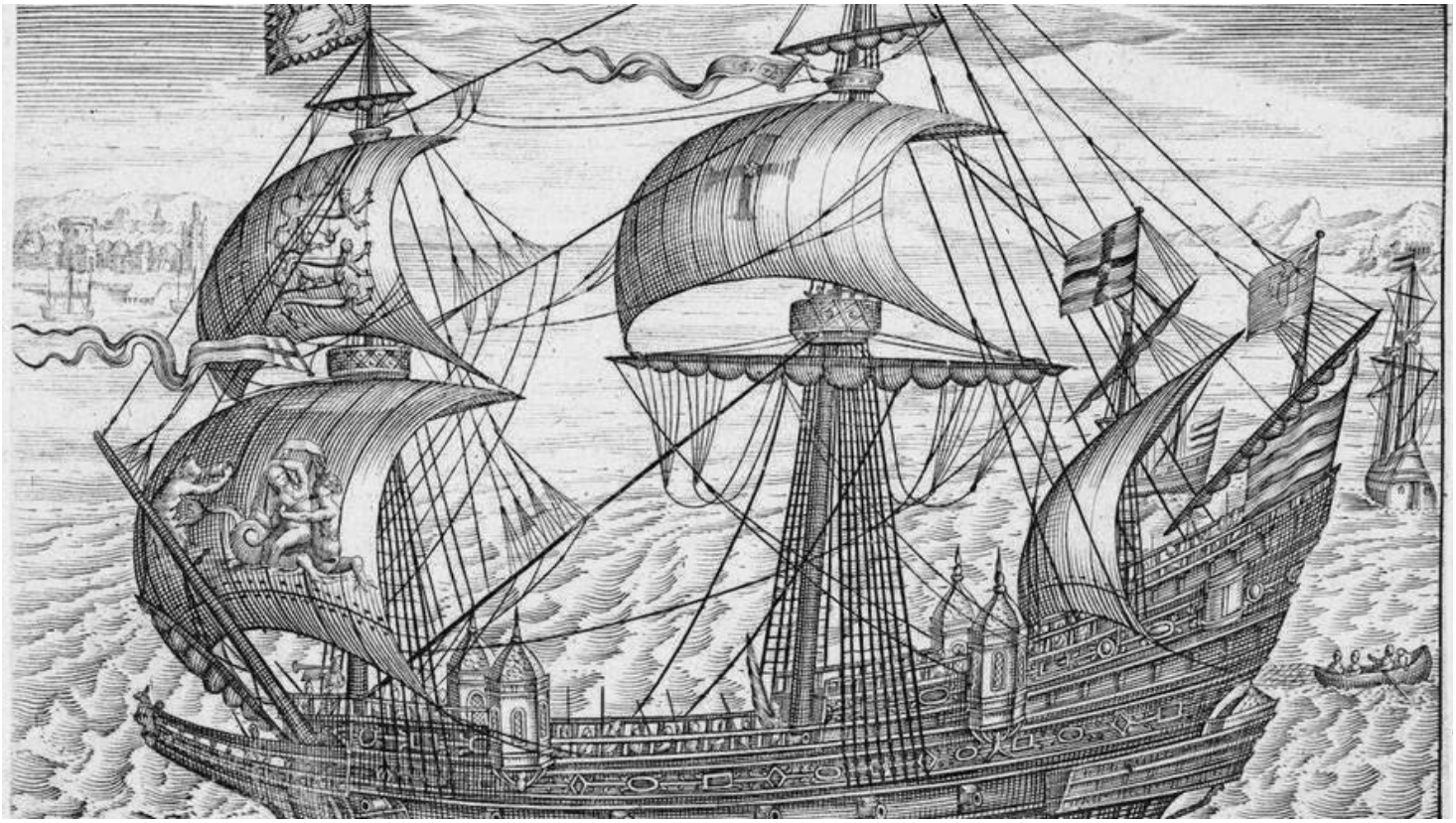
(C) by highlighting the major differences in how a cell is protected from the environment around it

(D) by showing different organelles that perform similar functions in both types of cells

Social Studies

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 0s, 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?

