TexasHomeLearning

Eighth 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: “Jesse Owens"

- Read and annotate “Jesse Owens" (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. 48).
- Write a paragraph that explains why scientists study biomechanics and sports medicine. Use evidence from the article to support your response.

☐ Day 3

Resilience and Success: “Paul Revere’s Ride”

- Read and annotate “Paul Revere’s Ride” (p. 51).
- Answer the text dependent questions.

☐ Day 4

Resilience and Success: “Paul Revere’s Ride”

- Reread “Paul Revere’s Ride” (p. 51).
- Write 1-2 paragraphs explaining what makes America unique in the context of this text? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

☐ Day 5

Resilience and Success: “Sonnet”

- Read and annotate “Sonnet” (p. 58).
- Answer the text dependent questions and the discussion questions.

Week 2

☐ Day 1

Resilience and Success: "Grit: The Power of Passion and Perseverance"

- Read and annotate "Grit: The Power of Passion and Perseverance" (p. 62).
- Answer the text dependent and discussion questions.

☐ Day 2

Resilience and Success: "These Middle Schoolers Explore the World on a Plate"

- Read and annotate "These Middle Schoolers Explore the World on a Plate" (p. 66).
- Write a paragraph explaining the central idea of the text. Use at least two details to support your response.

☐ Day 3

Resilience and Success: "We Wear the Masks"

- Read and annotate "We Wear the Masks" (p. 69).
- Answer the text dependent question and the discussion questions

☐ Day 4

Resilience and Success: "Captive Youth Sports Audience Helps to Raise Money Just by Being There"

- Read and annotate "Captive Youth Sports Audience Helps to Raise Money Just by Being There" (p. 73).
- Write a response to the following questions: What is the purpose of the advertisements that LeagueSide posts at youth sporting events? How effective do you predict the LeagueSide advertisements will be? If otherwise, what does LeagueSide need to do to be more effective? Explain your response.

☐ Day 5

Resilience and Success: "Hope Is a Thing with Feathers"

- Read and annotate "Hope Is a Thing with Feathers" (p. 76).
- Answer the text dependent questions and the discussion questions.

Week 3

☐ Day 1

Making Change: Day 1 of 5

- Read and annotate “The History of the Cylinder Phonograph" (p. 79).
- 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. 83).
- 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 “What is a Robonaut?” (p. 87).
- 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. 92).
- 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 “Developing Civilization in Ancient Egypt" (p. 95).
- Answer the text dependent questions and the discussion questions.

Week 4

☐ Day 1

Making Change: Day 1 of 5

- Read and annotate “It’s a Watch, It’s a Gadget, It’s a Medical Device: It’s Apple Watch” (p. 102).
- Answer the text dependent quiz questions.

☐ Day 2

Making Change: Day 2 of 5

- Reread “It’s a Watch, It’s a Gadget, It’s a Medical Device: It’s Apple Watch” (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 “The Sit-In Movement” (p. 106).
- Answer the text dependent questions.

☐ Day 4

Making Change: Day 4 of 5

- Read and annotate “The Tipi Goes Modern and Bright for a Special Museum Exhibit” (p. 110).
- Choose an important detail from the text and write a paragraph explaining how it supports the main idea of the text.

☐ Day 5

Making Change: Day 5 of 5

- Read and annotate “Millennials Prefer to Give Their Time and Talent to Charity” (p. 113).
- Answer the text dependent quiz questions.

Additional Lessons

☐ Additional Lesson 1

Community: Day 1 of 5

- Read and annotate “No Man is an Island” (p. 117).
- Answer the text dependent questions and the discussion questions.

☐ Additional Lesson 2

Community: Day 2 of 5

- Read and annotate "Study Shows One Brain’s Electrical Pulses Can Influence Those of Another" (p. 121).
- Write 2-3 paragraphs responding to the following prompt: Group work is most effective to learning when students feel connected to each other and the material. What relevant data or evidence from the article supports this claim? Justify why the data or evidence supports the claim.

☐ Additional Lesson 3

Community: Day 3 of 5

- Read and annotate “The Gift of the Magi” (p. 124).
- Answer the text dependent questions.

☐ Additional Lesson 4

Community: Day 4 of 5

- Reread “The Gift of the Magi” (p. 124).
- Write 1-2 paragraphs explaining how the theme of sacrifice and love develop in the text. What does the text teach us about love? Provide evidence from the text to support your response.

☐ Additional Lesson 5

Community: Day 5 of 5

- Read and annotate “Love and Friendship” (p. 131).
- 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. 134).
- 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. 134).
- Write a 2-3 paragraphs explaining your opinion or belief about food waste. Provide at least two supporting details to support your ideas.

☐ Additional Lesson 8

Community: Day 3 of 5

- Read and annotate “East African Runners Set the Pace” (p. 138).
- Answer the text dependent quiz questions.

☐ Additional Lesson 9

Community: Day 4 of 5

- Reread “East African Runners Set the Pace” (p. 138).
- Write a paragraph explaining the central idea of the article. Use at least two details from the article to support your response.

☐ Additional Lesson 10

Community: Day 5 of 5

- Read and annotate “Texting Can be a Positive and Powerful Force, Experts Say” (p. 142).
- Answer the text dependent quiz questions.

☐ Additional Lesson 11

Personal Growth: Day 1 of 5

- Read and annotate “Timekeeping: Why We Need Clocks and Calendars” (p. 146).
- Answer the text dependent quiz questions.

☐ Additional Lesson 12

Personal Growth: Day 2 of 5

- Reread “Timekeeping: Why We Need Clocks and Calendars" (p. 146).
- Write 1-2 paragraphs explaining the claim or argument of the text and whether you agree or disagree with the claim. Include at least two details to support your response.

☐ Additional Lesson 13

Personal Growth: Day 3 of 5

- Read and annotate “The Difference Between Empathy and Sympathy” (p. 153).
- Answer the text dependent quiz questions.

☐ Additional Lesson 14

Personal Growth: Day 4 of 5

- Reread “The Difference Between Empathy and Sympathy” (p. 153).
- 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 “The Value of Being Confused” (p. 157).
- Answer the text dependent questions and the discussion.

☐ Additional Lesson 16

Education and Knowledge: Day 1 of 5

- Read and annotate “Curiosity Changes the Brain to Boost Memory and Learning” (p. 162).
- 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. 162)."
- Read the following claim. Curiosity assists memory and learning by increasing activity in the brain. What evidence from the article supports this claim? Write 2-3 paragraphs explaining how the evidence supports this claim.

☐ 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. 166).
- 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. 166).
- Write a paragraph explaining the central idea of the article. Include at least 2-3 details from the text that support the central idea.

☐ Additional Lesson 20

Education and Knowledge: Day 5 of 5

- Read and annotate “17th Century Self-Portraits Exhibited as the Original ‘Selfies’” (p. 170).
- Answer the text dependent quiz questions.

Week 1

☐ Day 1

Representing Proportional Relationships

- Complete the warmup and getting started sections (p. 174).
- Complete activity 1.1. (p. 176).

☐ Day 2

Comparing Ratios and Graphs

- Complete activity 1.2 (p. 1).

☐ Day 3

Comparing Speeds

- Complete activity 1.3 (p.181).

Comparing Depth of Color

- Complete activity 1.4 and Talk the Talk (p. 183).

☐ Day 5

Practice and Review

- Complete the Assignment section (p. 186).

Week 2

☐ Day 1

Constant of Proportionality as Rate of Change

- Complete the warmup and getting started sections (p. 190).
- Complete activity 2.1 (p. 192).

☐ Day 2

Slope of a Line

- Complete activity 2.2. (p. 195)

☐ Day 3

Equation for a Line Not Through the Origin

- Complete the activity 2.3. (p. 199).

☐ Day 4

A Negative Unit Rate

- Complete activity 2.4. (p. 201)

☐ Day 5

Describing Linear Equations

- Complete activity 2.5 and Talk the Talk. (p. 203)

Week 3

☐ Day 1

Practice and Review

- Complete the Assignment section (p. 208).

☐ Day 2

Triangles and the Equation y = mx

- Complete the warmup and getting started sections (p. 210).
- Complete activity 3.1. (p. 212).

☐ Day 3

Triangles, Slope, and the Equations y = mx + b

- Complete activity 3.2 and Talk the Talk (p. 215).

☐ Day 4

Practice and Review

- Complete the Assignment section (p. 218).

☐ Day 5

Skills Practice: From Proportions to Linear Relationships

- Complete section I (p. 220).

Week 4

☐ Day 1

Skills Practice: From Proportions to Linear Relationships

- Complete section II (p. 224).

☐ Day 2

Skills Practice: From Proportions to Linear Relationships

- Complete section III (p. 228).

☐ Day 3

Modeling a Linear Relationship

- Complete the warmup and getting started sections. (p. 223).
- Complete activity 1.1 (p. 235).

☐ Day 4

Hot Shirts

- Complete activity 1.2 (p. 238).

☐ Day 5

Comparing Linear Relationships

- Complete activity 1.3 and Talk the Talk (p. 240).

Additional Lessons

☐ Additional Lesson 1

Practice and Review

- Complete the Assignment section (p. 243).

☐ Additional Lesson 2

Analyzing a Linear Relationship from a Table

- Complete the warmup and getting started sections (p. 245).
- Complete activity 2.1 (p. 247).

☐ Additional Lesson 3

Calculating Rate of Changes from a Table

- Complete activity 2.2 (p. 249).

☐ Additional Lesson 4

Practice with Linear Relationships in Tables

- Complete activity 2.3 (p. 252).

☐ Additional Lesson 5

Determining If a Relationship is Linear

- Complete activity 2.4 and Talk the Talk (p. 254).

☐ Additional Lesson 6

Practice and Review

- Complete the Assignment section (p. 259).

☐ Additional Lesson 7

Choosing Independent and Dependent Quantities

- Complete the warmup and getting started sections (p. 261).
- Complete activity 3.1 (p. 263).

☐ Additional Lesson 8

Determining Slope from Context

- Complete activity 3.2 and Talk the Talk (p. 265).

☐ Additional Lesson 9

Practice and Review

- Complete the Assignment section (p. 269).

☐ Additional Lesson 10

Determining the y-Intercept

- Complete the warmup and getting started sections (p. 271).
- Complete activity 4.1 (p. 273).

☐ Additional Lesson 11

Writing Equations in Slope-Intercept Form

- Complete activity 4.2 (p. 275).

☐ Additional Lesson 12

Analyzing Linear Relationships

- Complete activity 4.3 and Talk the Talk (p. 277).

☐ Additional Lesson 13

Practice and Review

- Complete the Assignment sections (p. 283).

☐ Additional Lesson 14

Writing Equations in Point-Slope Form

- Complete the warmup and getting started sections (p. 287).
- Complete activity 5.1 (p. 289).

☐ Additional Lesson 15

Horizontal and Vertical Lines

- Complete activity 5.2 (p. 292).

☐ Additional Lesson 16

Matching Representations

- Complete activity 5.3 and Talk the Talk (p. 294).

☐ Additional Lesson 17

Practice and Review

- Complete the Assignment section (p. 301).

☐ Additional Lesson 18

Skills Practice- The Real Number System

- Complete Topic I Section I Introduction to Irrational Numbers (p. 303).

☐ Additional Lesson 19

Skills Practice- The Real Number System

- Complete Topic I Section II: Graphing Real Numbers on a Number Line (p. 304).

☐ Additional Lesson 20

Skills Practice- The Real Number System

- Complete Topic I Section III: Ordering Rational and Irrational Numbers (p. 305).

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. 308).
- 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. 308).
- 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. 313).
- 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 56

- Perform the experiment and record findings using “Rolling cans down a hill" (p. 316).
- 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

- Read “How roller coasters work" (p. 319).
- 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. 323).
- 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. 327).

☐ Day 5

Potential and Kinetic Energy: Day 5 of 5

- Reread “Experiment: swinging with a pendulum” (p. 327).
- Answer the questions based on your observations from the experiment: Is the period of the longer pendulum longer or shorter than the period of the shorter pendulum? Was this what you excepted? Why or why not? How does energy change from potential to kinetic energy during the swing?

Week 3

☐ Day 1

Force and Motion: Day 1 of 5

- Read “A history of rockets” (p. 331).
- Create a timeline showing the history and development of 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. 335).
- Describe gravity and how it impacts life on Earth.

☐ Day 3

Force and Motion: Day 3 of 5

- Describe gravity and how it impacts life on Earth.

☐ 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.” Many materials can be substituted, be creative and find other options to experiment (p. 339).

☐ 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. 343).
- 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. 348). 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. 352).
- 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. 356).
- Explain how submarine volcanoes form.

☐ Additional Lesson 2

Land Transformations: Day 2 of 5

- Reread “Underwater volcanoes and the ecosystems they create” (p. 356).
- 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. 360).
- 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.” Many materials can be substituted, be creative and find other options to experiment (p. 363).

☐ Additional Lesson 5

Land Transformations: Day 5 of 5

- Continue experiment from previous day: If you have materials, perform the experiment and record finding for “Experiment: Exploring the erosive energy of waves.” Many materials can be substituted, be creative and find other options to experiment (p. 363).

☐ Additional Lesson 6

Ecosystems: Day 1 of 5

- Read “Ecosystem superheroes: Sea otters help coastal waters in check” (p. 366).
- 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. 371).
- 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. 375).
- 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. 378).
- 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. 381)
- 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. 386).
- 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. 390).
- List and describe the different types of cells in the reading.

☐ Additional Lesson 17

Cells: Day 2 of 5

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

☐ Additional Lesson 18

Cells: Day 3 of 5

- Read “The facts about cells” (p. 395).
- 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. 402).
- 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. 402).
- 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 travel" (p. 406).
- 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. 410).
- 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. 415).
- 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. 418).
- 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. 418).
- Answer the question: How are sea otters important to the ecosystem in which they live?

☐ Day 3

No Title: Day 3 of 5

- What other factors are contributing to the reduction of sea otter populations?

☐ 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. 427).
- 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. 485)
- Take the quiz.

☐ Day 3

Culture: Day 3 of 5

- Reread “Food and Agriculture in Ancient Greece” (p. 431).
- 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. 435).
- 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. 435).
- Consider the importance of each of the 10 amendments and add to what you wrote yesterday about each amendment.

☐ Additional Lesson 3

Government and Citizenship: Day 3 of 5

- Read "Teens learn there is a freedom in telling their stories" (p. 440).
- 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. 444).
- 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. 446).

☐ Additional Lesson 8

Citizenship: Day 3 of 5

- Read and annotate "Rights and responsibilities of U.S. Citizenship" (p. 447).
- 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.452).
- 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. 454).
- 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. 457).
- Take the quiz.

☐ Additional Lesson 17

Economics: Day 2 of 5

- Reread "How to save money as a teenager" (p. 457).
- 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. 462).
- 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. 466).
- 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

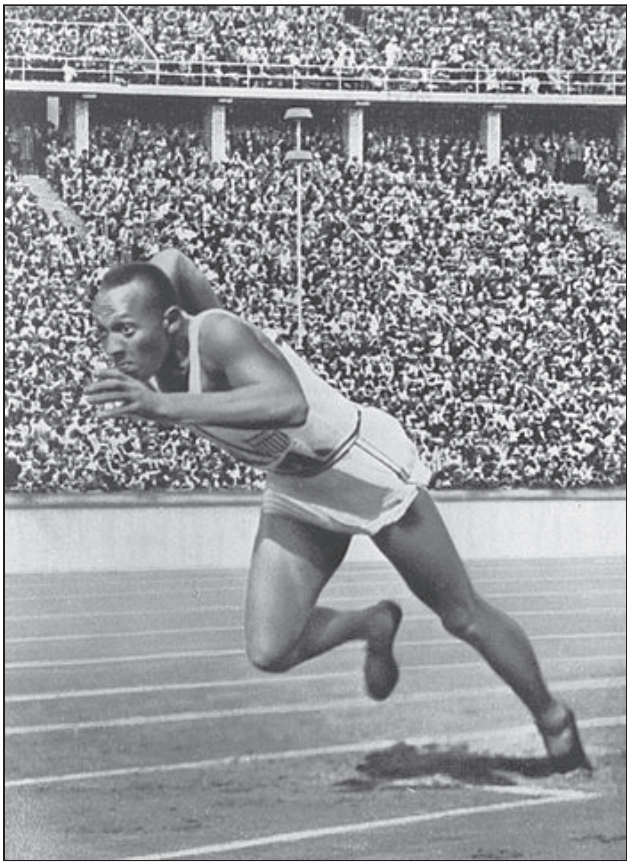
Name: _____ Class: _____

Jesse Owens

By Shelby Ostergaard
2018

James Cleveland "Jesse" Owens (1913-1980) was an African American track and field athlete. Owens won four gold medals at the Summer Olympics in Germany in 1936. In this informational text, Shelby Ostergaard provides additional information about Owens' life and success in the Olympics. As you read, take notes on the challenges that Owens faced in sports and in life.

[1] Jesse Owens could run. He could run faster and jump longer than anyone in the world. But when he set out to prove this at the Summer Olympics in Berlin in 1936, no one wanted him there. No one wanted him running that race. He wasn't even welcome in the country, let alone the stadium. But Jesse Owens was an expert at overcoming hurdles and blazing his own path forward. He was determined to compete, no matter how many barriers were in his way.



"Jesse Owens3" by Unknown is in the public domain.

Early Life

Jesse Owens was born on September 12, 1913, in the town of Oakville, Alabama, but he moved to Cleveland, Ohio, when he was nine. He was actually named James Cleveland Owens and nicknamed J.C. — but in Ohio, one of his teachers couldn't understand his thick Southern accent. She thought he called himself Jesse. It stuck.

His athletic career began at East Technical High School. He won three track and field events while competing in the 1933 National Interscholastic Championships. He went on to race for Ohio State University and was later nicknamed "The Buckeye Bullet," as Ohio is known as the Buckeye State. While at university, he matched one world record in the 100-yard dash and broke three others: the long jump, the 220-yard dash, and the 220-yard low hurdles. Owens was used to winning. He competed in 42 different collegiate events in 1935 and won all of them.

Owens was a star track performer in college, but he also faced major challenges. His school did not offer scholarships for track and field, as the sport was not as well respected back then, so Owens had to work a series of jobs throughout college to pay for his tuition. In addition, the University did not allow Owens to live on campus because of his race. Owens, like many African Americans during this time period, was subject to racist treatment and was often discriminated against.

[5] He would not let this deter[1] him, however, and continued to succeed on the track. Owens enjoyed running because, as he said, "it was something you could do by yourself, and under your own power." It was this mindset that would lead him to the pinnacle[2] of athletics, where he would face even more challenges.

The Olympics

At the 1936 Summer Games, Jesse Owens became the first person ever in Olympic history to win four gold medals in track and field, claiming victory in the long jump, the 100-meter dash, the 200-meter dash, and as a member of the 4x100 meter relay. His feats remained unmatched until the 1984 Summer Olympics. But what Jesse Owens — the son of a sharecropper[3] and the grandson of slaves — did was particularly special because of when and where he did it.

The 1936 Summer Olympics were the first to be broadcast on television and took place in Berlin, Germany, during a turbulent[4] time. Fascism[5] was spreading across Europe, and Germany's Chancellor, Nazi leader Adolf Hitler, was at the center of it. International tensions were high. Europe was on the brink of World War II, which officially broke out three years after the Summer Olympics. People were terrified. But the games and the excitement surrounding them continued in spite of the impending war.

The reception Owens received in Berlin was cold. Hitler criticized the United States for including athletes of color and Jewish athletes on the roster. He believed that they were inferior to white athletes and could not believe that the United States had chosen people of diverse ethnicities to represent itself on the world stage. Owens was called racial slurs in public and was generally mistreated by the Berliners.

The heightened exposure of the games that broadcast television provided was exciting for Hitler; he believed it was a chance for favorable world news coverage of Nazi Germany. Hitler planned to use the Summer Olympics to prove his theories that "Aryans," or white Europeans, were a superior race to all others. Jesse Owens' success at the Olympics undermined this completely, proving that athletes of color were not in any way inferior to white athletes. Hitler was angered by Owens' success. He stormed out of the stadium and refused to shake Owens' hand. Instead of stories about German successes, the papers were filled with articles about Owens breaking records and Hitler's overblown response to his wins. Both Owens' medals and Hitler's reaction catapulted Jesse Owens into international fame.