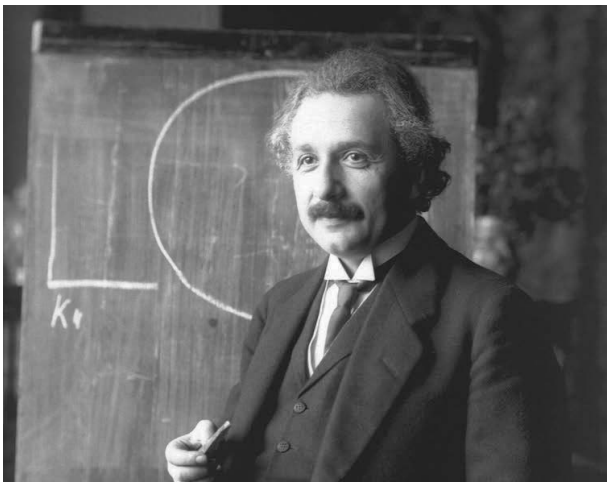
The mysterious puzzle about time's boundaries has kept philosophers debating its nature for centuries. Science fiction writers such as H.G. Wells, who wrote the 1895 novel "The Time Machine," have plotted it backwards and forwards into wildly imaginative stories. And some physicists have even attempted 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. 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. 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.

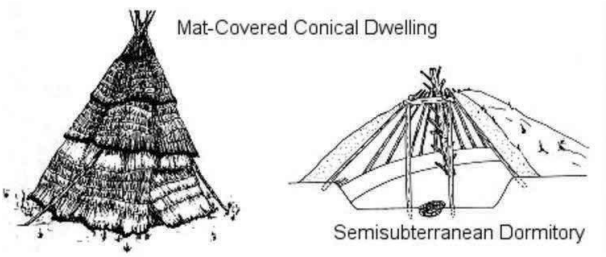
The Nez Perce diet also included wild berries. Huckleberries, cousins of the blueberry, grew low to the ground in the mountains. They were used in jams, jellies and pies. Along with a few other local berries, they were often also used by the Nez Perce to make a dish called pemmican.

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.

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.

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.

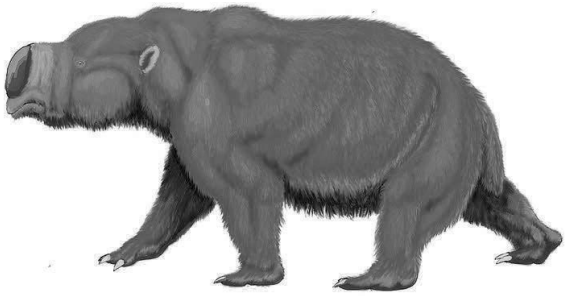
Mysteriously, many of them died off.

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

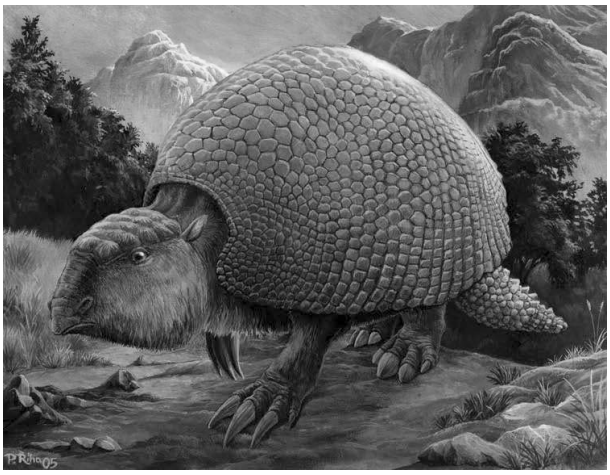
Before, we thought the megafauna died off almost immediately after humans arrived. Now, it might be that humans first spread out across Australia. They ate whatever they came across and transformed the environment. "It's undeniable that humans are preying on some of these large animals," says Miller.

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.

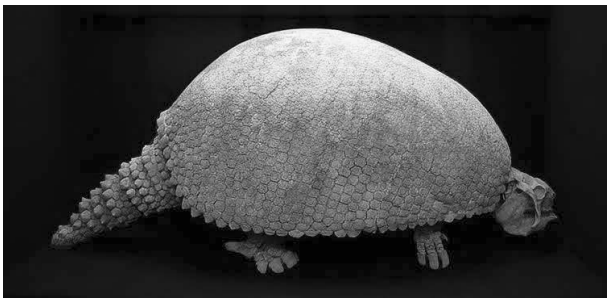
Some argue that just because a spearhead was found in the same location as a mammoth, it doesn't mean humans killed it. They could've just been scavenging its meat. And then there's the fact that plenty of other species—from short-faced bears to huge armadillos—have no evidence of humans hunting them.

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

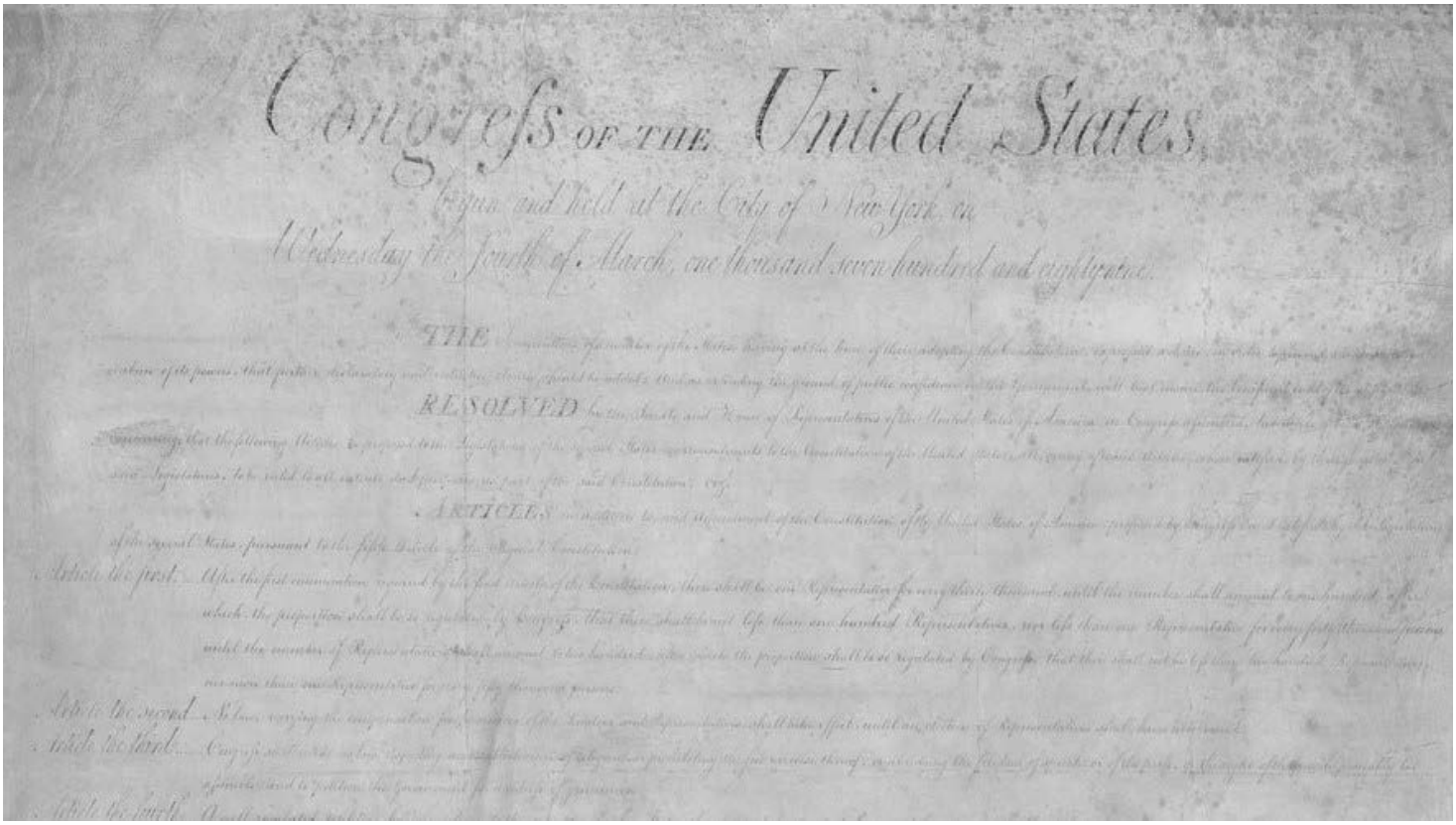
(B) by showing trade was an important part of farming in Greece