After the Olympics

[10] But fame did not lead to post-Olympic success. Athletes didn't come home to multi-million dollar endorsements deals then as they do now. Owens was only 22 when he became an international hero, but he never again competed as a traditional athlete. Owens found that there were many people willing to congratulate him on his success but few who would offer him a job. To earn money after the Olympics, Owens raced against cars and horses, and he even played for the basketball exhibition team, the Harlem Globetrotters.

1. **Deter** ***(verb):*** to discourage someone from doing something
2. the most successful point
3. a farmer who gets a portion of the crop they harvest for a landowner
4. **Turbulent** ***(adjective):*** characterized by conflict or disorder
5. a political system characterized by a very powerful leader and state control of social and economic life

Despite his achievements as a national hero, Owens was still a black man in a deeply divided and racially segregated United States. He faced discrimination and aggression when he returned home. Even as a gold-winning Olympic athlete, he wasn't allowed to ride in the front of the bus. He couldn't use the front door to enter public buildings. He couldn't raise his family where he wanted. Jesse Owens wasn't invited to shake hands with Adolf Hitler after his biggest win, but he wasn't invited to shake hands with President Franklin Delano Roosevelt, either.

He eventually set up a public relations and marketing business in Chicago, Illinois, and traveled the country to speak at conventions and other business gatherings. He encouraged individual achievement, regardless of race, class, or creed.[6] His speeches often called back to why he fell in love with running in the first place — it was something he could do himself without having to rely on others to allow him to do it.

Jesse Owens died in 1980 from cancer. His accomplishments continue to inspire even after his passing. It is difficult to achieve something that you have never seen someone else achieve. Before Jesse Owens, there were few black athletes whose success shown so bright. Jesse Owens was celebrated around the world and cheered on by people of every race. He did not let the opinions of anyone hold him back or stop him from running.

6. the beliefs that a person lives by

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 text?
    A. Jesse Owens used his platform after his win at the Olympics to bring attention to how white and black athletes are treated differently.
    B. Even after Jesse Owens returned from the Olympics, he continued to better himself as an athlete and compete.
    C. When Jesse Owens returned from the Olympics, he demanded respect and to be treated like the hero he was.
    D. Jesse Owens didn't allow the racial discrimination he faced at home or abroad to keep him from doing what he loved and succeeding at it.

2. PART B: Which detail from the text best supports the answer to Part A?
    A. "He would not let this deter him, however, and continued to succeed on the track. Owens enjoyed running…'it was something you could do by yourself, and under your own power.'" (Paragraph 5)
    B. "Instead of stories about German successes, the papers were filled with articles about Owens breaking records and Hitler's overblown response to his wins." (Paragraph 8)
    C. "To earn money after the Olympics, Owens raced against cars and horses, and he even played for the basketball exhibition team, the Harlem Globetrotters." (Paragraph 9)
    D. "He eventually set up a public relations and marketing business in Chicago, Illinois, and traveled the country to speak at conventions and other business gatherings." (Paragraph 11)

3. What is the author's main purpose in the text?
    A. to show how the Olympic games have changed over time, specifically in the treatment of black athletes
    B. to provide information about Jesse Owens' famous wins and the effect that they, and his attitude, had on others
    C. to criticize the United States for disrespecting Jesse Owens in the past and not giving him the credit he deserved
    D. to emphasize the discrimination that black athletes from all nations faced during the Olympic games

4. How do paragraphs 9-10 contribute to the development of ideas in the text?
    A. They provide students with important historical information about segregation.
    B. They prove that the United States wasn't impressed with Jesse Owens' win.
    C. They emphasize how poorly Jesse Owens was treated, even as an Olympic winner.
    D. They show how little the United States used to care about Olympic winners.

5. What is the relationship between Jesse Owens' attitude and his success as a runner?

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, Jesse Owens is described as an international hero. Why were his actions in the Summer Olympics heroic? Despite his heroic status, how was Owens treated and why? How do you think a hero should be treated?

2. Jesse Owens overcame several obstacles, both in America and when he competed in the Olympics abroad. How did he approach these obstacles? How did his attitude help him overcome them? Describe a time when you faced something difficult and what you did to overcome it.

3. Throughout his life, Owens faced prejudice because of his race, even after winning gold Olympic gold medals. What were the effects of this prejudice? Do you think Owens would have continued to compete if it weren't for the prejudice he encountered when he returned to America? Why or why not?

How fast can humans run?

By ThoughtCo.com, adapted by Newsela staff on 04.16.18
Word Count **900**
Level **1210L**

Image 1. Usain Bolt of Jamaica competes in the men's 4 x 100-meter relay during the World Championships held in London, England, in August 2017. Bolt is the fastest human to ever run the 100-meter dash. Photo by Andy Lyons/Getty Images for IAAF

The fastest person clocked on our planet today is Usain Bolt. The Jamaican athlete ran the 100-meter sprint at the 2008 Summer Olympics in Beijing 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, and 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 are forcibly stretched and then contracted during acceleration. Two forms of energy at play are gravitational energy and kinetic energy. Gravitational energy is due to gravity, so the higher you lift your leg, the more potential energy it has, as it has to cover a longer distance to return to the ground. Kinetic energy is the energy due to motion, so the faster an object moves the more kinetic energy it has. As the runner's muscles alternate between releasing and absorbing energy, they change the body's potential and kinetic energy, and make the runner move at a certain speed.

What Makes An Elite Runner?

Scholars believe that the fastest runners — the elite sprinters like Bolt — are those who run economically, meaning that they use a low amount of energy compared to other people over the same distance. The ability to do that is influenced by a number of different factors, including age, sex and how muscle fiber is distributed. 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 greater force relative to their body weight. They also increase the horizontal speed of their ankles and the number of steps per minute.

Long-Distance Runners

When considering velocity, 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, or the amount of pressure the foot puts on the ground. Changes in biomechanical factors, or how the legs move in terms of 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 velocity between 558 and 577 feet per minute, based on marathons run in Chicago and New York between 2012 and 2016.

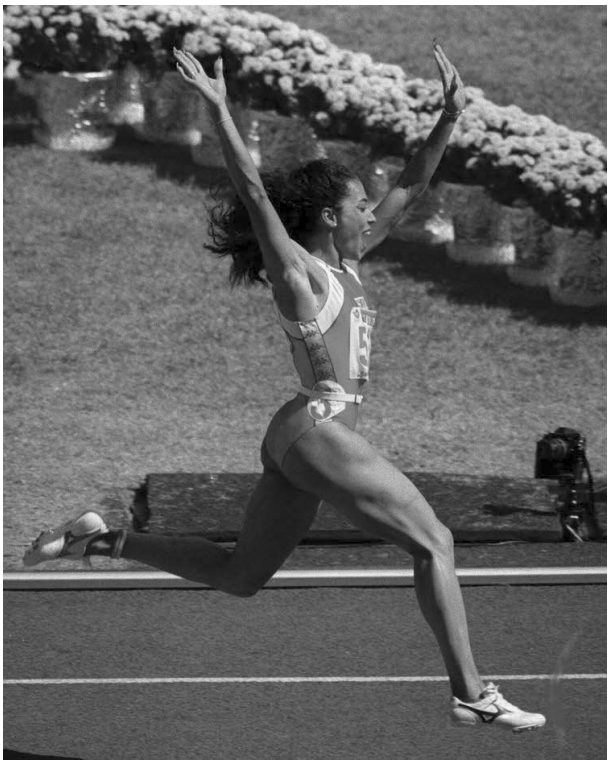
The New York City marathon runs in waves. There are four groups of runners who begin the race at roughly 30-minute intervals. As a result, statistics are available for runner velocities at 3-mile segments throughout the race. Researcher Zhenquan Lin and his team used that data to provide support to the notion that one factor of speed is competition, showing that 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 specialists Peter Weyand and his team to suggest that the upper limit might reach 35–40 mph. So far, though, no scholar has been willing to confirm that officially.

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, and Powell's is 9.72.

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, and 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, completing the 26.2-mile race in just 2 hours, 2 minutes, 57 seconds. Bekele finished the Berlin Marathon in 2:03:03 in 2016, and 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 and Dibaba each completed the 2017 London Marathon in 2:17:01 and 2:17:56, respectively.

Name: _____ Class: _____

Paul Revere's Ride

By Henry Wadsworth Longfellow
1860

Henry Wadsworth Longfellow (1807-1882) was an American poet. This piece, written nearly a century after the events occurred, tells the story of Paul Revere, whose ride through greater Boston one night in 1775 helped spark the American Revolution. While not entirely historically accurate, the poem popularized the tale most Americans know today. Told from the perspective of an innkeeper, the poem recounts Revere's midnight ride as he warns colonists of approaching British soldiers. Written in 1860 when America was on the verge of Civil War, Longfellow intended for the poem to be a call to action, reminding supporters of the northern Union that history favors the courageous. As you read, consider the similarities between the urgency of Revere's ride and the problem of slavery, and take notes on how Longfellow's use of imagery contributes to the mood and spirit of the piece.

[1] Listen, my children, and you shall hear
Of the midnight ride of Paul Revere,
On the eighteenth of April, in Seventy-Five:[1]
Hardly a man is now alive
[5] Who remembers that famous day and year.

He said to his friend, "If the British march
By land or sea from the town to-night,
Hang a lantern aloft in the belfry-arch[2]
Of the North-Church-tower,[3] as a signal-light, —
[10] One if by land, and two if by sea;
And I on the opposite shore will be,
Ready to ride and spread the alarm
Through every Middlesex[4] village and farm,
For the country-folk to be up and to arm."[5]

[15] Then he said "Good night!" and with muffled oar[6]
Silently rowed to the Charlestown[7] shore,
Just as the moon rose over the bay,
Where swinging wide at her moorings[8] lay
The Somerset,[9] British man-of-war:
[20] A phantom ship, with each mast and spar[10]
Across the moon, like a prison-bar,
And a huge black hulk, that was magnified
By its own reflection in the tide.

"Boston - North End: Paul Revere" by Wally Gobetz is licensed under CC BY-NC-ND 2.0.

1. referring to 1775
2. a bell tower
3. The North Church is the oldest standing church in Boston and is now considered a National Landmark.
4. Middlesex county in Massachusetts.
5. "To arms" means to ready their guns (arms) for battle.
6. a paddle used for rowing a boat
7. Charlestown is the oldest neighborhood in Boston, north of the Charles River.
8. The place where a boat or a ship is secured in water while it is not in use.

Meanwhile, his friend,[11] through alley and street
Wanders and watches with eager ears,
Till in the silence around him he hears
The muster of men at the barrack[12] door,
The sound of arms, and the tramp of feet,
And the measured tread[13] of the grenadiers[14]
Marching down to their boats on the shore.

Then he climbed to the tower of the church,
Up the wooden stairs, with stealthy tread,
To the belfry-chamber overhead,
And startled the pigeons from their perch
On the sombre[15] rafters, that round him made
Masses and moving shapes of shade, —
By the trembling ladder, steep and tall,
To the highest window in the wall,
Where he paused to listen and look down
A moment on the roofs of the town,
And the moonlight flowing over all.

Beneath, in the churchyard, lay the dead,
In their night-encampment on the hill,
Wrapped in silence so deep and still
That he could hear, like a sentinel's[16] tread,
The watchful night-wind, as it went
Creeping along from tent to tent,
And seeming to whisper, "All is well!"
A moment only he feels the spell
Of the place and the hour, and the secret dread
Of the lonely belfry and the dead;
For suddenly all his thoughts are bent
On a shadowy something far away,
Where the river widens to meet the bay, —
A line of black, that bends and floats
On the rising tide, like a bridge of boats.

9. The HMS Somerset was a ship in the British Royal Navy.
10. the rigging of a sailing ship
11. an unnamed friend of Revere back in Boston
12. a place where soldiers are housed
13. **Tread** ***(verb):*** to walk or step
14. Here, grenadier refers to the British soldiers.
15. **Somber** ***(adjective):*** grave or serious in mood; gloomy
16. a guard or watchman

Meanwhile, impatient to mount and ride,
Booted and spurred, with a heavy stride,
On the opposite shore walked Paul Revere.
Now he patted his horse's side,
Now gazed on the landscape far and near,
Then impetuous[17] stamped the earth,
And turned and tightened his saddle-girth;[18]
But mostly he watched with eager search
The belfry-tower of the old North Church,
As it rose above the graves on the hill,
Lonely and spectral[19] and sombre and still.
And lo! as he looks, on the belfry's height,
A glimmer, and then a gleam of light!
He springs to the saddle, the bridle he turns,
But lingers and gazes, till full on his sight
A second lamp in the belfry burns!

A hurry of hoofs in a village-street,
A shape in the moonlight, a bulk in the dark,
And beneath from the pebbles, in passing, a spark
Struck out by a steed[20] that flies fearless and fleet:[21]
That was all! And yet, through the gloom and the light,
The fate of a nation was riding that night;
And the spark struck out by that steed, in his flight,
Kindled the land into flame with its heat.

He has left the village and mounted the steep,
And beneath him, tranquil[22] and broad and deep,
Is the Mystic,[23] meeting the ocean tides;
And under the alders,[24] that skirt its edge,
Now soft on the sand, now loud on the ledge,
Is heard the tramp of his steed as he rides.

It was twelve by the village clock
When he crossed the bridge into Medford town.
He heard the crowing of the cock,
And the barking of the farmer's dog,
And felt the damp of the river-fog,
That rises when the sun goes down.

17. **Impetuous** ***(adjective):*** acting quickly or thoughtlessly
18. A saddle-girth is a piece of equipment used to keep a horse's saddle in place.
19. **Spectral** ***(adjective):*** of or like a ghost; otherworldly
20. a riding horse
21. **Fleet** ***(adjective):*** fast and nimble in movement
22. **Tranquil** ***(adjective):*** calm or peaceful
23. the Mystic River in Massachusetts
24. Alders refers to a type of deciduous tree.

It was one by the village clock,
When he galloped into Lexington.
He saw the gilded weathercock[25]
Swim in the moonlight as he passed,
And the meeting-house windows, blank and bare,
Gaze at him with a spectral glare,
As if they already stood aghast[26]
At the bloody work they would look upon.

It was two by the village clock,
When he came to the bridge in Concord town.
He heard the bleating[27] of the flock,
And the twitter of birds among the trees,
And felt the breath of the morning breeze
Blowing over the meadows brown.
And one[28] was safe and asleep in his bed
Who at the bridge would be first to fall,
Who that day would be lying dead,
Pierced by a British musket-ball.[29]

You know the rest. In the books you have read,
How the British Regulars[30] fired and fled, —
How the farmers gave them ball for ball,
From behind each fence and farmyard-wall,
Chasing the red-coats down the lane,
Then crossing the fields to emerge again
Under the trees at the turn of the road,
And only pausing to fire and load.

So through the night rode Paul Revere;
And so through the night went his cry of alarm[31]
To every Middlesex village and farm, —
A cry of defiance,[32] and not of fear,
A voice in the darkness, a knock at the door,
And a word that shall echo forevermore!
For, borne on the night-wind of the Past,
Through all our history, to the last,
In the hour of darkness and peril[33] and need,
The people will waken and listen to hear
The hurrying hoof-beats of that steed,
And the midnight message of Paul Revere.

25. a weathervane with a rooster on it
26. **Aghast** ***(adjective):*** filled with horror or shock
27. Bleating is the sound made by a sheep, goat, or calf.
28. a reference to the man who would be the first to die in battle on the following day
29. A musket-ball is a type of bullet.
30. The British Regulars is another term for the British Red-coats, or the Britsh soldiers fighting the American militia.

"Paul Revere's Ride"" by Henry Wadsworth Longfellow (1860) is in the public domain.

31. This is a reference to the legend that Revere shouted "The British are coming!" throughout his midnight run as a warning to the militia. Contrary to popular belief, Revere did not actually shout these words, as the operation was planned to be as discreet as possible so as not to attract attention.
32. **Defiance** ***(noun):*** open resistance or bold disobedience
33. **Peril** ***(noun):*** serious and immediate danger

Text-Dependent Questions

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

1. PART A: To whom is the narrator speaking in the poem, and how does this serve the author's purpose?
    A. The narrator is speaking to children, telling them the story of Paul Revere, thus serving the author's purpose of teaching this historical lesson.
    B. The narrator is speaking to children, telling them the story of Paul Revere, thus serving the author's purpose of instilling a sense of American pride and courage.
    C. The narrator is speaking to a general audience, serving the author's purpose of bringing awareness to this historical event.
    D. The narrator is speaking to the British soldiers, serving the author's purpose of criticizing Great Britain for its attempt to control the American colonists.

2. PART B: Which of the following stanzas best supports the answer to Part A?
    A. Stanza 1
    B. Stanza 2
    C. Stanza 13
    D. Stanza 14

3. PART A: What does the word "muffled"most closely mean as it is used in line 15?
    A. Urgent
    B. Trembling
    C. Proud
    D. Quiet

4. PART B: Which phrase from the same stanza best supports the answer to Part A?
    A. "'Good night!'"
    B. "silently rowed"
    C. "as the moon rose"
    D. "swinging wide"

5. PART A: What mood does the description of the Somerset ship evoke in lines 20-23?
    A. Gloomy
    B. Menacing
    C. Awestruck
    D. Sympathetic

6. PART B: Which of the following quotes best supports the answer to Part A?
    A. "A phantom ship"
    B. "Across the moon"
    C. "a huge black hulk"
    D. "magnified"

7. How do the behaviors of Paul Revere and his friend waiting for news differ?
    A. Revere is impatient for news, while his friend observes the tense silence of the night.
    B. Both are impatient for news.
    C. Both look to the cemetery to observe its stillness and solemn reminder of what is to come.
    D. His friend is paralyzed by the tension while Revere is energized by it.

8. In stanza 8, the narrator describes a spark coming from the horse's hooves hitting the street. What is meant by the lines: "And the spark struck out by that steed, in his flight, / Kindled the land into flame with its heat"?

9. Which of the following statements best describes how the poem's form contributes to the overall tone?
    A. The poem uses mainly slant rhyme, keeping the tone light but not too melodic.
    B. The poem uses alliteration, contributing to the speech-making tone.
    C. The poem utilizes end rhyme to make it sound like a nursery song.
    D. The poem utilizes end rhyme, giving it a lyric style, which contributes to the celebratory yet instructive tone.

10. What effect does Paul Revere's message have on the American people, according to the last stanza?

Name: _____ Class: _____

Sonnet

By James Weldon Johnson
1893

James Weldon Johnson (1871-1938) was an American writer and civil rights activist. Johnson served a vital role in the National Association for the Advancement of Colored People (NAACP). The following poem by Johnson is a sonnet, which consists of fourteen rhyming lines. As you read, take notes on how the speaker's uses imagery in the poem.

[1] My heart be brave, and do not falter[1] so,
Nor utter more that deep, despairing wail.
Thy way is very dark and drear I know,
But do not let thy strength and courage fail;
[5] For certain as the raven-winged night
Is followed by the bright and blushing morn,
Thy coming morrow will be clear and bright;
'Tis darkest when the night is furthest worn.
Look up, and out, beyond, surrounding clouds,
[10] And do not in thine own gross darkness grope,[2]
Rise up, and casting off thy hind'ring shrouds,[3]
Cling thou to this, and ever inspiring hope:
Tho' thick the battle and tho' fierce the fight,
There is a power making for the right.

1. **Falter** ***(verb):*** to start to lose strength; to hesitate
2. **Grope** ***(verb):*** to feel about blindly
3. **Shroud** ***(noun):*** a length of cloth

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 theme of the poem?
    A. Tragedy and adversity builds character by testing people's patience.
    B. Resiliency and hope will help people get through even the toughest of times.
    C. The experience of fighting and war should teach everyone the importance of peace.
    D. Life should be spent celebrating rather than mourning, because adversity is temporary.