(C) by explaining how Greek farmers were able to keep their soil fresh

(D) by explaining the ancient Greeks invented irrigation

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.

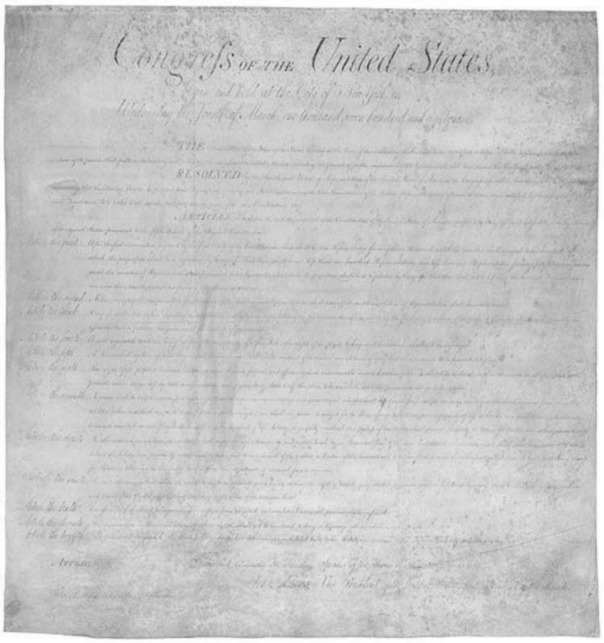
Amendment IX

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.


Congress of the United States

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

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 ry." 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.

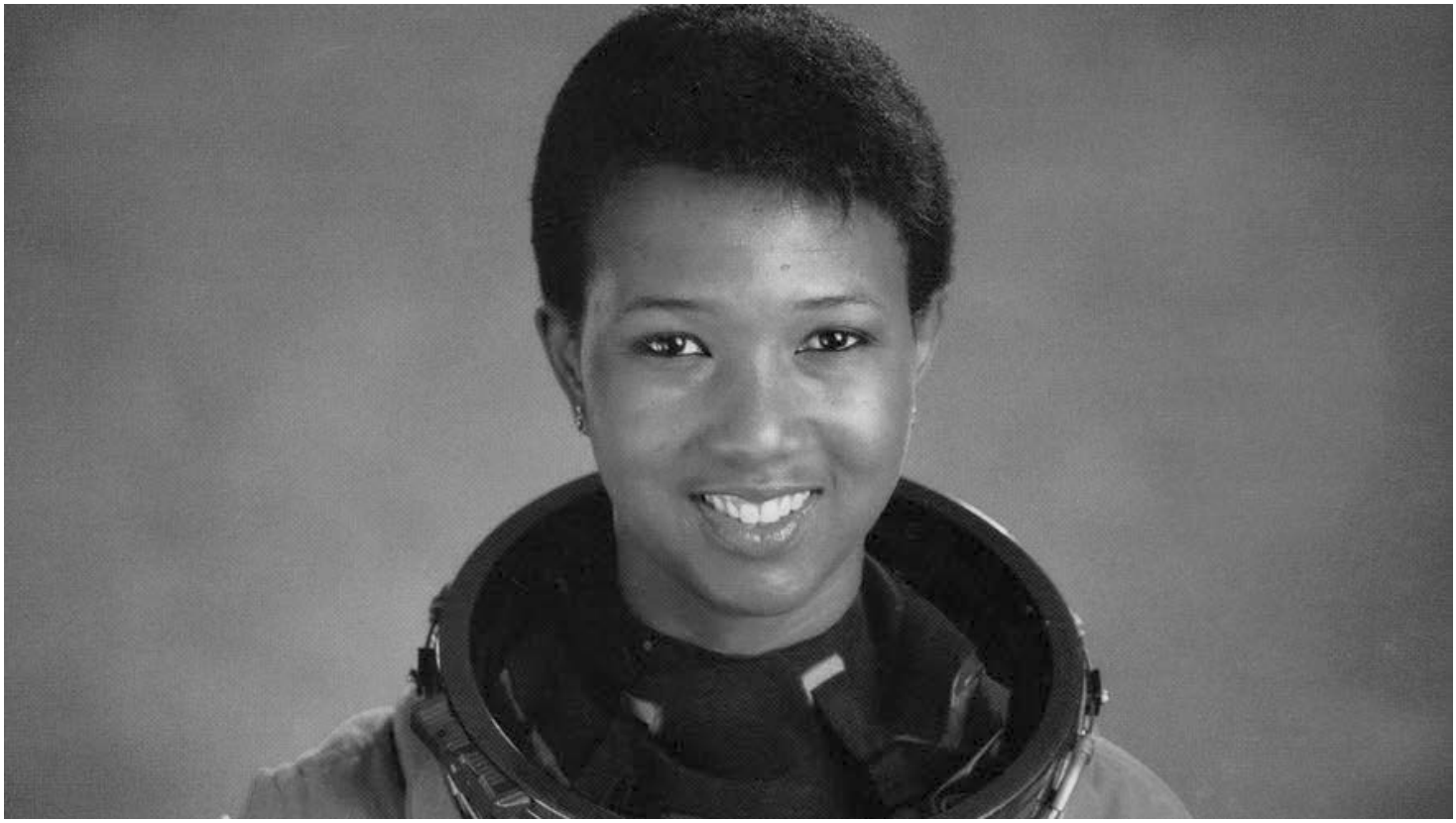
Later Years And Death

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.

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

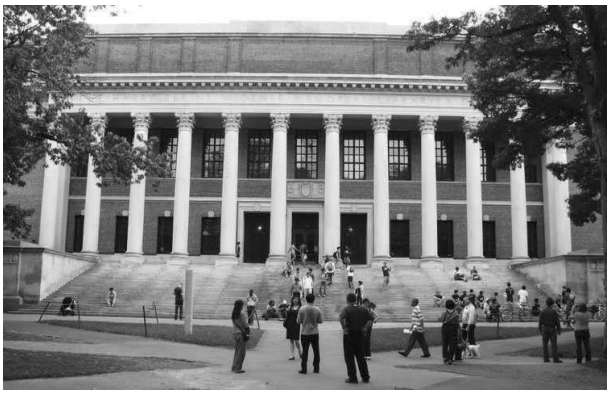
There are many different types of colleges and universities. The options after high school can seem overwhelming. To help you figure out which colleges or career schools might be best for you, here is a list of the main types of schools and the average time it takes students to graduate.

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