2. PART B: Which of the following quotes best supports the answer to Part A?
    A. "My heart be brave, and do not falter so, / Nor utter more that deep, despairing wail." (Lines 1-2)
    B. "Look up, and out, beyond, surrounding clouds, / And do not in thine own gross darkness grope" (Lines 9-10)
    C. "Rise up, and casting off thy hind'ring shrouds" (Line 11)
    D. "Tho' thick the battle and tho' fierce the fight, / There is a power making for the right." (Lines 13-14)

3. How does the word choice in the poem contribute to its tone?
    A. The poem uses phrases such as "bright and blushing morn," suggesting that the speaker is excited for what will happen in the future, contributing to a gleeful tone.
    B. The poem uses words such as "despairing" and "drear," revealing that the speaker is upset about the current situation, conveying a pessimistic tone.
    C. The poem uses phrases such as "my heart," implying that the speaker is addressing a loved one, contributing to a affectionate tone.
    D. The poem uses phrases such as "rise up" and "fierce the fight," suggesting the speaker feels inspired to act, contributing to an impassioned tone.

4. How does the poem's use of imagery develop the theme of the poem? Cite evidence from the text in your answer.

5. How does the structure of the poem contribute to its meaning? Cite evidence from the text 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. Why do you think the speaker cautions the reader not to “grope” in their own “darkness”? What does this mean?

2. In the context of this poem, how does a person overcome adversity? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

3. In the context of this poem, what does it mean to be brave? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

Name: _____ Class: _____

Grit: The Power of Passion and Perseverance

By Angela Lee Duckworth
2013

Angela Lee Duckworth is a psychologist and author who studies grit and self-control at the University of Pennsylvania. In this TED Talk, Duckworth discusses the role that grit plays in success. As you read, take notes on what grit is and how it impacts an individual's ability to overcome obstacles.

[1] When I was 27 years old, I left a very demanding job in management consulting for a job that was even more demanding: teaching. I went to teach seventh graders math in the New York City public schools. And like any teacher, I made quizzes and tests. I gave out homework assignments. When the work came back, I calculated grades.

"high School students in various classroom settings" by Government of Prince Edward Island is licensed under CC BY-NC-ND 2.0.

What struck me was that IQ was not the only difference between my best and my worst students. Some of my strongest performers did not have stratospheric[1] IQ scores. Some of my smartest kids weren't doing so well. And that got me thinking. The kinds of things you need to learn in seventh grade math, sure, they're hard: ratios, decimals, the area of a parallelogram. But these concepts are not impossible, and I was firmly convinced that every one of my students could learn the material if they worked hard and long enough.

After several more years of teaching, I came to the conclusion that what we need in education is a much better understanding of students and learning from a motivational perspective, from a psychological perspective. In education, the one thing we know how to measure best is IQ. But what if doing well in school and in life depends on much more than your ability to learn quickly and easily?

So I left the classroom, and I went to graduate school to become a psychologist. I started studying kids and adults in all kinds of super challenging settings, and in every study my question was, who is successful here and why? My research team and I went to West Point Military Academy. We tried to predict which cadets[2] would stay in military training and which would drop out. We went to the National Spelling Bee and tried to predict which children would advance farthest in competition. We studied rookie teachers working in really tough neighborhoods, asking which teachers are still going to be here in teaching by the end of the school year, and of those, who will be the most effective at improving learning outcomes for their students? We partnered with private companies, asking, which of these salespeople is going to keep their jobs? And who's going to earn the most money? In all those very different contexts, one characteristic emerged as a significant predictor of success. And it wasn't social intelligence. It wasn't good looks, physical health, and it wasn't IQ. It was grit.

1. extremely high
2. a person being trained for the armed services

[5] Grit is passion and perseverance for very long-term goals. Grit is having stamina. Grit is sticking with your future, day in, day out, not just for the week, not just for the month, but for years, and working really hard to make that future a reality. Grit is living life like it's a marathon, not a sprint.

A few years ago, I started studying grit in the Chicago public schools. I asked thousands of high school juniors to take grit questionnaires, and then waited around more than a year to see who would graduate. Turns out that grittier kids were significantly more likely to graduate, even when I matched them on every characteristic I could measure, things like family income, standardized achievement test scores, even how safe kids felt when they were at school. So it's not just at West Point or the National Spelling Bee that grit matters. It's also in school, especially for kids at risk for dropping out.

To me, the most shocking thing about grit is how little we know, how little science knows, about building it. Every day, parents and teachers ask me, "How do I build grit in kids? What do I do to teach kids a solid work ethic? How do I keep them motivated for the long run?" The honest answer is, I don't know. (Laughter)

What I do know is that talent doesn't make you gritty. Our data show very clearly that there are many talented individuals who simply do not follow through on their commitments. In fact, in our data, grit is usually unrelated or even inversely[3] related to measures of talent.

So far, the best idea I've heard about building grit in kids is something called "growth mindset." This is an idea developed at Stanford University by Carol Dweck, and it is the belief that the ability to learn is not fixed, that it can change with your effort. Dr. Dweck has shown that when kids read and learn about the brain and how it changes and grows in response to challenge, they're much more likely to persevere when they fail, because they don't believe that failure is a permanent condition.

[10] So growth mindset is a great idea for building grit. But we need more. And that's where I'm going to end my remarks, because that's where we are. That's the work that stands before us. We need to take our best ideas, our strongest intuitions, and we need to test them. We need to measure whether we've been successful, and we have to be willing to fail, to be wrong, to start over again with lessons learned.

In other words, we need to be gritty about getting our kids grittier.

Thank you. (Applause)

3. in the opposite manner, position, or order

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 identifies Duckworth's claim in the speech?
    A. A common trait that successful people possess is grit, as it pushes them to persevere despite obstacles.
    B. Teachers are unable to help students succeed if they don't understand what drives them.
    C. Grit is not a trait that is easily developed, rather, it something that people are usually born with.
    D. People who lack talent are more likely to have grit, as they have to work harder for their success.

2. PART B: Which detail from the text best supports the answer to Part A?
    A. "I came to the conclusion that what we need in education is a much better understanding of students and learning from a motivational perspective," (Paragraph 3)
    B. "Grit is sticking with your future, day in, day out, not just for the week, not just for the month, but for years, and working really hard to make that future a reality." (Paragraph 5)
    C. "'How do I build grit in kids? What do I do to teach kids a solid work ethic? How do I keep them motivated for the long run?' The honest answer is, I don't know." (Paragraph 7)
    D. "What I do know is that talent doesn't make you gritty. Our data show very clearly that there are many talented individuals who simply do not follow through on their commitments." (Paragraph 8)

3. What connection does the speaker draw between "growth mindset" and "grit"?
    A. Both growth mindset and grit are necessary for students to succeed.
    B. Students show grit when they understand and develop a growth mindset.
    C. Students can see the effects of growth mindset once they've practiced grit.
    D. Students can't develop grit without understanding growth mindset.

4. How did Duckworth's experiences as a teacher contribute to 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. Do you agree with Duckworth's findings on grit? Why or why not?

2. In the context of the text, what should be the goal of education? How do you think Duckworth's findings can be used to promote greater academic success in students? Cite examples from the text, your own experience, and other literature, art, or history in your answer.

3. In the context of the text, what does it take to succeed? Do you think that grit is a necessary trait in all forms of success? Why or why not?

4. Do you think grit is an important part of an individual's identity? Why or why not? Do you think it matters whether or not you are born with grit or develop grit? Cite examples from the text, your own experience, and other literature, art, or history in your answer.

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."

Name: _____ Class: _____

We Wear the Mask

By Paul Laurence Dunbar
1896

Paul Laurence Dunbar (1872-1906) was one of the first African American authors to reach a national and international audience. Best known as a poet, Dunbar published his first poems at age 16. ***Skill Focus:*** *In this lesson, you'll practice analyzing an author's use of figurative language. This means paying attention to similes and metaphors. As you read, take note of the comparisons and the message they reveal.*

We wear the mask that grins and lies,
It hides our cheeks and shades our eyes, —
This debt[1] we pay to human guile;[2]
With torn and bleeding hearts we smile,
And mouth with myriad subtleties.[3]

Why should the world be over-wise,
In counting all our tears and sighs?
Nay, let them only see us, while
We wear the mask.

We smile, but, O great Christ, our cries
To thee from tortured souls arise.
We sing, but oh the clay is vile[4]
Beneath our feet, and long the mile;
But let the world dream otherwise,
We wear the mask!

"Untitled" by Nick Owuor (astro.nic.visuals) is licensed under CC0

"We Wear the Mask" by Paul Laurence Dunbar (1896) is in the public domain.

1. Here, having a debt to pay means having an obligation, or something one must do.
2. **Guile** ***(noun):*** clever but sometimes dishonest behavior that one uses to deceive others
3. "Mouth with myriad subtleties" may refer to the many expectations for "respectful" speech, such as calling someone sir or ma'am.
4. **Vile** ***(adjective):*** extremely unpleasant; wicked or immoral

Text-Dependent Questions

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

1. Which of the following best describes a central theme of the text?
    A. Identity comes from what we do and are, not what we look like.
    B. Social pressure can turn independent people into just faces in a crowd.
    C. Being sad and upset by tragedy is okay, and people should not hide it away.
    D. Silence allows people to stay strong in difficult situations, even though it does have consequences.

2. Which of the following quotes best supports the idea of why people wear masks?
    A. "This debt we pay to human guile" (Line 3)
    B. "Why should the world be over-wise, / In counting all our tears and sighs?" (Lines 6-7)
    C. "O great Christ, our cries / To thee from tortured souls arise." (Lines 10-11)
    D. "We sing, but oh the clay is vile / Beneath our feet, and long the mile" (Lines 12-13)

3. Why must the people (the "we" mentioned) wear the mask?
    A. The people wear the mask to protect their faces and themselves.
    B. The people wear the mask because they are told to by the larger society.
    C. The people wear the mask to keep their identities a secret.
    D. The people wear the mask to hide their suffering.

4. The speaker says, "We sing, but oh, the clay is vile / Beneath our feet, and long the mile." (Lines 12-13) What is the most likely interpretation of these lines?
    A. The people dislike the journey, so they sing a happy song to make themselves feel better.
    B. The people's lives are difficult, but they pretend to feel joy when others can see.
    C. The people are on a gross and muddy road, but they still enjoy traveling together.
    D. The people have to travel a very long way, and the song helps them pass the time.

5. How does the poet use figurative language to develop the theme in “We Wear the Mask”?

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 Paul Laurence Dunbar and the status of black Americans in the early twentieth century, why does the speaker feel the need to wear a mask?

2. Think of other situations where people might wear masks (not literal masks).Do you think a person should hide their emotions? Why or why not?

3. In the context of this poem, how do people overcome adversity? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

4. Does the speaker seem genuine when he recommends wearing “the mask?” Consider when the poem was written and the tone the speaker uses.

Captive youth sports audience helps to raise money just by being there

By Philadelphia Inquirer, adapted by Newsela staff on 08.22.17
Word Count **1,013**
Level **1240L**

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 "living the dream" as two single guys in their mid-20s sharing an apartment in the city, free of daunting family responsibilities. In other words, they have no kids.

Yet, they work on behalf of kids daily as founders of the startup LeagueSide. Written atop 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 funding for uniforms, equipment, field rentals and referees — mom-and-pop pizza shops, local hardware stores and players’ parents. LeagueSide helps groups to land sponsorships from regional and national brands.

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

2017 Is Shaping Up As A Huge Funding Year

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 just this year, he said, though he declined to disclose how much of that money the business takes.

While its millennial staff of 12 is expected to expand to 20 by the end of the year, it still would not be big enough for LeagueSide to realize its goal of opening regional offices. So LeagueSide soon plans to raise funds of $3 million to $5 million from investors. Last year, it raised $750,000 from investors, including Ben Franklin Technology Partners, cigar businessman Marvin Samel and former NFL player Ronnie Lott.

"What is so exciting as we grow," said Teherani, 26, LeagueSide's chief operating officer, "is not only is this a scalable company that is worth a lot of money; simultaneously, we're giving back money to communities."

The Lightbulb Moment

The idea came to Brandoff a couple of years ago when he was in Detroit, Michigan, as a Venture for America fellow. He was running business-to-business sales and advertising for Benzinga.com, a financial-media company. He met Teherani at Venture for America training.

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

"Effective local marketing plus helping kids play sports equals huge win-win," Brandoff said.

Lowering Sports Enrollment Costs Is Working

Fragmentation makes reaching youth sports audiences a monumental effort, even for large companies with big marketing budgets. LeagueSide estimates that there are 38 million kids playing youth sports in the United States. Many towns have multiple sports leagues, almost all run by volunteers.

With its hyperlocal sponsorships, LeagueSide can "reach families in an engaged setting" with customized campaigns. Efforts include banners, coupons, coach-of-the-year contests, email blasts 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, playing sports."

The sponsorships are intended to enable leagues to lower enrollment costs for families and cover the expenses for kids whose parents cannot afford to pay anything. Brandoff said LeagueSide's work has had an impact on more than 500,000 families, either in lower registration fees or through 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.

No Selling, No Problem

Working in some of Philadelphia's neediest neighborhoods, Felix Agosto, chief executive of MVP360 Community Programs, said he has kept registration costs at around $40 a sport. He said

this is despite continuing growth since he founded the youth sports nonprofit in 2012.

“The more kids we have, the more costs,” said Agosto, a father of two who does not like to ask parents to raise funds because they are already paying a registration fee. When he heard of LeagueSide, Agosto figured there was no harm in trying it, especially when he found out that, unlike other programs, it did not require him to sell anything.

The only ask, Agosto said, is that MVP360 make two social-media posts, send out two emails to parents, and hang a banner at sporting events — all referencing LeagueSide sponsors. For MVP360, those have been a health care network, law firm, and 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 educationally relevant from the sponsors relating to sports. Some examples are tips on avoiding or treating injuries. LeagueSide creates the content, which Agosto said organizations such as his welcome, given limited resources.

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

The Smoothie King Example

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

While radio has a broad reach, its audience often is “hearing a message and forgetting about it,” said Young, who studied advertising and marketing at Villanova University in Pennsylvania. His Smoothie King territory is the Mid-Atlantic and Northeast.

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, on the field their store owners will be there sampling, he said.

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

Name: _____ Class: _____

“Hope” is the thing with feathers - (254)

By Emily Dickinson
1891

Emily Dickinson (1830-1886) was an American poet who lived a mostly introverted, secluded life. She wrote over 1,800 poems — many of which deal with themes of death and immortality — in her seclusion. The following poem was first published in 1891 and discusses the nature of hope. As you read, take notes on Dickinson's symbol of hope and the figurative language used to describe it.

[1] “Hope” is the thing with feathers —
That perches in the soul —
And sings the tune without the words —
And never stops — at all —

[5] And sweetest — in the Gale[1] — is heard —
And sore[2] must be the storm —
That could abash[3] the little Bird
That kept so many warm —

I’ve heard it in the chillest land —
[10] And on the strangest Sea —
Yet — never — in Extremity,[4]
It asked a crumb — of Me.

"Feathers in Black and White" by arbyreed is licensed under CC BY-NC-SA 2.0

1. **Gale** ***(noun):*** strong wind
2. In this case, “sore” refers to the severity or terribleness of this hypothetical storm.
3. **Abash** ***(verb):*** to destroy the self-confidence of; to bewilder or embarrass
4. **Extremity** ***(noun):*** the furthest limit; or the extreme degree or nature of something

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 poem?
    A. Love and family help people get through tough times.
    B. Nature is the natural opponent of people.
    C. Overcoming obstacles requires great hope, strength, and resilience.
    D. One can always rely on hope to help overcome obstacles.

2. PART B: Which of the of the following quotes best supports the answer to Part A?
    A. "'Hope' is the thing with feathers" (Line 1)
    B. "That perches in the soul — / ... And never stops — at all" (Lines 2-4)
    C. "sore must be the storm — / That could abash" (Lines 6-7)
    D. "I've heard it in the chilliest land — / And on the strangest Sea — " (Lines 9-10)

3. PART A: What does the storm most likely represent?
    A. Hardship
    B. Death
    C. Sadness
    D. Danger

4. PART B: Which of the following quotes best supports the answer to Part A?
    A. "'Hope' is the thing with feathers" (Line 1)
    B. "sings the tune without the words" (Line 3)
    C. "abash the little Bird" (Line 7)
    D. "the strangest Sea" (Line 10)

5. What does the last stanza suggest about the speaker's point of view regarding hope?
    A. The speaker has experienced some troubled times but is now in a much better place.
    B. The speaker thinks of hope as the only source of comfort in his/her life, even more than food (i.e. the "crumb").
    C. The speaker thinks hope is helpful, but only to a certain point.
    D. The speaker, having experienced adversity, regards hope in a positive light, as it never asked anything of him/her.

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 this poem, how do people overcome adversity? Use evidence from this poem, your own experience, and other literature or art in your answer.

2. How do the descriptions of nature contribute to the meaning of the poem? Is the comparison of hope to a bird effective? Why or why not?

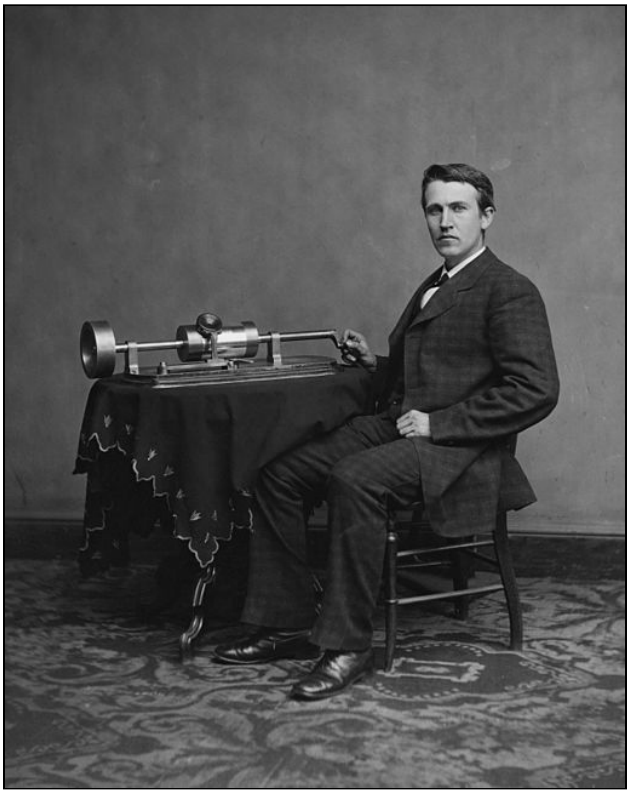
Name: _____ Class: _____

The History of the Cylinder Phonograph

By The Library of Congress
2016

Thomas Edison (1847-1931), an American inventor and businessman, is often described as America's greatest inventor. While Edison is arguably best known for his invention of the lightbulb, his invention of the phonograph also had a great influence on life around the world. As you read, take notes on how Edison continues to improve upon his invention.

[1] The phonograph was developed as a result of Thomas Edison's work on two other inventions, the telegraph[1] and the telephone. In 1877, Edison was working on a machine that would transcribe telegraphic messages through indentations on paper tape, which could later be sent over the telegraph repeatedly. This development led Edison to speculate that a telephone message could also be recorded in a similar fashion. He experimented with a diaphragm[2] which had an embossing[3] point and was held against rapidly-moving paraffin paper.[4] The speaking vibrations made indentations in the paper. Edison later changed the paper to a metal cylinder with tin foil wrapped around it. The machine had two diaphragm-and-needle units, one for recording, and one for playback. When one would speak into a mouthpiece, the sound vibrations would be indented onto the cylinder by the recording needle in a vertical (or hill and dale)[5] groove patter. Edison gave a sketch of the machine to his mechanic, John Kruesi, to build, which Kruesi supposedly did within 30 hours. Edison immediately tested the machine by speaking the nursery rhyme into the mouthpiece, "Mary had a little lamb." To his amazement, the machine played his words back to him.



"Edison and phonograph" by Levin C. Handy is in the public domain.

1. a system for transmitting messages from a distance along a wire
2. a thin sheet of material creating a division
3. creating a mold or stamp of a design on a surface
4. wax paper
5. A dale is a valley.

Although it was later stated that the date for this event was on August 12, 1877, some historians believe that it probably happened several months later, since Edison did not file for a patent[6] until December 24, 1877. Also, the diary of one of Edison's aides, Charles Batchelor, seems to confirm that the phonograph was not constructed until December 4, and finished two days later. The patent on the phonograph was issued on February 19, 1878. The invention was highly original. The only other recorded evidence of such an invention was in a paper by French scientist Charles Cros, written on April 18, 1877. There were some differences, however, between the tow men's ideas, and Cros's work remained only theory, since he did not produce a working model of it.

Edison took his new invention to the offices of Scientific American in New York City and showed it to staff there. As the December 22, 1877, issue reported, "Mr. Thomas A. Edison recently came into this office, placed a little machine on our desk, turned a crank, and the machine inquired as to our health, asked how we liked the phonograph, informed us that it was very well, and bid us a cordial[7] good night." Interest was great, and the invention was reported in several New York newspapers, and later in other American newspapers and magazines.

The Edison Speaking Phonograph Company was established on January 24, 1878, to exploit the new machine by exhibiting it. Edison received $10,000 for the manufacturing and sales rights and 20% of the profits. As a novelty, the machine was an instant success, but was difficult to operate except by experts, and the tin foil would last for only a few playings.

[5] Ever practical and visionary,[8] Edison offered the following possible future uses for the phonograph in North American Review in June 1878:

1. Letter writing and all kinds of dictation[9] without the aid of a stenographer.[10]

2. Phonographic books, which will speak to blind people without effort on their part.

3. The teaching of elocution.[11]

4. Reproduction of music.

[10] 5. The "Family Record" – a registry of sayings, reminiscences, etc., by members of a family in their own voices, and of the last words of dying persons.

6. Music-boxes and toys.

7. Clocks that should announce in articulate speech the time for going home, going to meals, etc.

8. The preservation of languages by exact reproduction of the manner of pronouncing.

6. the right granted by the government to an inventor to create, use, or sell an invention
7. warm and friendly
8. **Visionary** ***(adjective):*** having or showing clear ideas about what should happen or be done in the future
9. the action of saying words aloud to be written down
10. a person employed to write
11. the skill of clear and expressive speech

9. Educational purposes; such as preserving the explanations made by a teacher, so that the pupil can refer to them at any moment, and spelling or other lessons placed upon the phonograph for convenience in committing to memory.

[15] 10. Connection with the telephone, so as to make that instrument an auxiliary[12] in the transmission of permanent and invaluable records, instead of being the recipient of momentary and fleeting communication.

Eventually, the novelty of the invention wore off for the public, and Edison did no further work on the phonograph for a while, concentrating instead on inventing the incandescent[13] light bulb.

12. a thing providing additional help or support
13. emitting light as a result of being heated

Text-Dependent Questions

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

1. PART A: In paragraph 4, what is the meaning of the word “exploit”?
    A. research
    B. promote
    C. improve
    D. defend

2. PART B: What phrase from paragraph 4 supports the answer to Part A?
    A. “machine was an instant success.”
    B. “difficult to operate”
    C. “except by experts”
    D. “last for only a few playings”

3. PART A: Which part of the invention process was most likely the key step for securing the patent?
    A. testing the machine
    B. improving the machine’s parts
    C. constructing the original machine
    D. demonstrating the machine to the public

4. PART B: Which statement from the passage supports the answer to Part A?
    A. “Edison later changed the paper to a metal cylinder with tin foil wrapped around it.” (Paragraph 1)
    B. “To his amazement, the machine played his words back to him.” (Paragraph 1)
    C. “and Croc’s work remained only a theory, since he did not produce a working model of it.” (Paragraph 2)
    D. “Interest was great, and the invention was reported in several New York newspapers” (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. What are examples of a modern phonograph? How do you benefit from Thomas Edison's invention today?

2. In the context of the text, what are the costs and benefits of technology? How did Thomas Edison's invention contribute to society? What are some possible disadvantages to Edison's development of this technology? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

3. In the context of the text, why do people succeed? How did Thomas Edison ensure that his invention was a success? Cite evidence from this text, your own experience, and other literature, art, or history 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.

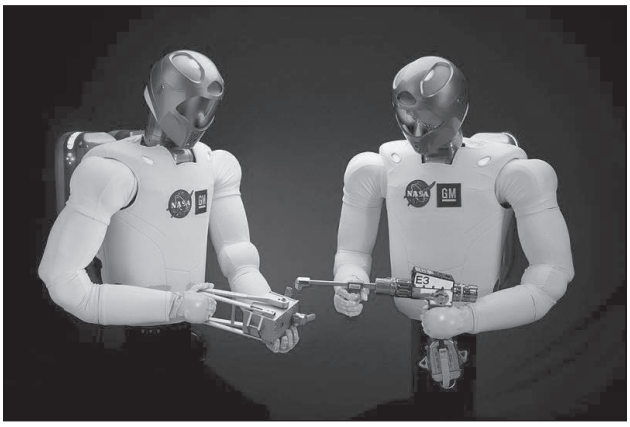
Name: _____ Class: _____

What is a Robonaut?

By NASA

In this informational text, NASA discusses the humanoid robots that will likely work alongside humans in space. As you read, take notes on how Robonauts could be useful in space.

[1] A Robonaut is a dexterous humanoid[1] robot built and designed at NASA Johnson Space Center in Houston, Texas. Our challenge is to build machines that can help humans work and explore in space. Working side by side with humans, or going where the risks are too great for people, Robonauts will expand our ability for constructions and discovery. Central to that effort is a capability we call dexterous manipulation, embodied by an ability to use one's hand to do work, and our challenge has been to build machines with dexterity that exceeds that of a suited astronaut.



"Robonaut 2 working" by NASA is in the public domain.

There are currently four Robonauts, with others in development. This allows us to study various types of mobility, control methods, and task applications. The value of a humanoid over other designs is this ability to use the same workspace and tools — not only does this improve efficiency in the types of tools, but also removes the need for specialized robotic connectors. Robonauts are essential to NASA's future as we go beyond low earth orbit and continue to explore the vast wonder that is space.

Robonaut 2 or R2, launched to the International Space Station on space shuttle Discovery as part of the STS-133 mission, it is the first dexterous humanoid robot in space, and the first U.S.-built robot at the space station. But that was just one small step for a robot and one giant leap for robot-kind.

Initially R2 will be deployed on a fixed pedestal inside the ISS.[2] Next steps include a leg for climbing through the corridors of the Space Station, upgrades for R2 to go outside into the vacuum of space, and then future lower bodies like legs and wheels to propel the R2 across Lunar and Martian terrain. A four wheeled rover[3] called Centaur 2 is being evaluated at the 2010 Desert Field Test in Arizona as an example of these future lower bodies for R2.

1. something resembling a human
2. International Space Station
3. a vehicle for driving over rough terrain, especially controlled remotely

Robonaut 2

[5] In the current iteration[4] of Robonaut, Robonaut 2, or R2, NASA and General Motors are working together with assistance from Oceaneering Space Systems engineers to accelerate development of the next generation of robots and related technologies for use in the automotive and aerospace industries. Robonaut 2 (R2) is a state of the art highly dexterous anthropomorphic[5] robot. Like its predecessor Robonaut 1 (R1), R2 is capable of handling a wide range of EVA[6] tools and interfaces, but R2 is a significant advancement over its predecessor. R2 is capable of speeds more than four times faster than R1, is more compact, is more dexterous, and includes a deeper and wider range of sensing. Advanced technology spans the entire R2 system and includes: optimized overlapping dual arm dexterous workspace, series elastic joint technology, extended finger and thumb travel, miniaturized 6-axis load cells, redundant force sensing, ultra-high speed joint controllers, extreme neck travel, and high resolution camera and IR[7] systems. The dexterity of R2 allows it to use the same tools that astronauts currently use and removes the need for specialized tools just for robots.

One advantage of a humanoid design is that Robonaut can take over simple, repetitive, or especially dangerous tasks on places such as the International Space Station. Because R2 is approaching human dexterity, tasks such as changing out an air filter can be performed without modifications to the existing design.

Another way this might be beneficial is during a robotic precursor mission. R2 would bring one set of tools for the precursor mission, such as setup and geologic investigation. Not only does this improve efficiency in the types of tools, but also removes the need for specialized robotic connectors. Future missions could then supply a new set of tools and use the existing tools already on location.

4. a new version
5. having human characteristics
6. extra-vehicular activity; activity done by an astronaut outside a spacecraft beyond Earth's atmosphere
7. InfraRed

Text-Dependent Questions

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

1. The word "dexterous" is used several times in the passage. What is the meaning of "dexterous" as used in the passage?
    A. skillful
    B. experienced
    C. intelligent
    D. quick

2. PART A: Paragraph 3 contains an allusion to American astronaut Neil Armstrong's statement when, as the first person ever to walk on the Moon, he said: "That's one small step for man, one giant leap for mankind." What is the author implying by the allusion to Armstrong's statement in paragraph 3?
    A. Like Armstrong's Moon landing, the launch of the first Robonaut aboard the Discovery represents a historic breakthrough in space exploration.
    B. The use of R2 aboard the International Space Station will make space exploration safer for astronauts in the future.
    C. In the future, human astronauts like Neil Armstrong will unfortunately be replaced with humanoid robots like R2.
    D. Compared to the launch of R2 aboard the space shuttle Discovery, Neil Armstrong's Moon landing was only a minor achievement.

3. PART B: What piece of evidence from the passage best supports the answer to Part A?
    A. "our challenge has been to build machines with dexterity that exceeds that of a suited astronaut." (Paragraph 1)
    B. "not only does this improve efficiency in the types of tools, but also removes the need for specialized robotic connectors." (Paragraph 2)
    C. "Next steps include a leg for climbing through the corridors of the Space Station" (Paragraph 4)
    D. "Robonaut can take over simple, repetitive, or especially dangerous tasks" (Paragraph 6)

4. PART A: Why does the author explain Robonauts' abilities in detail?
    A. to outline the history of Robonauts abilities in detail
    B. to demonstrate the benefits of using Robonauts
    C. to explain how Robonauts might be useful in everyday life
    D. to persuade readers that Robonauts' skills have applications for other types of work beyond space exploration

5. PART B: Which detail from the passage supports the answer to Part A?
    A. "Robonauts are essential to NASA's future" (Paragraph 2)
    B. "But that was just one small step for a robot" (Paragraph 3)
    C. "Centaur 2 is being evaluated… as an example of these future lower bodies" (Paragraph 4)
    D. "for use in the automotive and aerospace industries." (Paragraph 5)

6. PART A: How does paragraph 4 contribute to the topic of the passage?
    A. It explains some improvements planned for the R2 to make it more useful.
    B. It adds details about the R2 that was launched on the space shuttle.
    C. It provides a comparison between the R2 and previous models.
    D. It states conclusions about the value of having the R2 on space missions.

7. PART B: Which additional paragraph contributes to the development of the topic in a similar way?
    A. Paragraph 2
    B. Paragraph 3
    C. Paragraph 5
    D. Paragraph 6

8. PART A: Which statement from the passage is a reasoned judgment?
    A. "The value of a humanoid over other designs is the ability to use the same workspace and tools" (Paragraph 2)
    B. "it is the first dexterous humanoid robot in the space" (Paragraph 3)
    C. "NASA and General Motors are working together with assistance from Oceaneering Space Systems engineers" (Paragraph 5)
    D. "Another way this might be beneficial is during a robotic precursor mission." (Paragraph 7)

9. PART B: Which additional statement from the passage is also a reasoned judgment?
    A. "There are currently four Robonauts, with others in development." (Paragraph 2)
    B. "R2 is a significant advancement over its predecessor." (Paragraph 5)
    C. "Robonaut can take over simple, repetitive, or especially dangerous tasks on places such as the International Space Station." (Paragraph 6)
    D. "R2 would bring one set of tools for the precursor mission, such as setup and geologic investigation." (Paragraph 7)

10. PART A: What is one central idea that is developed in the passage?
    A. Robonauts can work more efficiently than astronauts.
    B. Use of robonauts will replace astronauts in space travel.
    C. Robonauts can make more reliable decisions about spacecraft maintenance than humans.
    D. Use of robonauts will allow space exploration to exceed what humans alone can do.

11. PART B: Which detail from the passage best supports the answer to Part A?
    A. "going where the risks are too great for people" (Paragraph 1)
    B. "includes a deeper wider range of sensing." (Paragraph 5)
    C. "allows it to use the same tools that astronauts currently use" (Paragraph 5)
    D. "tasks such as changing out an air filter can be performed without modifications to the existing design." (Paragraph 6)

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, the author focuses on the many benefits of a Robonaut. Do you think there could be any risks of using Robonauts for missions in space? Are there some jobs in space that you think require human thought and action? If so, what are they?

2. Robonauts will eventually complete the tasks that are too dangerous for astronauts. What are other dangerous jobs humanoid robots could be useful for?

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."

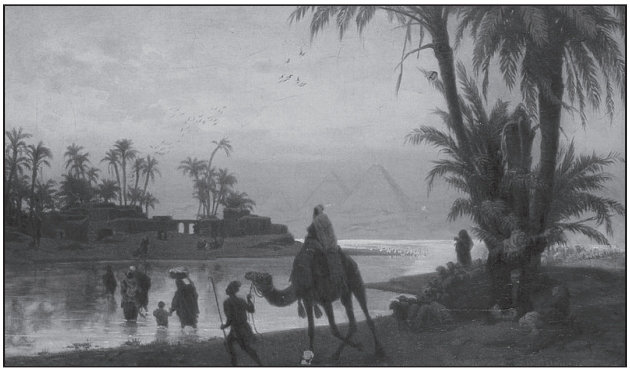
Name: _____ Class: _____

Developing Civilization in Ancient Egypt

By USHistory.org
2016

Egypt is a modern-day country that was one of the first regions of the world to be a cradle of civilization. Civilization first emerged in the northeast corner of Africa along the 4,200 mile Nile River over 5,000 years ago. In 3150 B.C., Menes united Upper and Lower Egypt and founded the first dynasty of Egypt. As you read, note the ways that civilization is able to grow, and how one development of civilization affects another.

[1] Hieroglyphs, pyramids, mummies, the Sphinx of Giza, King Tut, and Cleopatra — the sands of the Nile River Valley hold many clues about one of the most mysterious, progressive, and artistic ancient civilizations. A great deal of evidence survives about how the ancient Egyptians lived, but questions remain. Even the wise sphinx[1] would have trouble answering some of them. How were the pyramids built? Who came up with the idea for mummies and why? What was a typical day like for a pharaoh?[2]



"The River Nile with the Giza Pyramids" by Otto Heyden is in the public domain.

Something we can know is that Ancient Egypt had the five major components of civilization: cities, specialized workers, complex governing institutions, record keeping, and advanced technology.

In De-Nile

None of the achievements of the remarkable ancient Egyptian civilization would have been possible without the Nile River. There is always a connection between landscape and how a people develop. It does not take the wisdom of a sphinx to understand why.

Archaeologists[3] and historians don't know exactly how Egyptian civilization evolved. It is believed that humans started living along the Nile's banks starting in about 6000 B.C. Uncovered remains reveal that Neolithic (late Stone Age) people thrived[4] in the Nile Valley that far back. But it wasn't until 3800 B.C. that the valley's inhabitants began to form a cohesive[5] civilization. In 3000 B.C., Egypt looked similar geographically to the way it looks today. The country was mostly covered by desert. But along the Nile River was a fertile swath that proved — and still proves — a life source for many Egyptians.

1. A sphinx is a mythical creature with the head of a human and body of a lion. The Great Sphinx of Giza is a large stone statue that can be seen near the pyramids of Giza.
2. The pharaoh is the monarch, or royal ruler, of Egypt.
3. someone who studies the science of past human life and activities by studying the artifacts of ancient people
4. **Thrive** ***(verb):*** to grow or develop successfully
5. **Cohesive** ***(adjective):*** closely united

[5] The Nile is the longest river in the world; it flows northward for nearly 4,200 miles. In ancient times, crops could be grown only along a narrow, 12-mile stretch of land that borders the river. Early Egyptians grew crops such as beans, wheat, and cotton. Despite the lack of many natural resources, such as forests or an abundance[6] of land for farming, a great society emerged.

Food for Thought

For the earliest inhabitants[7] of the Nile Valley, food was not easy to find. There were no McTut's selling burgers, and, though there were a lot of crocodiles, those critters were pretty hard to catch.

Over time, however, despite being in the midst of desert surroundings, people discovered that the Nile River provided many sources of food. Along the river were fruit trees, and fish swam in the Nile in great numbers.

Perhaps most importantly, they discovered that, at the same time each year, the Nile flooded for about six months. As the river receded,[8] it deposited a rich, brown layer of silt[9] that was suitable for growing wheat, beans, barley, or even cotton. Farmers learned to dig short canals leading to fields near the Nile, thus providing fresh water for year-round irrigation.[10] Planting immediately after a flood yielded harvests before the next year's flood.

The road to civilization required more organization and increased efficiency. Farmers began producing surplus[11] crops that allowed others to move their concentration from farming to pursuing other trades, such as mercantilism[12] or skilled craftwork. This development of specialized workers is a hallmark[13] of civilization.

[10] Egyptian artisans[14] created copper tools such as chisels and needles — all new inventions — that allowed them to fabricate ornamental jewelry. Artisans discovered how to make bronze by mixing copper and tin, which marked the beginning of the Bronze Age. Evidence also suggests that ancient Egyptians invented the potter's wheel. This tool made it easier to create pots and jars for storage, cooking, religious needs, and decoration.

Prime Time

One of the ancient Egyptians' inventions, the calendar, has helped define time itself. In order to know when to plant, the Egyptians needed to track days. They developed a calendar based on the flooding of the Nile that proved remarkably accurate. It contained a year of 365 days divided into 12 months of 30 days each. The five extra days fell at the end of the year.

6. **Abundance** ***(noun):*** a large amount of something
7. **Inhabitant** ***(noun):*** a person or animal that lives in a particular place
8. **Recede** ***(verb):*** to move or back away
9. fine sand, clay, or other material carried and deposited by running water
10. the artificial watering of land for plant growth
11. **Surplus** ***(noun):*** an amount that is more than the amount needed
12. Mercantilism is the practice of profitable trading, such as between merchants.
13. a quality that is typical to a particular person or thing
14. a person who is skilled at making things by hand

Here's a problem that the sphinx might have trouble answering: how did the ancient Egyptians make their calendars? What material did they use? Remember, there was no paper. Need a clue? Take a dip in the Nile.

Large reeds[15] called papyrus grew wild along the Nile. The Egyptians developed a process that turned these reeds into flattened material that could be written on (also called papyrus). In fact, the English word "paper" has its root in the ancient Greek word "papyrus." Among the first things written on papyrus were calendars that tracked time.

Papyrus had many other uses. Boats were constructed by binding the reeds together in bundles. Baskets, mats, rope, and sandals were also fashioned from this multipurpose material.

[15] Writing set the Egyptians apart from some of their neighbors. Egyptians used hieroglyphics or pictures to represent words or sounds. This early form of writing was discovered by the Western world after Napoleon's army invaded Egypt in 1798.[16] The Rosetta Stone, a black tablet containing inscriptions, was deciphered[17] and became crucial in unlocking the mystery of hieroglyphics and understanding Egyptian history.

Sand, Land, and Civilization

Even today, the world around the Nile is quite barren.[18] Outside of the narrow swath of greenery next to the river, there is sand as far as the eye can see. To the Nile's west exists the giant Sahara Desert, the largest desert in the world.

From north to south, the Sahara is between 800 and 1,200 miles wide; it stretches over 3,000 miles from east to west. The total area of the Sahara is more than 3.5 million square miles. It's the world's biggest sandbox.

And, as if there weren't enough sand in the Sahara, east of the Nile are other deserts.

Although sand had limited uses, these deserts presented one tremendous strategic advantage: few invaders could ever cross the sands to attack Egypt — the deserts proved too great a natural barrier.

[20] After learning to take advantage of the Nile's floods — and not having to fear foreign attacks — the Egyptians concentrated on improving farming techniques. As the years passed, Egyptians discovered that wheat could be baked into bread, that barley could be turned into soup (or even beer), and that cotton could be spun into clothing.

With many of life's necessities provided, the Egyptians started thinking about other things, such as art, government, religion, and philosophy — some of the basics needed to create a civilization. The pharaohs emerged, ruling Egypt for about 3,000 years. They were by and large capable administrators, strong military leaders, sophisticated traders, and overseers of great building projects. Eventually, pyramids, mummies, and great cities became touchstones[19] of this flourishing[20] culture.

15. A reed is a thin, tall grass that grows in wet areas.
16. Napoleon Bonaparte was a French military and political leader who declared himself emperor of the French from 1804-1814.
17. **Decipher** ***(verb):*** to figure out the meaning of something that is difficult to read or understand
18. **Barren** ***(adjective):*** bare or empty

Ancient Egyptian civilization lasted for several thousand years. Many of its discoveries and practices have survived an even greater test of time.

19. A touchstone is a standard by which other things are judged or recognized.
20. **Flourish** ***(verb):*** to grow and do very well

Text-Dependent Questions

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

1. PART A: Which of the following phrases best expresses the central idea of the article?
    A. Egypt would have developed civilization sooner if they built canals that forced the Nile River to flood less often.
    B. The natural environment protected Egyptians from invaders and also played a critical role in their development of agriculture and calendars.
    C. Egyptians would not have been able to predict the Nile's flooding without the invention of papyrus paper.
    D. The desert was an important resource because it not only provided protection from invaders, but also rocks for building and salt for trading.

2. PART B: Which of the following phrases from the text best supports the answer to Part A?
    A. "There is always a connection between landscape and how a people develop." (Paragraph 3)
    B. "Among the first things written on papyrus were calendars that tracked time." (Paragraph 13)
    C. "Writing set the Egyptians apart from some of their neighbors. Egyptians used hieroglyphics or pictures to represent words or sounds." (Paragraph 15)
    D. "[The pharaohs] were by and large capable administrators, strong military leaders, sophisticated traders, and overseers of great building projects." (Paragraph 21)

3. Which statement best describes the relationship between the Nile and timekeeping?
    A. The Egyptians used the annual flooding of the Nile to keep track of the time of day.
    B. The Egyptians developed calendars based on the moon to help them predict when the Nile would flood.
    C. The Egyptians used the predictable flooding of the Nile to create accurate calendars to help them plant crops.
    D. The Egyptians planted their crops just before the Nile would flood to ensure their harvest had proper irrigation and time to grow.

4. How does the section "Sand, Land, and Civilization" contribute to the author's explanation of Egypt's civilization?
    A. It shows how natural boundaries, such as deserts, allowed Egypt to develop its civilization without outside interference.
    B. It reveals how resourceful the Egyptians were to develop civilization in an area that had no access to a reliable water supply.
    C. It reinforces the idea that Egypt was the most unlikely successful ancient civilization to develop because it was located in a desert.
    D. It details elements of ancient Egyptian civilization that are still present in Egypt today.

5. How does the discovery of the uses for papyrus contribute to Egypt's development of civilization?

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 technological advancements did the Egyptians make, and what were the costs and benefits of them?

2. Egypt is one of six cradles of civilization that developed independently from one another around the world. The others are in Mesopotamia, India and China near major rivers, and in South American and Central American jungles and mountains. Based on your knowledge of Egypt, what do you think are some important factors that allowed civilization to first develop?

3. In the context of this article, how do people create change? Cite evidence from the text, your personal experience, and other literature, art, and history in your answer.

4. Egypt is a land of deserts and floods. In the context of this article, who is in control: man or nature?

It's a watch, it's a gadget, it's a medical device: It's Apple Watch

By Associated Press, adapted by Newsela staff on 09.24.18
Word Count **896**
Level **1190L**

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 turn its smartwatch from a niche gadget into a tool for better health by slowly evolving it into a medical device.

The fourth version of the Apple Watch, called Series 4, comes out in late September. The Apple Watch will add features that allow it to take high-quality heart readings and detect falls. It's part of Apple's long-in-the-making strategy to give people a distinct reason to buy a wrist gadget that largely does things smartphones already do.

Since the Apple Watch launched in April 2015, most people have not figured out why they need to buy one. Apple does not release sales figures, but estimates from two analysts 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 anticipated that nearly 1.9 billion phones will be sold, according to the research company Gartner.

New Watch Pushes The Health Envelope

Tim Cook, Apple's CEO, 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, including data on speed and vertical descent.

The latest version, unveiled on September 12, is pushing the health envelope even further. It now takes electrocardiograms, or EKGs, which measure the electrical activity of the heart. EKGs can help to 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 gained an onstage endorsement from Dr. Ivor Benjamin, a cardiologist, or heart specialist, who is president of the American Heart Association. He said such real-time data would change the way doctors work.

From Prestigious To Practical

Gartner analyst Tuong Nguyen said the feature could turn smartwatches "from something people buy for prestige into something they buy for more practical reasons."

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 shows signs of atrial fibrillation, 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 doctors will find the electronic files to be.

Much Is Still Unknown

Eric Topol is a cardiologist and director of the Scripps Research Translational Institute in California. He warned that the EKG feature could spur more tests than necessary, result in unnecessary prescriptions for blood thinners and overwhelm doctors with calls from patients who probably don't need treatment.

He said that while the feature will probably save some lives and prevent strokes with early detection of heart trouble, "the ratio between the benefits and the costs remains a big unknown."

Apple said the EKG feature will be available to U.S. customers later this year, an indication that it might not be ready for launch quite yet.

Slip, Trip And Fall Alerts

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 the latter 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 who are designated as emergency contacts.

Only certain Apple Watch models support cellular calls, but those that don't can still make emergency calls when near a paired iPhone or Wi-Fi service.

Apple says it monitored about 2,500 people, measuring 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.

"I can see kids buying one for their parents and grandparents," researcher Patrick Moorhead said. He works at Moor Insights, a company that studies and advises other companies in the technology industry.

The Missing Link

There are a few drawbacks of the newly released model. The Apple Watch still lacks one feature found in rival wrist gadgets: the ability to analyze sleep quality. Battery life in the new watch remains at 18 hours, meaning it needs a nightly recharge.

Quiz

1 Which of the following sentences from the section "From Prestigious To Practical" BEST develops a central idea of the article?

(A) Gartner analyst Tuong Nguyen said the feature could turn smartwatches "from something people buy for prestige into something they buy for more practical reasons."

(B) It could also lead some health insurance plans to help pay for the cost of an Apple Watch, Nguyen said.

(C) 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.

(D) A new app will say whether each reading is normal or shows signs of atrial fibrillation, an irregular heart rate that increases the risk of heart complications, such as stroke and heart failure.

2 Read the analysis of how the central idea was introduced.

The central idea of the article was introduced by summarizing the new features of the Series 4 Apple Watch. This was meant to immediately show the reader what will be different about Apple's newest product.

How was the CENTRAL idea developed further?

(A) The author included several opinions about the potential effectiveness of the new Apple Watch.

(B) The author provided a description of how Apple developed the special features included in the new watch.

(C) The author developed the counterargument that the Apple Watch will never be as successful as the iPhone.

(D) The author gave a few more examples about wearers' personal experiences with the watch.

3 Which section introduces a point of view that opposes Tuong Nguyen's perspective?

(A) "New Watch Pushes The Health Envelope"

(B) "From Prestigious To Practical"

(C) "Much Is Still Unknown"

(D) "Slip, Trip And Fall Alerts"

4 Which piece of evidence from the article MOST appeals to the reader's sense of emotion?

(A) Apple is trying to turn its smartwatch from a niche gadget into a tool for better health by slowly evolving it into a medical device.

(B) Tim Cook, Apple's CEO, has long emphasized the watch's health and fitness-tracking capabilities.

(C) Apple said the EKG feature will be available to U.S. customers later this year, an indication that it might not be ready for launch quite yet.

(D) "I can see kids buying one for their parents and grandparents," researcher Patrick Moorhead said.

Name: _____ Class: _____

The Sit-In Movement

By USHistory.org
2016

The Civil Rights Movement (1954-1968) was a social movement in the United States during which activists attempted to end racial segregation and discrimination against African Americans. This movement employed several different types of protests. As you read, identify the tactics that civil rights activists used to oppose racial segregation.

[1] By 1960, the Civil Rights Movement had gained strong momentum. The nonviolent measures employed by Martin Luther King Jr.[1] helped African American activists win supporters across the country and throughout the world.

"5 – The U.S. Civil Rights Movement" by U.S. Embassy The Hague is licensed under CC BY-ND 2.0

On February 1, 1960, the peaceful activists introduced a new tactic into their set of strategies. Four African American college students walked up to a whites-only lunch counter at the local Woolworth's store in Greensboro, North Carolina, and asked for coffee. When service was refused, the students sat patiently. Despite threats and intimidation, the students sat quietly and waited to be served.

The civil rights sit-in was born.

No one participated in a sit-in of this sort without seriousness of purpose. The instructions were simple: sit quietly and wait to be served. Often the participants would be jeered and threatened by local customers. Sometimes they would be pelted with food or ketchup. Protestors did not respond when provoked by angry onlookers. In the event of a physical attack, the student would curl up into a ball on the floor and take the punishment. Any violent reprisal would undermine the spirit of the sit-in. When the local police came to arrest the demonstrators, another line of students would take the vacated seats.

[5] Sit-in organizers believed that if the violence were only on the part of the white community, the world would see the righteousness of their cause. Before the end of the school year, over 1500 black demonstrators were arrested. But their sacrifice brought results. Slowly, but surely, restaurants throughout the South began to abandon their policies of segregation.[2]

1. Martin Luther King Jr. (1929-1968) was an American Baptist minister and leader of the African-American Civil Rights Movement.
2. **Segregation** ***(noun):*** the enforced separation of different racial groups

In April 1960, Martin Luther King Jr. sponsored a conference to discuss strategy. Students from the North and the South came together and formed the Student Nonviolent Coordinating Committee (SNCC). Early leaders included Stokely Carmichael[3] and Fannie Lou Hamer.[4] The Congress on Racial Equality (CORE) was a northern group of students led by James Farmer,[5] which also endorsed direct action. These groups became the grassroots[6] organizers of future sit-ins at lunch counters, wade-ins at segregated swimming pools, and pray-ins at white-only churches.

Bolstered[7] by the success of direct action, CORE activists planned the first freedom ride in 1961. To challenge laws mandating segregated interstate transportation, busloads of integrated black and white students rode through the South. The first freedom riders left Washington, D.C., in May 1961 en route to New Orleans. Several participants were arrested in bus stations. When the buses reached Anniston, Alabama, an angry mob slashed the tires on one bus and set it aflame. The riders on the other bus were violently attacked, and the freedom riders had to complete their journey by plane.

New Attorney General Robert Kennedy ordered federal marshals to protect future freedom rides. Bowing to political and public pressure, the Interstate Commerce Commission[8] soon banned segregation on interstate travel. Progress was slow indeed, but the wall between the races was gradually being eroded.

3. Stokely Carmichael (1941-1998) was a prominent activist during the Civil Rights Movement, and was a leader of several groups in support of the rights of black people.
4. Fannie Lou Hamer (1917-1977) was an activist for civil rights and African-American voting rights.
5. James Leonard Farmer Jr. (1920-1999) was a civil rights activist and a leader in the Civil Rights Movement, working alongside Martin Luther King Jr.
6. "Grassroots" are the most basic level of an activity or organization, relying on local support and volunteerism to effect change. Grassroots tactics include fundraising, registering voters, and merely encouraging political conversations among the public
7. **Bolster** ***(verb):*** to support or strengthen
8. The Interstate Commerce Commission regulates railroads and common carriers, such as interstate bus lines, to prevent rate discrimination.

Text-Dependent Questions

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

1. PART A: Which statement best identifies the central idea of the text?
    A. Despite the violence civil rights activists endured, the sit-in movement influenced desegregation and inspired other protests.
    B. Civil rights activists did not believe the sit-in movement would reverse segregation, but they wanted to draw nationwide attention to racial prejudice in the South.
    C. Although Dr. Martin Luther King, Jr. and other civil rights activists used nonviolent means of resistance, they were considered weak by white racists.
    D. The sit-in movement was a brave attempt to end segregation in the South, but it was not as effective as the freedom riders.

2. PART B: Which quote from the text best supports the answer to Part A?
    A. "In the event of a physical attack, the student would curl up into a ball on the floor and take the punishment." (Paragraph 4)
    B. "But their sacrifice brought results. Slowly, but surely, restaurants throughout the South began to abandon their policies of segregation." (Paragraph 5)
    C. "Sit-in organizers believed that if the violence were only on the part of the white community, the world would see the righteousness of their cause." (Paragraph 5)
    D. "Bowing to political and public pressure, the Interstate Commerce Commission soon banned segregation on interstate travel." (Paragraph 8)

3. PART A: What is the meaning of "reprisal" in paragraph 4?
    A. attention
    B. behavior
    C. movement
    D. retaliation

4. PART B: Which detail from paragraph 4 best supports the answer to Part A?
    A. "without seriousness of purpose"
    B. "jeered and threatened by local customers"
    C. "Protestors did not respond when provoked"
    D. "police came to arrest the demonstrators"

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

The tipi goes modern and bright for a special museum exhibit

By Smithsonian.com, adapted by Newsela staff on 03.19.18
Word Count **987**
Level **1190L**

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

Some symbols are so familiar that even with different surroundings, colors and materials, they remain immediately recognizable. That's the case of the five neon-colored tipis that anchor an exhibit called "Manifestipi." The exhibit is on view at the Smithsonian's National Museum of the American Indian's George Gustav Heye Center in New York City.

Created by ITWÉ Collective, a trio of artists based in Winnipeg and Montreal, Canada, the 8-foot-tall structures are made of frosted plexiglass. They look nothing like what we think of as a traditional tipi, also spelled tepee, but are unmistakably that.

"You see the tipi, you immediately recognize it — but the artists are doing something very unconventional with the form," says Kathleen Ash-Milby, associate curator of 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."

"A Powerful Symbol Of Our Culture"

The tension between tradition and change is evoked in the exhibition's multimedia elements. A shifting soundscape, created by audio artist and musician Michel Germain, who worked with ITWÉ on the project, fills the room. On the wall, historic images and illustrations of native people, sourced from the Saint-Boniface archives in Manitoba, Canada, are played in a continuous loop with bright streaks and patches of color added by the artists. The colors of the tipis drift from pink to blue to orange and back.

"We have been evolving tremendously, and the tipi still remains a powerful symbol of our culture," explains artist Caroline Monnet, who is Algonquin North American Indian and French. She is a multimedia artist based in Montreal, Canada, and 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. "However, we cannot put all indigenous people in the same bag. ... We are challenging the tipi as a stereotypical symbol of our culture and therefore making it fun and accessible to all," Monnet said.

To Be Empowering

The title brings to mind the 19th-century belief in "Manifest Destiny." In the 1800s, white U.S. settlers believed that occupying and annexing Native American lands throughout North America was a God-given right. Today, ITWÉ aims to reframe the idea of "manifestation" into something empowering for indigenous people.

"Like, 'manifest something' or reignite something — to manifest your own reality," Burton says. "To try not to get caught up in a downward spiral or wallow in self-hatred. 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 shared a similar sentiment about the meaning of the exhibit's name.

"Manifestipi was created with the aim of opening up dialogue, taking up space as indigenous people but also inviting other nations to be part of our manifestation," she explained.

The Circle Of Open Dialogue

The artists laid out the work in a circle, in a way that resembles a gathering place. Its location is in the lower level of the museum, where the institution traditionally brings groups for education, meetings or performances. A circle is painted onto the room's floor, which evokes the sense of open dialogue that the artists hope will take place among people who visit the exhibit.

The layout also reflects the democratic 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 create art that is distinct from their individual work.

"Kevin has a strong background in filmmaking, new media and community work, Sébastien is coming from his graphic design perspective and I bring some experience in visual arts and filmmaking," Monnet says. "Together, we weave our respective interests, expertise and cultural background to create new works."

An "Urban Indigenous" Tipi

The work itself is an evolution of form and materials. ITWÉ created the original Manifestipi in 2013 as an outdoor work set on The Forks in Winnipeg, Canada. The location is a historic gathering place where two rivers, the Red River and Assiniboine River, meet.

In the outdoor version, the video was projected onto trees, with dry ice 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 by using materials from city surroundings, making a type of a tipi as "urban indigenous," Monnet said. "We wanted to take back territories and space. We wanted to occupy space and grounds."

Burton adds that the work was meant to be a statement about occupied space, reimagining The Forks as if it were still the home of indigenous people.

"We couldn't just go and chop down trees," he explains, "but we sourced the wiring and metal rods for the tipis from local sellers, enacting that process of gathering local materials." Everyone had a hand in building it, he says.

Newly Neon And Transportable

After its exhibition at The Forks, Manifestipi went on to be shown at three galleries throughout Canada, evolving as it traveled. The design changed, the number of tipis grew from one to five, and in 2016, ITWÉ worked with engineers to manufacture the current versions of the neon-colored structures.

The exhibit was made more transportable, too. 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 something that's static or in the past, "tradition is really about things being in motion and changing."

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

By Pittsburgh Post-Gazette, adapted by Newsela staff on 12.22.15
Word Count **747**
Level **1080L**

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

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

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

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

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

Giving From The Ground Up

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

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

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

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

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

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

Going Beyond Social Media

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

Nonprofits that used digital-only campaigns limited to emails and social media posts “didn’t get the highest response rate” from millennials, Feldmann said.

But when nonprofits linked Giving Tuesday to actual events, they got the biggest response from millennials, he said.

The University of North Carolina (UNC) offers one example. A student-giving council and a young graduate leadership council hosted on-campus Giving Tuesday events.

UNC created its own Twitter hashtag, "#TarHeelTuesday," for the day. It also encouraged students to volunteer with a student ambassadors program and to share their photos on Snapchat.

The university raised about $236,000. Its goal was only $150,000. About $23,000 came from millennials, who accounted for 29 percent of all donors.

A combination of digital, community and self-organizing strategies that let millennials "own that day and experience it firsthand will get a good response,” Feldmann said.

Learning The Habit Of Giving

In addition to the Dick's event at Sarah Heinz House, Pittsburgh Cares organized other Giving Tuesday activities, including some involving sorting and packaging toys for the U.S. Marine Corps' Toys for Tots program.

An evening event at the regional Toys for Tots storage facility was designed for families. The idea was to let children help their parents choose and pack toys for boys and girls in need.

"Millennials very much want their children involved," Hopkins said. "I get four or five calls a day from people looking for volunteer opportunities for kids as young as 5 years old."

The idea of linking giving to hands-on participation in charitable causes is not limited to millennials, though, she said.

"I wouldn't say they want that experience more than other people. They are more tech savvy, but we see a tremendous amount of activity among baby boomers and our retired and senior volunteers."

Quiz

1 Read the following excerpt.

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

Which answer choice is the BEST definition of "fulfilling" as used in the sentence?

(A) useful

(B) doable

(C) acceptable

(D) meaningful

2 Read this sentence about Giving Tuesday from the section "Giving From The Ground Up."

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

Which definition has the CLOSEST meaning to the phrase "sparked a wave"?

(A) to create a pleasant surprise

(B) to create a major problem

(C) to cause a large response

(D) to cause an immediate reaction

3 What does the section "Learning The Habit Of Giving" contribute to the article?

(A) a discussion of the volunteering activities of various age groups

(B) a comparison between children and their parents who volunteer

(C) an explanation of different volunteer opportunities for readers

(D) a comparison between millennials and earlier generations of volunteers

4 Which of the following BEST describes the article's organization overall?

(A) It discusses the pros and cons of a current phenomenon.

(B) It investigates the causes of a current phenomenon.

(C) It provides an account of someone's personal experience with a current phenomenon.

(D) It contrasts a current phenomenon with similar events in previous generations.

Name: _____ Class: _____

No Man Is An Island

By John Donne
1624

John Donne (1572-1631) was an English poet whose time spent as a cleric in the Church of England often influenced the subjects of his poetry. In 1623, Donne suffered a nearly fatal illness, which inspired him to write a book of meditations on pain, health, and sickness called Devotions upon Emergent Occasions. *"No Man is an Island" is a famous section of "Meditation XVII" from this book. As you read, take notes on how the author uses figurative language to describe humanity.*

Modern Version

[1] No man is an island entire of itself; every man is a piece of the continent, a part of the main; if a clod[1] be washed away by the sea, Europe is the less, as well as if a promontory[2] were, as [5] well as any manner of thy friends or of thine own were; any man's death diminishes me, because I am involved in mankind.
And therefore never send to know for whom the bell tolls;[3] it tolls for thee.

Early Modern English Version

No man is an Iland, intire of itselfe; every man is a peece of the Continent, a part of the maine; if a Clod bee washed away by the Sea, Europe is the lesse, as well as if a Promontorie were, as well as if a Manor of thy friends or of thine owne were; any mans death diminishes me, because I am involved in Mankinde;
And therefore never send to know for whom the bell tolls; It tolls for thee.

1. a clump of soil
2. a point of high land that juts out into a large body of water, like a peninsula
3. ringing a bell to mark or announce something (such as the time or a person's passing)

Text-Dependent Questions

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

1. Which of the following best describes a theme of the poem?
    A. People tend to care only about themselves and cannot easily connect with others.
    B. Peace among different people and countries is possible through shared grief.
    C. Everyone and everything in the world is connected as part of a larger whole.
    D. Loneliness is one of the worst fates one can suffer and no one should have to bear it.

2. How does the figurative language in lines 1-4 develop the poem's theme?
    A. It compares people to land masses, and when one clod is washed away it lessens the continent; this develops the theme of connection between individuals as parts of a whole.
    B. It compares people to islands, and when one island loses land it only impacts the one island; this develops the theme of people who exist within their own worlds.
    C. It compares the world to the continent of Europe; this develops the theme of European expansion across the world, uniting different parts of it under colonial rule.
    D. It compares different peoples to land masses, and when one clod is washed away it lessens the continent; this develops the theme of peace and unity among different countries.

3. PART A: What does the word "diminish" most likely mean as used in line 6?
    A. to end
    B. to belittle
    C. to lessen
    D. to sadden

4. PART B: Which of the following quotes best supports the answer to Part A?
    A. "No man is an island entire of itself" (Line 1)
    B. "if a clod be washed away by the sea, Europe / is the less" (Lines 3-4)
    C. "as any manner of thy friends or of thine / own were" (Lines 5-6)
    D. "I am involved in mankind." (Line 7)

5. How do lines 8-9 contribute to the overall meaning 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. How does our modern society value connection between people? Is this similar to how Donne conceived of it?

2. In the context of this poem, how do people face death? How are people affected or not affected by grief today? Cite evidence from the text, your personal experience, or other sources of history and literature.

3. How does the poet likely define friendship? What does it mean to be a friend?

4. In the context of this poem, what is the importance of community? What does it mean to be a part of a community? Cite evidence from the text, your personal experience, or other sources of history and literature.

Study shows one brain's electrical pulses can influence those of another

By Los Angeles Times, adapted by Newsela staff on 05.03.17
Word Count **819**
Level **1170L**

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 scientists who have gone outside the laboratory, we have learned that interacting with others changes us. For instance, research shows that good friendships are connected to good health. Women who spend a lot of time together can start to experience synchronized menstrual periods, and couples who stay together long enough can 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 in humans' natural habitat: group brain synchrony. Group brain synchrony is when people's brains work in very similar ways at the same time.

Neurons, the cells in our brains, process and transmit information through electrical and chemical signals. The human brain has about 100 billion neurons, and everything we think, feel and do is a result of communication between them. When a mass of neurons communicate with each other,

synchronized electrical pulses are produced. These are called brain waves, and scientists measure them to learn more about how our brains work.

"Theta" Waves And "Beta" Waves

Waves are measured in frequency, which is the number of pulses in a certain amount of time. Scientists generally use the unit hertz (Hz), which is equal to one pulse per second. Different brain-wave patterns have different names based on their frequency. “Theta” waves, for example, are 4-7 Hz, or pulses per second. This pattern is associated with daydreaming or feeling sleepy, while the “Beta” wave pattern, with a range of 12-30 Hz, is the most common frequency when we’re awake.

Scientists can measure brain-wave patterns using a machine called an electroencephalograph or EEG. In group brain synchrony, the brain-wave patterns inside two or more brains, as seen on EEG readings, will look very similar.

Psychology researchers at New York University gave 12 high school seniors a portable EEG machine to gather the students’ brain-wave readings. They observed the students' brain-wave patterns over an entire semester’s worth of biology classes. The researchers reported that when students were most engaged with each other and deeply involved in group learning, the readings on their EEGs tended to show very similar brain-wave patterns.

Strong Connections

The group brain synchrony was most pronounced when students liked their teacher. Individual students who reported feeling connected to their classmates, as well as those who showed high levels of empathy, 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 was evident in social dynamics among classmates as well. This is notable since the give-and-take of group learning might have made for a less uniform experience, Dikker said.

“Brain-to-brain synchrony is a possible neural marker for dynamic social interactions, likely driven by shared attention mechanisms,” the team of researchers wrote.

Using what we know about brain waves, we can actually change how our brains work. Through a process called brain-wave "entrainment," audio or visual stimulation can train our brains to follow a certain wave pattern. For instance, brainwaves of 2Hz usually happen when we’re sleeping. If someone is having trouble sleeping, special audio recordings of the 2Hz frequency can nudge the brain to follow along.

Brain Waves In Sync

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. The similar type of brain activity shows up on EEGs as neural synchrony. In other words, the electrical pulses in one brain can influence those of another.

Dikker noted that the project itself was explicitly designed as an effort to gather data in a natural setting. The researchers first gave the students a crash course in neuroscience. After enlisting their support in designing the experiment, the researchers helped the 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.

Researchers Design Larger Projects

The idea that neural entrainment in groups can be detected and measured with portable EEGs — and then analyzed to perceive patterns — opens new avenues for research, Dikker added.

The researchers are now designing larger projects in which they’ll be able to record brain data 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: _____

The Gift of The Magi

By O. Henry
1902

O. Henry (1862-1910), who was born William Sydney Porter, was an American author who wrote hundreds of short stories. He is known for his wit, wordplay, and twist endings. "The Gift of the Magi" was published in 1902. As you read, take notes about the relationship between Jim and Della.

[1] One dollar and eighty-seven cents. That was all. And sixty cents of it was in pennies. Pennies saved one and two at a time by bulldozing the grocer and the vegetable man and the butcher until one's cheeks burned with the silent imputation[1] of parsimony[2] that such close dealing implied. Three times Della counted it. One dollar and eighty-seven cents. And the next day would be Christmas.

"Insomnia." by Lauren Hammond is licensed under CC BY 2.0

There was clearly nothing to do but flop down on the shabby little couch and howl. So Della did it. Which instigates[3] the moral reflection that life is made up of sobs, sniffles, and smiles, with sniffles predominating.[4]

While the mistress of the home is gradually subsiding from the first stage to the second, take a look at the home. A furnished flat[5] at $8 per week. It did not exactly beggar description,[6] but it certainly had that word on the lookout for the mendicancy squad.[7]

In the vestibule[8] below was a letter-box into which no letter would go, and an electric button from which no mortal finger could coax a ring. Also appertaining thereunto[9] was a card bearing the name "Mr. James Dillingham Young."

1. a suggestion that someone is guilty of something
2. **Parsimony** ***(noun):*** extreme unwillingness to spend money; cheapness
3. to provoke or bring about
4. **Predominate** ***(verb):*** to be the strongest or main element
5. an apartment that has furniture in it
6. "Beggar" can mean "someone who begs," and it can also serve as a verb and mean "to defy." In this instance, something that beggars description is something that is so strange or extraordinary that it cannot be described. The author uses "beggar description" in the negative here: in other words, the apartment is not especially strange or extraordinary.
7. A mendicancy squad was a group of police who arrested beggars and homeless people.
8. a room just inside the main doors of a building; often called a "lobby"
9. "Thereunto" is an archaic way of saying "to that" or "unto that." In this case, the author suggests that there is a name card that is attached to "that," the letter-box.

[5] The “Dillingham” had been flung to the breeze during a former period of prosperity when its possessor was being paid $30 per week. Now, when the income was shrunk to $20, though, they were thinking seriously of contracting to a modest and unassuming D. But whenever Mr. James Dillingham Young came home and reached his flat above he was called “Jim” and greatly hugged by Mrs. James Dillingham Young, already introduced to you as Della. Which is all very good.

Della finished her cry and attended to her cheeks with the powder rag. She stood by the window and looked out dully at a gray cat walking a gray fence in a gray backyard. Tomorrow would be Christmas Day, and she had only $1.87 with which to buy Jim a present. She had been saving every penny she could for months, with this result. Twenty dollars a week doesn't go far. Expenses had been greater than she had calculated. They always are. Only $1.87 to buy a present for Jim. Her Jim. Many a happy hour she had spent planning for something nice for him. Something fine and rare and sterling[10] — something just a little bit near to being worthy of the honor of being owned by Jim.

There was a pier-glass between the windows of the room. Perhaps you have seen a pier-glass in an $8 flat. A very thin and very agile person may, by observing his reflection in a rapid sequence of longitudinal strips, obtain a fairly accurate conception of his looks. Della, being slender, had mastered the art.

Suddenly she whirled from the window and stood before the glass. Her eyes were shining brilliantly, but her face had lost its color within twenty seconds. Rapidly she pulled down her hair and let it fall to its full length.

Now, there were two possessions of the James Dillingham Youngs in which they both took a mighty pride. One was Jim’s gold watch that had been his father’s and his grandfather’s. The other was Della’s hair. Had the queen of Sheba lived in the flat across the airshaft, Della would have let her hair hang out the window some day to dry just to depreciate[11] Her Majesty's jewels and gifts. Had King Solomon been the janitor, with all his treasures piled up in the basement, Jim would have pulled out his watch every time he passed, just to see him pluck at his beard from envy.

[10] So now Della’s beautiful hair fell about her rippling and shining like a cascade of brown waters. It reached below her knee and made itself almost a garment for her. And then she did it up again nervously and quickly. Once she faltered for a minute and stood still while a tear or two splashed on the worn red carpet.

On went her old brown jacket; on went her old brown hat. With a whirl of skirts and with the brilliant sparkle still in her eyes, she fluttered out the door and down the stairs to the street.

Where she stopped the sign read: “Mme. Sofronie. Hair Goods of All Kinds.” One flight up Della ran, and collected herself, panting. Madame, large, too white, chilly, hardly looked the “Sofronie.”

“Will you buy my hair?” asked Della.

“I buy hair,” said Madame. “Take yer hat off and let’s have a sight at the looks of it.”

[15] Down rippled the brown cascade.

10. **Sterling** ***(adjective):*** being of the highest standard or quality
11. **Depreciate** ***(verb):*** to lower something's value, or to cause something to seem less valuable

"Twenty dollars," said Madame, lifting the mass with a practised hand.

"Give it to me quick," said Della.

Oh, and the next two hours tripped by on rosy wings. Forget the hashed metaphor. She was ransacking the stores for Jim's present.

She found it at last. It surely had been made for Jim and no one else. There was no other like it in any of the stores, and she had turned all of them inside out. It was a platinum fob chain simple and chaste in design, properly proclaiming its value by substance alone and not by meretricious[12] ornamentation — as all good things should do. It was even worthy of The Watch. As soon as she saw it she knew that it must be Jim's. It was like him. Quietness and value — the description applied to both. Twenty-one dollars they took from her for it, and she hurried home with the 87 cents. With that chain on his watch Jim might be properly anxious about the time in any company. Grand as the watch was, he sometimes looked at it on the sly on account of the old leather strap that he used in place of a chain.

[20] When Della reached home her intoxication gave way a little to prudence and reason. She got out her curling irons and lighted the gas and went to work repairing the ravages made by generosity added to love. Which is always a tremendous task, dear friends — a mammoth task.

Within forty minutes her head was covered with tiny, close-lying curls that made her look wonderfully like a truant schoolboy. She looked at her reflection in the mirror long, carefully, and critically.

"If Jim doesn't kill me," she said to herself, "before he takes a second look at me, he'll say I look like a Coney Island chorus girl. But what could I do — oh! what could I do with a dollar and eighty-seven cents?"

At 7 o'clock the coffee was made and the frying-pan was on the back of the stove hot and ready to cook the chops.

Jim was never late. Della doubled the fob chain in her hand and sat on the corner of the table near the door that he always entered. Then she heard his step on the stair away down on the first flight, and she turned white for just a moment. She had a habit for saying little silent prayer about the simplest everyday things, and now she whispered: "Please God, make him think I am still pretty."

[25] The door opened and Jim stepped in and closed it. He looked thin and very serious. Poor fellow, he was only twenty-two — and to be burdened with a family! He needed a new overcoat and he was without gloves.

Jim stopped inside the door, as immovable as a setter[13] at the scent of quail. His eyes were fixed upon Della, and there was an expression in them that she could not read, and it terrified her. It was not anger, nor surprise, nor disapproval, nor horror, nor any of the sentiments that she had been prepared for. He simply stared at her fixedly with that peculiar expression on his face.

Della wriggled off the table and went for him.

12. appearing attractive but having no real value
13. a large dog used for hunting birds

"Jim, darling," she cried, "don't look at me that way. I had my hair cut off and sold because I couldn't have lived through Christmas without giving you a present. It'll grow out again — you won't mind, will you? I just had to do it. My hair grows awfully fast. Say 'Merry Christmas!' Jim, and let's be happy. You don't know what a nice — what a beautiful, nice gift I've got for you."

"You've cut off your hair?" asked Jim, laboriously,[14] as if he had not arrived at that patent[15] fact yet even after the hardest mental labor.

[30] "Cut it off and sold it," said Della. "Don't you like me just as well, anyhow? I'm me without my hair, ain't I?"

Jim looked about the room curiously.

"You say your hair is gone?" he said, with an air almost of idiocy.

"You needn't look for it," said Della. "It's sold, I tell you — sold and gone, too. It's Christmas Eve, boy. Be good to me, for it went for you. Maybe the hairs of my head were numbered," she went on with sudden serious sweetness, "but nobody could ever count my love for you. Shall I put the chops on, Jim?"

Out of his trance Jim seemed quickly to wake. He enfolded his Della. For ten seconds let us regard with discreet scrutiny some inconsequential object in the other direction. Eight dollars a week or a million a year — what is the difference? A mathematician or a wit would give you the wrong answer. The magi brought valuable gifts, but that was not among them. This dark assertion will be illuminated later on.

[35] Jim drew a package from his overcoat pocket and threw it upon the table.

"Don't make any mistake, Dell," he said, "about me. I don't think there's anything in the way of a haircut or a shave or a shampoo that could make me like my girl any less. But if you'll unwrap that package you may see why you had me going a while at first."

White fingers and nimble tore at the string and paper. And then an ecstatic scream of joy; and then, alas! a quick feminine change to hysterical tears and wails, necessitating the immediate employment of all the comforting powers of the lord of the flat.

For there lay The Combs — the set of combs, side and back, that Della had worshipped long in a Broadway window. Beautiful combs, pure tortoise shell, with jewelled rims — just the shade to wear in the beautiful vanished hair. They were expensive combs, she knew, and her heart had simply craved and yearned over them without the least hope of possession. And now, they were hers, but the tresses that should have adorned the coveted adornments were gone.

But she hugged them to her bosom, and at length she was able to look up with dim eyes and a smile and say: "My hair grows so fast, Jim!"

[40] And then Della leaped up like a little singed[16] cat and cried, "Oh, oh!"

14. slowly and requiring much effort
15. **Patent** ***(adjective):*** obvious
16. burned by a flame

Jim had not yet seen his beautiful present. She held it out to him eagerly upon her open palm. The dull precious metal seemed to flash with a reflection of her bright and ardent[17] spirit.

"Isn't it a dandy, Jim? I hunted all over town to find it. You'll have to look at the time a hundred times a day now. Give me your watch. I want to see how it looks on it."

Instead of obeying, Jim tumbled down on the couch and put his hands under the back of his head and smiled.

"Dell," said he, "let's put our Christmas presents away and keep 'em a while. They're too nice to use just at present. I sold the watch to get the money to buy your combs. And now suppose you put the chops on."

[45] The magi, as you know, were wise men — wonderfully wise men — who brought gifts to the Babe in the manger. They invented the art of giving Christmas presents. Being wise, their gifts were no doubt wise ones, possibly bearing the privilege of exchange in case of duplication. And here I have lamely related to you the uneventful chronicle of two foolish children in a flat who most unwisely sacrificed for each other the greatest treasures of their house. But in a last word to the wise of these days let it be said that of all who give gifts these two were the wisest. O all who give and receive gifts, such as they are wisest. Everywhere they are wisest. They are the magi.

17. **Ardent** ***(adjective):*** glowing or passionate

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 from the story?
    A. Your status doesn't define you
    B. Beauty isn't everything
    C. It's the thought that counts
    D. Unselfish love is the greatest of all gifts

2. How does the first paragraph help develop the plot of the story?
    A. It illustrates how rude Della is
    B. It illustrates how independent Della is
    C. It illustrates how expensive it is to live in London
    D. It illustrates how concerned with money Della is

3. Irony is when something unexpected happens in the story. Explain how the ending of "The Gift of the Magi" is ironic.

4. What is the purpose of paragraph 5's discussion of the name "Dillingham"?

5. PART A: What does the term “pier-glass” mean, as it is used in paragraph 7?
    A. A section of decorative stained glass
    B. A mirror
    C. A window
    D. A peep-hole

6. PART B: Which detail from the text best supports the answer to Part A?
    A. “Perhaps you have seen a pier-glass in an $8 flat.” (Paragraph 7)
    B. “...by observing his reflection...” (Paragraph 7)
    C. “Della, being slender, had mastered the art.” (Paragraph 7)
    D. “...whirled from the window and stood before the glass.” (Paragraph 8)

7. Reread paragraph 45. How are Jim and Della similar to the Magi?
    A. Jim and Della are shopping for Christmas presents; the Magi invented the tradition of giving Christmas presents
    B. Jim and Della make great sacrifices to give each other special Christmas gifts
    C. Jim and Della are poor, and cannot give each other what they want for Christmas
    D. Jim and Della are deeply religious, and hold the Magi in high esteem

Name: _____ Class: _____

Love and Friendship

By Emily Brontë
1846

Emily Brontë (1818-1848) was an English poet and novelist. While growing up, Brontë spent much of her time creating stories with her siblings, of whom two were also famous authors. Brontë was known for her solitary nature, and so it is interesting to consider her perspective on love and friendship. As you read, take notes on the poet's use of figurative language.

Love is like the wild rose-briar,
Friendship like the holly-tree
The holly is dark when the rose-briar blooms
But which will bloom most constantly?
The wild rose-briar is sweet in spring,
Its summer blossoms scent the air;
Yet wait till winter comes again
And who will call the wild-briar fair?
Then scorn the silly rose-wreath now
And deck thee with the holly's sheen,
That when December blights[1] thy brow
He may still leave thy garland green.

"holly berries" by Liz West is licensed under CC BY 2.0.

Love and Friendship by Emily Brontë is in the public domain.

1. **Blight** ***(verb):*** to spoil, harm, or damage

Text-Dependent Questions

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

1. In the poem, what is the most significant difference between the rose-briar and the holly-tree?
    A. The rose-briar is considered far more beautiful than the holly-tree.
    B. The holly-tree is more resilient during winter than the rose-briar.
    C. The rose-briar smells sweeter in spring than the holly-tree does in winter.
    D. The holly-tree has prickly leaves for more of the year than the rose has thorns.

2. PART A: Which of the following best identifies a theme of the text?
    A. Nature has many different elements, but they are all equally important.
    B. The best friendships and romantic relationships are grounded in trust and loyalty.
    C. Friendships are more reliable and therefore more valuable to pursue than romantic love.
    D. Most people will experience challenging moments in life and will need love and friendship to survive them.

3. PART B: Which of the following quotes best supports the answer to Part A?
    A. "Friendship like the holly-tree / The holly is dark when the rose-briar blooms" (Lines 2-3)
    B. "The wild rose-briar is sweet in spring, / Its summer blossoms scent the air" (Lines 5-6)
    C. "Yet wait till winter comes again / And who will call the wild-briar fair?" (Lines 7-8)
    D. "Then scorn the silly rose-wreath now / And deck thee with the holly's sheen" (Lines 9-10)

4. How does the poem's rhyme scheme contribute to the overall tone and theme?

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. According to the text, what are the qualities of the holly-tree? And how does that answer the question: What is friendship? Cite evidence from this text, your own experience, and other art or literature in your answer.

2. Which is more lasting, love or friendship? Support your answer with evidence in the poem, and pay special attention to the symbolism the speaker uses.

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 set the pace

By Scientific American, adapted by Newsela staff on 08.15.16
Word Count **942**
Level **1200L**

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, there is little doubt who will lead the distance races. In the men's 1,500 meters, Asbel Kiprop will be up front. In the women's 5,000 meters Almaz Ayana will run away, and she may also take the 10,000 meters. 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.

Most of these races will be dominated by runners from east Africa —namely from Kenya and Ethiopia, with a few runners from Eritrea and maybe a Ugandan also standing out. Mo Farah, currently at the top of the ranking for 10,000 meters, was born in Somalia and raised in the United Kingdom, and now trains in the U.S. Bernard Lagat, who just won the U.S. 5,000-meter Olympic qualifier - at age 41 - is Kenyan-American.

East African runners have dominated for the two decades since Kenyans started winning in the mid-1990s, followed by Ethiopians shortly thereafter. This has led to soul-searching on the part of

former distance powers like the U.S. and U.K. Yet reasons for that dominance remain hotly debated, and science has offered little clear information about it.

Many Factors Contribute To Their Success

The reigning theory in the West is that runners from eastern Africa have some evolutionary advantage over runners from other backgrounds. Because so many of the elite runners come from the Oromo ethnic group in Ethiopia and the Kalenjin tribes in Kenya, it is assumed these groups must have adaptations or environments that make them faster. Maybe their ancestors “persistence hunted,” chasing animals until they tired and could be easily killed. It could be their longer, thinner legs or their increased lung capacity from living at relatively high altitudes. In an attempt to find answers, researchers have collected DNA from across the region. Yannis Pitsiladis, a sports physiologist and geneticist from the University of Brighton in England, recently said, “We know genes are important. We just don’t know which ones they are.”

Another factor that has been largely overlooked, however, is the “running cultures” that have evolved in specific places in Ethiopia and Kenya. One is the poor Ethiopian town of Bekoji, which 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, according to British runner and writer Declan Murray, whose book about Bekoji will be published in 2017.

This mountain town's success rate is stunning. Countless other towns in the region have similar ethnic backgrounds, genetic makeup, economies and environments but have not produced a single elite runner.

Coach Helps Develop Local Talent

At the center of the town’s success is a coach named Sentayehu Eshetu, who has been fostering 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 at 6 a.m. the hills around Bekoji are filled with hundreds of runners. Sentayehu’s runners brought home five Olympic medals from Athens in 2004, four from Beijing in 2008 and four more from London in 2012.

Ethiopia’s running culture started with a trailblazer whose early success seemed to create a crop of young people who wanted 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, a management agency with runners from Kenya, Ethiopia and the U.K.

Town Attracts Some Of The Top Athletes

The small town of Iten has seen results similar to Bekoji's. Culturally, Iten functions in a way that 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, and if they are luckier still, they will 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.

Knowing someone who does something can be more powerful than hearing about someone who does it.

Language Barriers Can Affect Training

For several generations, athletic training knowledge has accumulated in Kalenjin training camps. Benoit Gaudin of the Department of Sport Sciences at Addis Ababa University interviewed elite non-Kalenjin runners, asking them how they gained their positions. They reported 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 reported. "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 they are protecting their group. He says this is very interesting because "it is ethnicity, but it has nothing to do with genetics.”

Quiz

1 Read the selection from the section "Language Barriers Can Affect Training."

Those who succeed do so by basically becoming Kalenjin.

Which of the following can be inferred from the selection?

(A) People who want to join the running camp must change their ethnicity to Kalenjin.

(B) Becoming familiar with Kalenjin culture helps a runner thrive at the running camp.

(C) Someone who is not Kalenjin will not be able to join the running camp.

(D) Only people who speak the local language will be able to become great runners.

2 Read the statement.

Having a community of great runners has helped East Africa develop more runners.

Which sentence from the article BEST supports the statement?

(A) Countless other towns in the region have similar ethnic backgrounds, genetic makeup, economies and environments but have not produced a single elite runner.

(B) If they are lucky — and fast — they will be accepted into a training camp, and if they are luckier still, they will be signed by an agent for training and racing abroad.

(C) Knowing someone who does something can be more powerful than hearing about someone who does it.

(D) He says this is very interesting because "it is ethnicity, but it has nothing to do with genetics."

3 Which of the following sentences from the article BEST develops a central idea?

(A) When the starting gun fires at the Olympic track in Rio de Janeiro, there is little doubt who will lead the distance races.

(B) Yet reasons for that dominance remain hotly debated, and science has offered little clear information about it.

(C) In an attempt to find answers, researchers have collected DNA from across the region.

(D) At the center of the town's success is a coach named Sentayehu Eshetu, who has been fostering local running talent for over 30 years.

4 Read the sentence from the section "Many Factors Contribute To Their Success."

Maybe their ancestors "persistence hunted," chasing animals until they tired and could be easily killed.

Does this sentence support the main idea of the article? Why or why not?

(A) Yes, because it shows that East Africans are great runners due to genetics and DNA makeup.

(B) Yes, because it emphasizes the importance of East African ancestry in developing great runners.

(C) No, because it does not explain the importance of the town of Bekoji and the how the people from there become well-known runners.

(D) No, because it does not account for the cultural factors in East African running.

Texting can be a positive and powerful force, experts say

By Washington Post, adapted by Newsla staff on 08.21.18
Word Count **1,157**
Level **1130L**

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

When texting tends to be in the news, people aren't usually singing its praises.

It often gets blamed for fostering social isolation or decreasing teens' attention spans. Other days, it's driving down self-esteem or damaging the spine — a phenomenon known as "text neck."

Still, some technological and medical experts say the negativity is unfair. Texting can and should be a positive force in people's lives, both in terms of emotional and physical health, they say — so 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," which analyzes how we communicate. She says "the problem really isn't that people have this new, interesting, intimate way of touching base ... the trouble is what happens to face-to-face conversation if your phone is always there."

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.

Medical Uses Of Texting

There are also medical uses. Texting eases the difficulty of communication with doctors, advances research as an easy and accurate way of gathering patient information in scientific studies, and can offer support to at-risk or suicidal individuals via instant-response crisis text lines.

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 been forced to acknowledge its benefits.

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

A No-No: Don't Bring Phones To The Dinner Table

If you're out to dinner with friends, put your phone away and keep it 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 should ask, "'Is texting keeping me away from a necessary conversation?' If not, enjoy."

It's better to refrain from texting even around total strangers, Davis said. She mentioned that when commuting home from work at the end of a long day, 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.

Reaching Out In Time Of 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 confronting 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 Parents 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 she sent her

mom pictures of different dresses.

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

More and more doctors, scientific researchers and mental-health advocates are using texting in their everyday work and are realizing its benefits, Topol said.

For physicians and their patients, texting offers a quick and non-intrusive way of getting in touch. Turkle remembered one night recently when she noticed a rash on her leg. It would have been a "big deal" to call her doctor past 9 p.m. at night — so instead, she texted him 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."

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.

It Allows Immediate Feedback, Help

It's easy to gather data because 70 percent of the world likely has cellphones, which makes it easier for participants to get involved and respond to researchers.

It allows for immediate feedback. People are also more likely to reply to a text than an email.

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

Suicides usually result when a combination of events and circumstances 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.

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

"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. "I don't think vulnerability necessarily requires face-to-face interaction. Texting allows users to respond in a minute or an hour and take as much time as they want to reflect on how they feel."

Texting Link With Art Museum

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 the texter 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,'" Mollica says. "And late at night they'll say things like 'Send me friends.'"

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

Quiz

1 Which statement would be MOST important to include in an objective summary of the article?

(A) Texting should be a mandatory service that all college campuses provide for their students' mental health.

(B) Texting is a better way for people to share their feelings and fears than talking to someone they love face-to-face.

(C) Experts are examining the way texting can benefit their research in a variety of fields by allowing immediate feedback.

(D) Experts agree the ease and personal nature of texting can provide benefits for both physical and mental health.

2 What is the relationship between the following selections from the article?

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.

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.

It would have been a "big deal" to call her doctor past 9 p.m. at night — so instead, she texted him a picture of the rash and asked whether she needed to visit the emergency room.

(A) They support the main idea that being thoughtful about how and when you text will determine its benefits.

(B) They support the main idea that texting is being used by doctors to provide physical health benefits.

(C) They develop the main idea that texting can help people deal with traumatic events and experiences.

(D) They develop the main idea that experts believe there are still more drawbacks than benefits to texting.

3 Which answer choice BEST explains why the author wrote this article?

(A) The author is arguing that the ease of texting is keeping many people from interacting with others.

(B) The author is persuading readers to participate in research that incorporates texting to help experts.

(C) The author is explaining experts' views on the new ways that texting is being used to positively affect people's lives.

(D) The author is providing evidence that more people now use texting more than traditional visits for health services.

4 Read the following list of people from the article.

1. *Eric Topol*
2. *Tchiki Davis*
3. *Shaye Carver*
4. *Jay Mollica*

Which two have perspectives that are MOST in AGREEMENT with each other?

(A) 1 and 3

(B) 2 and 3

(C) 1 and 4

(D) 2 and 4

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

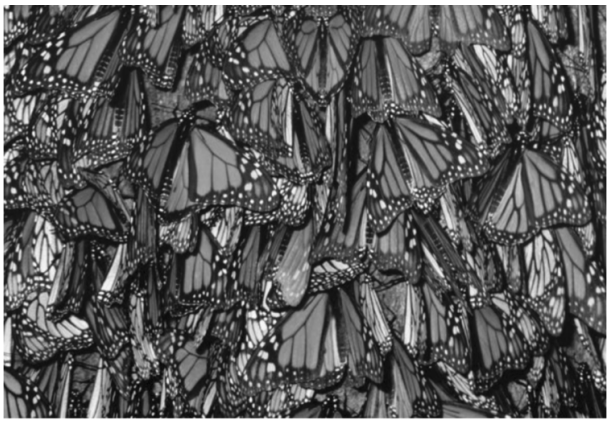
All life forms are born with some method for keeping track of time, but humans do it with greater precision and in more diverse ways than any other species.

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:

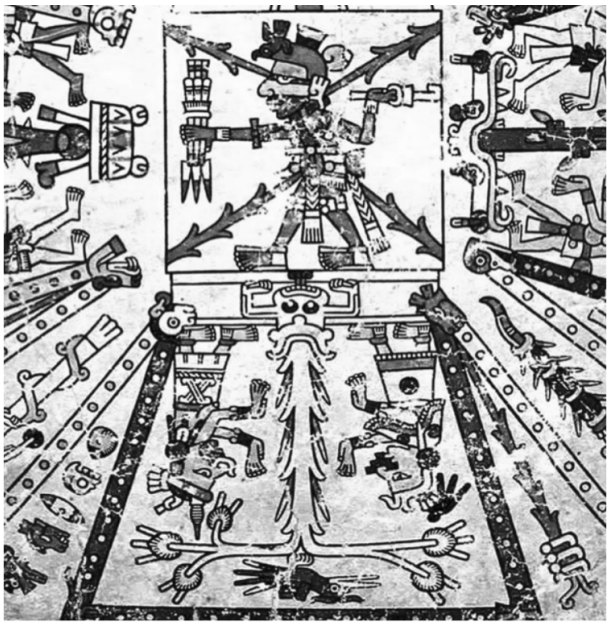
Professor Movius and I stood on the shelf looking across the valley as the Sun went slowly down behind the hills far to the right, sinking as a great red disc. As it was going down, the first crescent of the new Moon appeared in the sky as a thin silver arc, facing the sinking Sun. It was instantly apparent 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

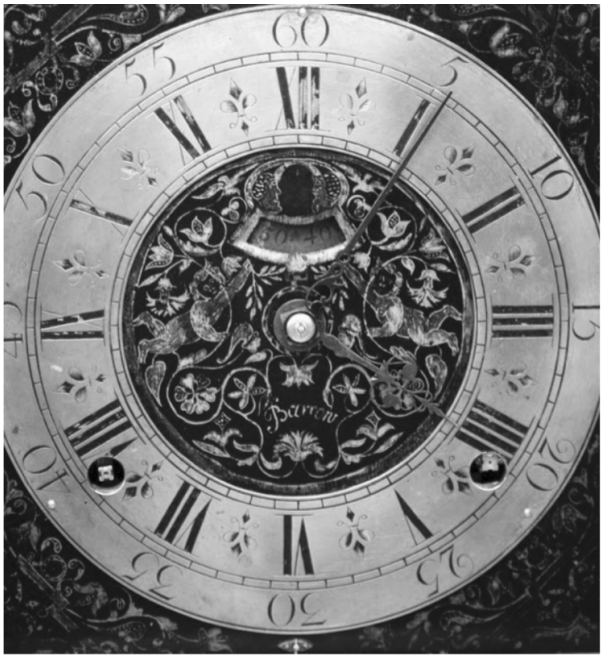
More elaborate instruments were used to track the movements of the stars and planets. It is possible that Stonehenge in England, which was constructed between 4,000 and 5,000 years ago, was designed partly to determine the exact dates of the summer and winter solstices (the days when the Sun reached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

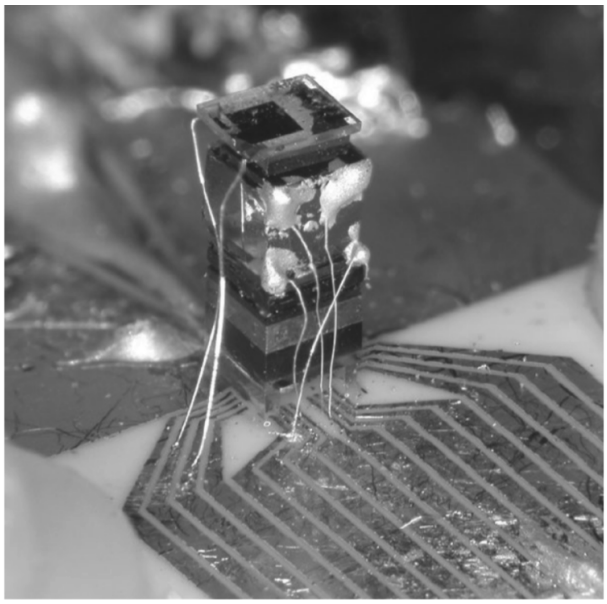
In the nineteenth century, the invention of railways and steamships — and their widespread use — required entirely new levels of precision. With so many passengers and important cargo relying on transportation lines, on-time departures, connections, and arrivals were critical to the whole network. The 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!

Quiz

1 Which of these sentences would be MOST important to include in an objective summary of the article?

(A) The human sense of tracking time is much better than the senses of most other animals.

(B) The technologies used for tracking time have changed as societies' needs have become more complicated.

(C) Modern society uses the Roman calendar because it includes a leap year, though the Mayan is more accurate.

(D) Inventions like radiometric dating have helped historians understand events like the Big Bang.

2 The central idea of the article is developed by:

(A) defining how time is perceived differently by people

(B) showing that farming was the first reason for marking time

(C) illustrating how different societies have measured and used time

(D) highlighting that time can improve transportation schedules

3 Read the second paragraph from the section "Keeping time in agrarian societies."

> *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.*

Why does the author include this paragraph in the article?

(A) It shows how agricultural societies had different needs than current civilizations.

(B) It provides the reasoning behind early timekeeping methods that organized work schedules.

(C) It describes the ways in which farming societies used the Sun to track the changing seasons.

(D) It explains why seeds needed to be sown during certain climate patterns to get the best harvest.

4 What is the MOST likely reason for including information about radiometric dating in the section "Toward the modern era"?

(A) It highlights why written records are not reliable sources of information about the past.

(B) It clearly describes the invention of the process for dating very old events and objects.

(C) It explains the most advanced form of timekeeping scientists have invented so far.

(D) It provides an example of how timekeeping has helped us better understand human history.

The difference between empathy and sympathy

By ThoughtCo., adapted by Newsela staff on 12.20.17
Word Count **829**
Level **1210L**

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 incorrectly used interchangeably, but their difference is important. Sympathy is a simple expression of concern for another person's misfortune while empathy, however, goes beyond that. 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, which 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 what we call 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, which are feelings that just simply recognize 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 or objects. 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 specialized in the field of emotions who 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, so 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, though Ekman warns that empathy can also go terribly wrong in some cases.

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," which 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 because, essentially, love can cure, but empathy cannot. While love can make any relationship — good or bad — better, empathy cannot do this. Empathy can even hasten the end of a strained relationship.

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 and 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 leading to health problems, which is common among mental health counselors, doctors, nurses, lawyers and teachers.

Paul Bloom is a professor of psychology and cognitive science at Yale University and goes so far as to suggest that due to its inherent dangers, people need to have less empathy, rather than more.

Quiz

1 Is the author of the article suggesting that empathy can be a dangerous emotion? Which selection from the article BEST supports your answer?

(A) No, the author does not suggest empathy can be dangerous; Empathy is often confused with sympathy, pity and compassion, which are feelings that just simply recognize another person's distress.

(B) No, the author does not suggest empathy can be dangerous; It also means openly sharing another person's emotions, including painful distress.

(C) Yes, the author does suggest empathy can be dangerous; Empathy requires shared experiences, so people generally feel empathy only for other people, not for animals or objects.

(D) Yes, the author does suggest empathy can be dangerous; Psychologists report cases of overly empathetic patients endangering their own well-being.

2 Which option would counselor Mark Stebnicki MOST LIKELY agree with? Which line from the article supports your answer?

(A) Empathy has both positive and negative effects; Empathy can make people angry — perhaps dangerously so — if they mistakenly perceive that another person is threatening a person they care for.

(B) Over-empathy causes mild depression later in life; Psychologists report cases of overly empathetic patients endangering their own well-being.

(C) Sometimes empathy makes people in certain professions exhausted; 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.

(D) Over-empathy hurts relationships; A scene from the animated comedy TV series "The Simpsons" is an example of how empathy can damage a relationship.

3 Which of the following sentences from the section "The Three Types Of Empathy" BEST develops a CENTRAL idea of the article?

(A) Paul Ekman is a psychologist specialized in the field of emotions who has identified three types of empathy.

(B) This is the ability to actually feel what people feel, or at least feel emotions similar to theirs, so there is always some level of shared feelings.

(C) Emotional empathy can be a trait among persons diagnosed with Asperger syndrome.

(D) Having empathy can give meaning to our lives, though Ekman warns that empathy can also go terribly wrong in some cases.

4 Which option provides an accurate and objective summary of the article?

(A) It is vital for people to express a certain level of empathy for healthy relationships. Teachers and doctors should be aware of the potential danger of empathy fatigue.

(B) Empathy is the ability to recognize when someone else is suffering. Empathy is dangerous when it leads to anger and empathy fatigue.

(C) Although commonly used interchangeably, sympathy and empathy are unique from one another. Over-empathy can cause health problems.

(D) People should watch out for symptoms of anger and empathy fatigue, and discuss any concerns with their doctor. Some professions have an increased risk of "empathy fatigue."

Name: _____ Class: _____

The Value of Being Confused

By Barrett Smith
2018

No one likes to feel confused, but could there actually be benefits to confusion? In this informational text, Barrett Smith explores why feeling confused is actually a good thing. As you read, take notes on how people respond to confusion.

[1] We've all felt confused before, and it can be one of the most frustrating feelings to deal with. Students might be confused about how to do a math problem or finish a project. Young people might be confused about who they are and what to do in the future. No matter what is making us confused, the feeling of not knowing what the answers or solutions are can make us feel useless, stupid, and cause us to worry.

"Confused" by CollegeDegrees360 is licensed under CC BY-SA 2.0

A lot of people are hard on themselves and others when there's a lack of understanding. People often tend to think the person who has all of the answers is smarter than the one who asks a lot of questions. Because of the negative judgment that surrounds confusion, people often try to hide their confusion in a variety of ways. Instead of admitting or accepting that they don't have the solution, people sometimes try to pretend they have the answers. At other times, people make educated guesses or create an answer even if they know it isn't right.

Students are often guilty of hiding their lack of understanding. If confused about a topic in school, they might pretend to know the answers. They can sometimes be embarrassed to ask questions. As young individuals, they can be confused about who they are, and might try harder to behave in a particular way. They can be too embarrassed to explore other groups or identities, afraid perhaps of being called a "wanna-be". They can be afraid people will know they're confused.

But confusion might actually be a good thing. When we jump to an answer, we don't have time to explore and understand the thing we're confused about. Fighting confusion ends up making us more confused. Instead of fighting or trying to ignore your confusion, accepting it and taking the opportunity to analyze what's confusing can benefit our learning. In fact, scientific studies show that confusion actually leads to deeper understanding. A 2004 study explored six moods that people feel while learning, including frustrated, bored, and confused. They found that students who spent more of the lesson confused learned the most. In another study, published in 2014, scientists tried to confuse students by giving them contradicting[1] information. Students who expressed confusion during the lesson did better on the final test. Based on these studies, scientists believe being confused is a step to learning. Not knowing the answer to a problem gives us space to look at different ways to solve it. The feeling of confusion also motivates us to look more deeply into the problem. In the end, this helps us understand the topic on a deeper level.

1. **Contradicting** ***(noun):*** something that is opposite to something else

[5] Confusion isn't just an important step to learning in school, it's also important for learning who you are. Psychologists call that sense of who you are identity. Your identity can involve being part of groups like race, gender, subcultures.[2] Identity is also made up of your values and goals. People figure out their identity in two steps. The first step is exploration, where you try out different groups and values and see what fits. The next step is commitment, when you decide firmly about some parts of your identity. Exploring your identity can feel very confusing. You might be afraid that people will judge you for going through different phases or not committing to a group. But phases are completely natural. A study published in the International Journal of Behavioral Development found that people who do the most exploring about who they are have better outcomes such as higher self-esteem later in life. Confusion gives us the space to try new things and be creative. Allowing ourselves to be confused and ask questions leads to deeper understanding, more learning, and higher self-confidence. So, try not to be embarrassed when you're confused about something. Instead of trying to hide or fight your confusion, try to resolve it by trying new things. Embrace the confusion and explore different solutions to your problem. Sometimes being confused is hard, not just because we judge ourselves, but because it can be frustrating. When we try over and over to understand something without making any progress, we can feel defeated and stop caring, and eventually give up. Trying a new method, asking for help, or researching different ways to approach the problem online can all be great resources to work through your confusion. Before you give up, make sure you have someone to help you and the resources you need to resolve your confusion.

2. a cultural group within a larger culture

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 ideas of the text?
    A. Allowing yourself to feel confused is a necessary part of developing your brain and understanding yourself.
    B. Confusion is more important to intellectual growth than it is to understanding your identity.
    C. It takes a certain degree of self-confidence and maturity to admit that you don't have all the answers.
    D. Feeling confused is something that will fade with time and experience as you acquire all of the answers.

2. PART B: Which detail from the text best supports the answer to Part A?
    A. "No matter what is making us confused, the feeling of not knowing what the answers or solutions are can make us feel useless, stupid, and cause us to worry." (Paragraph 1)
    B. "Instead of admitting or accepting that they don't have the solution, people sometimes try to pretend they have the answers." (Paragraph 2)
    C. "Students are often guilty of hiding their lack of understanding. If confused about a topic in school, they might pretend to know the answers." (Paragraph 3)
    D. "Confusion isn't just an important step to learning in school, it's also important for learning who you are." (Paragraph 5)

3. PART A: Which of the following describes the author's main purpose in the text?
    A. to provide readers with tools to overcome their confusion
    B. to reassure readers that it's completely normal to feel confused
    C. to encourage readers to work through their confusion, rather than avoid it
    D. to explore why teenagers are more susceptible to confusion than adults

4. PART B: Which quote from the text best supports the answer to Part A?
    A. "We've all felt confused before, and it can be one of the most frustrating feelings to deal with." (Paragraph 1)
    B. "As young individuals they can be confused about who they are, and might try harder to behave in a particular way." (Paragraph 3)
    C. "A 2004 study explored six moods that people feel while learning, including frustrated, bored, and confused." (Paragraph 4)
    D. "Instead of trying to hide or fight your confusion, try to resolve it by trying new things." (Paragraph 5)

5. Explain the relationship between confusion and growth in the text. Cite evidence from the text to support your response.

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. According to the text, confusion is an important part of growth. Why do people resist it? How do you feel when you are confused?

2. Psychologists found that struggling through multiple phases in your life helps you decide who you are. What makes you who you are? Have you ever been confused by your identity or gone through a phase that didn't seem true to yourself? Has a friend? Describe the experience.

3. Smith claims that working through confusion leads to deeper understanding. How do we understand the world around us? Describe a time when you worked through your confusion to learn something new.

Curiosity changes the brain to boost memory and learning

By The Conversation, adapted by Newsela staff on 08.07.19
Word Count **772**
Level **1200L**

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

The more curious we are about a topic, the easier it is to remember information about that topic and other unrelated information shown at the same time. A study published in 2014 in Neuron shows what happens inside our brains when our curiosity is sparked.

Participants in the study were asked to rate how curious they were to find out the answer to a specific trivia question, like "What does the term 'dinosaur' actually mean?" The participants were then placed in a magnetic resonance imaging (MRI) machine, which measures brain activity.

The participants saw the trivia question again followed by the image of a person's face and were asked to make a specific decision about the person, and then they were shown the answer to the trivia question, in the dinosaur case, "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 produced three key findings that we can learn from.

The first finding is 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 researcher at the University of New South Wales, in Australia. She shared her thoughts about this finding: "This shows that when the brain is engaged more, by making a task relevant and interesting, people learn more."

The second research finding is that activity increases in the hippocampus when curiosity is stimulated. The hippocampus is the region of the brain associated with memory. The last 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 focuses on 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, and 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, a behavioral neuroscientist, said more could be done to see whether 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 happens when a person does something because it is naturally satisfying to them. Curiosity is an 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 a relationship, 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, and most people with the diseases are elderly.

Kumfor adds that research into extrinsic rewards on memory is an important research area. According to her, "previous research has suggested 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 a person who is trying to learn something that isn't interesting or who doesn'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 by increasing 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 HOW does the article develop the idea that curiosity plays an important role in learning and memory?

(A) by describing how participants were tested, explaining the results and examining the relationship between motivation and curiosity

(B) by explaining the key findings in the study, discussing how the brain influences behavior and suggesting applications

(C) by providing the results of the MRI scan, explaining brain anatomy and examining how motivation varies from person to person

(D) by outlining the steps involved in the research process, including a question used in the test and citing earlier findings

2 Which of the following BEST describes HOW Jee Hyun Kim sees the relationship between motivation and curiosity?

(A) People with low curiosity are more likely to be motivated extrinsically.

(B) A person's curiosity level may be related to variations in motivation.

(C) People with high curiosity are more likely to be motivated intrinsically.

(D) A person's curiosity level may indicate how motivation changes.

3 Read the section "Motivations Matter."

Which selection from the section BEST describes unhealthy changes in the brain?

(A) Alzheimer's and dementia

(B) behavioral neuroscience

(C) neurological disorders

(D) low curiosity

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

> *They should also work more to see if people with high intrinsic motivation are better left to their own devices, she said.*

What is the meaning of the phrase "left to their own devices" as used in the sentence?

(A) allowed to make their own choices

(B) helped to understand their actions

(C) given permission to use devices

(D) encouraged to find motivation

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

Post-Secondary Proportions

Representations of Proportional Relationships

WARM UP

Determine each equivalent ratio.

1. $\frac{7}{16} = \frac{x}{48}$
2. $\frac{t}{90} = \frac{5}{9}$
3. $\frac{10}{p} = 1$
4. $250 = \frac{1000}{q}$

LEARNING GOALS

- Represent proportional relationships with tables, lines, and linear equations.
- Compare graphs of proportional relationships.
- Compare two different proportional relationships represented in multiple ways.

KEY TERMS

- proportional relationship
- constant of proportionality

You have studied proportional relationships in previous courses. How can you represent and compare proportional relationships using graphs, tables, and equations?

Ratio of Women to Men

Government agencies and civil rights groups monitor enrollment data at universities to ensure that different groups are fully represented. One study focused on the enrollment of women at a certain university. The study found that three out of every five students enrolled were women.

Use the findings of the study to write each ratio.

1. **the number of enrolled female students to the total number of students**

2. **the number of enrolled male students to the total number of students**

3. **the number of enrolled female students to the number of enrolled male students**

4. **the number of enrolled male students to the number of enrolled female students**

ACTIVITY
1.1 Representing Proportional Relationships

Use the findings of the enrollment study to make predictions.

1. **Determine the number of enrolled female students for each given total number of enrolled students. Explain your reasoning.**

   a. **15 total students**

   b. **250 total students**

   c. **4000 total students**

2. **Compare the total number of enrolled students to the number of enrolled male students.**

   a. **Complete the table.**

Total Students Enrolled in a University	Male Students Enrolled in a University
0	
250	
6000	
	6000

   b. **Explain how you calculated each value.**

3. **Determine the number of female students if 800 enrolled students are male. Show all work and explain your reasoning.**

NOTES

4. **Choose the correct equation to match each description. Then compare the equations.**

$y = \frac{2}{5}x$	$y = 2x + 3$	$y = \frac{2}{3}x$
$y = \frac{3}{2}x$	$y = \frac{3}{5}x$	
$y = \frac{5}{2}x$	$y = 2x + 5$	$y = 3x + 2$

a. **the number of female students enrolled, *y*, for *x* total number of students enrolled**

b. **the number of male students enrolled, *y*, for *x* total number of students enrolled**

c. **the number of female students enrolled, *y*, for *x* male students enrolled**

d. **the number of male students enrolled, *y*, for *x* female students enrolled**

e. **Describe the similarities and differences in each of the correct equations.**

5. **Create graphs that display each ratio. Then compare the graphs.**

   a. **the total number of female students enrolled, *y*, with respect to the total number of students enrolled, *x***

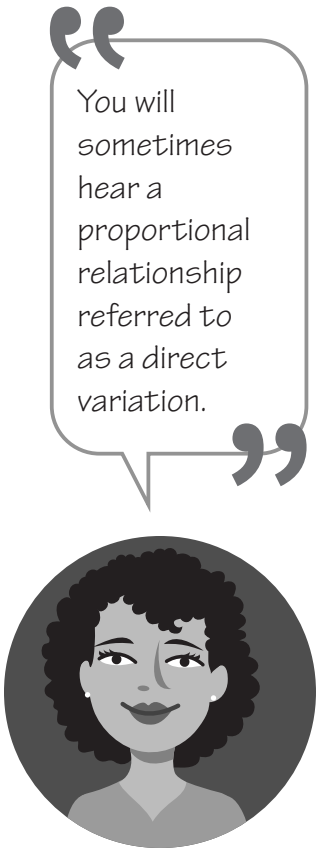
   b. **the total number of male students enrolled, *y*, with respect to the total number of students enrolled, *x***

   c. **Describe the similarities and differences of the two graphs.**

In this lesson, you are studying relationships that are proportional. A **proportional relationship** is one in which the ratio of the inputs to the outputs is constant. For example, the ratio of women to men at a university is 3 : 2. Proportional relationships are always written in the form $y = kx$, where x represents an input value, y represents an output value, and k represents some constant that is not equal to 0. The constant k is called the **constant of proportionality**.

6. **Identify the constant of proportionality for each relationship in Question 4.**

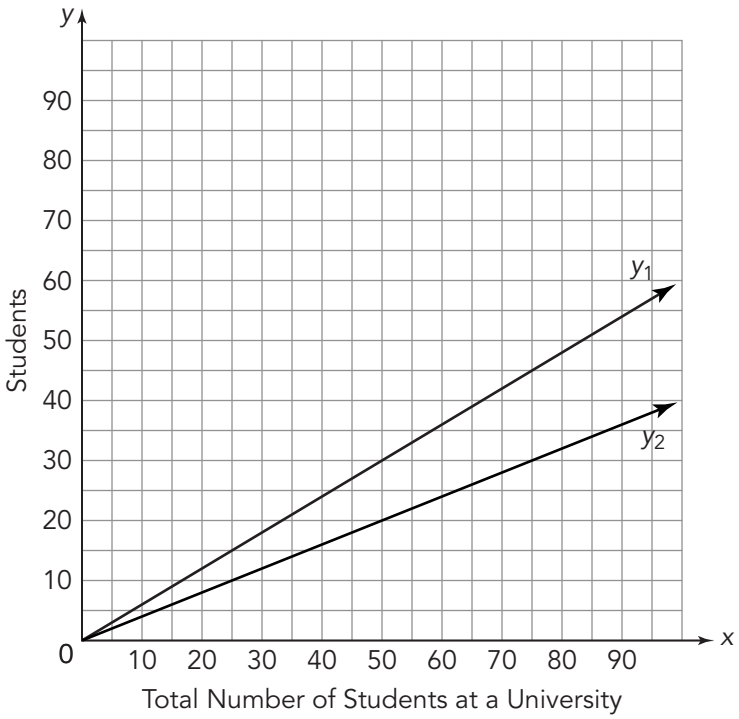
7. **Identify the constant of proportionality, or rate of change, for each graph in Question 5. Then explain how to determine *k* from a graph.**



ACTIVITY
1.2 Comparing Ratios and Graphs

Graphs provide a variety of information about relationships between quantities.

1. **Examine the lines graphed on the coordinate plane. What can you determine about the relationships between the quantities by inspecting the graph?**



The lines y_1 and y_2 each represent a proportional relationship. One line represents the proportional relationship between the number of females enrolled and the total number of students. The other line represents the proportional relationship between the number of males enrolled and the total number of students.

2. **Determine which line represents each relationship. Explain your reasoning.**

   a. **the number of females enrolled in a university**

   b. **the number of males enrolled in a university**

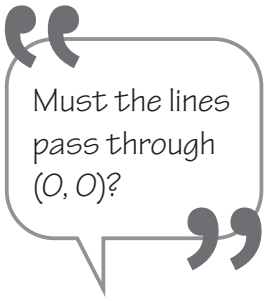
The ratio of the number of students who enjoy music to the total number of students is slightly more than the ratio of female students to the total number of students.

3. **Draw a line on the coordinate plane that might represent the ratio of the number of students who enjoy music to the total number of students. Label this line y_3. Explain your reasoning.**

In a linear relationship, any change in an independent variable will produce a corresponding change in the dependent variable.

The ratio of students who work full-time to total students is less than the ratio of male students to total students.

4. **Draw a line on the coordinate plane that might represent the ratio of students at a university who work full-time to the total number of students. Label this line y_4. Explain your reasoning.**



5. **Of the lines on the coordinate plane, which is the steepest? How does this relate to the ratios?**

ACTIVITY
1.3 Comparing Speeds

Daisa attends college in another state. During summer break, she drives home from college to visit her family and friends.

Daisa's Drive Home

Time (hours)	Distance (miles)
3	180
2	120
1.5	90
2.5	150

1. **Daisa decides to keep track of the time it takes her to drive home from school. She records her distance after various numbers of hours. Her data are shown in the table.**

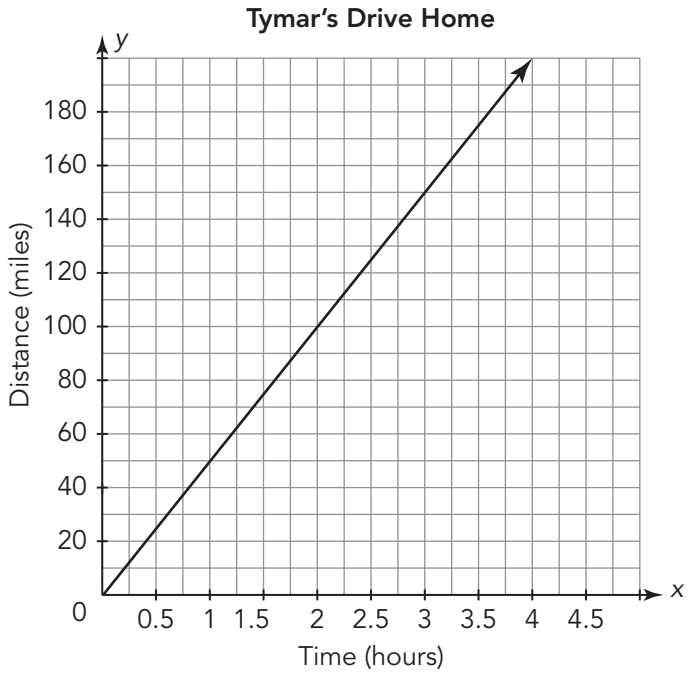
   a. **Does this table represent a proportional relationship? Explain your reasoning.**

   b. **Write a ratio for distance to time.**

   c. **Write the unit rate for distance per 1 hour.**

Unit rate is a comparison of two quantities in which the denominator has a value of one unit.

One of Daisa's high school classmates, Tymar, attends college with Daisa. He also drives home during the summer break but takes a different route.



2. Analyze the graph of his trip.

a. Does the graph represent a proportional relationship? Explain your reasoning.

b. Who drives faster—Daisa or Tymar? Explain your reasoning.

A third friend, Alisha, offers to drive Daisa and Tymar home for spring break so that they can share the cost of gas money. When asked how fast she drives, Alisha reported that the distance traveled, y, for the time, x, can be expressed as $y = 57x$.

3. Does Alisha's equation represent a proportional relationship? Explain your reasoning.

4. Compare the representations of the three friends.

a. Who drives the fastest? Explain your reasoning.

b. Rank the friends in order from the slowest driver to the fastest driver.

ACTIVITY
1.4 Comparing Depth of Color

Students in a sculpting class at a university are working in teams to create modeling clay. The students learned that they can make different types of clay by changing the ratio of flour to water. Their recipes are shown in the table.

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
Flour	2.5 cups	3 cups	7.5 cups	4 cups	12 cups	3.75 cups	5 cups
Water	1 cup	2 cups	3 cups	2 cups	8 cups	1.5 cups	2 cups

1. **How many different recipes for clay did the students create? Show all work and explain your reasoning.**

The art professor would like all of the projects to include the same shade of orange. The students have learned that orange paint is created by mixing red and yellow paints. Three groups presented suggestions for the shade of orange to be used for the art projects.

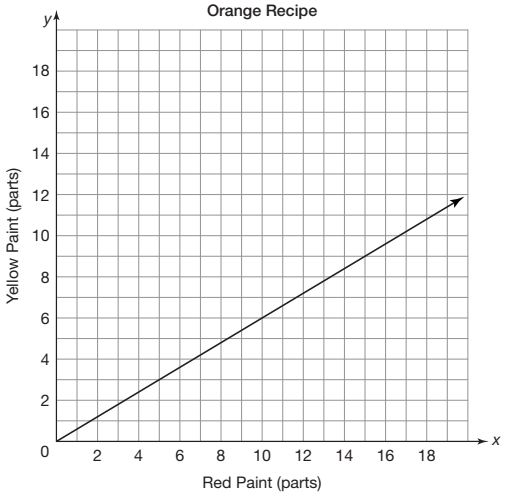
Avi's Group

$y = \frac{4}{5}x$, where x is the amount of red paint and y is the amount of yellow paint

Zander's Group

Red Paint (parts)	Yellow Paint (parts)
6	1.5
8	2
12	3
15	3.75

Paul's Group



2. **Explain how you know that each group's proposal represents a proportional relationship.**

   a. **Avi's Group**

   b. **Zander's Group**

   c. **Paul's Group**

The greater the ratio of yellow to red paint used, the lighter the shade of orange paint.

3. **Rate the group's proposals from lightest orange to deepest orange. Explain your reasoning.**

4. **Write an equation, where *x* is the amount of red paint and *y* is the amount of yellow paint, that would create a shade of orange that is between the two deepest shades. Explain your reasoning.**

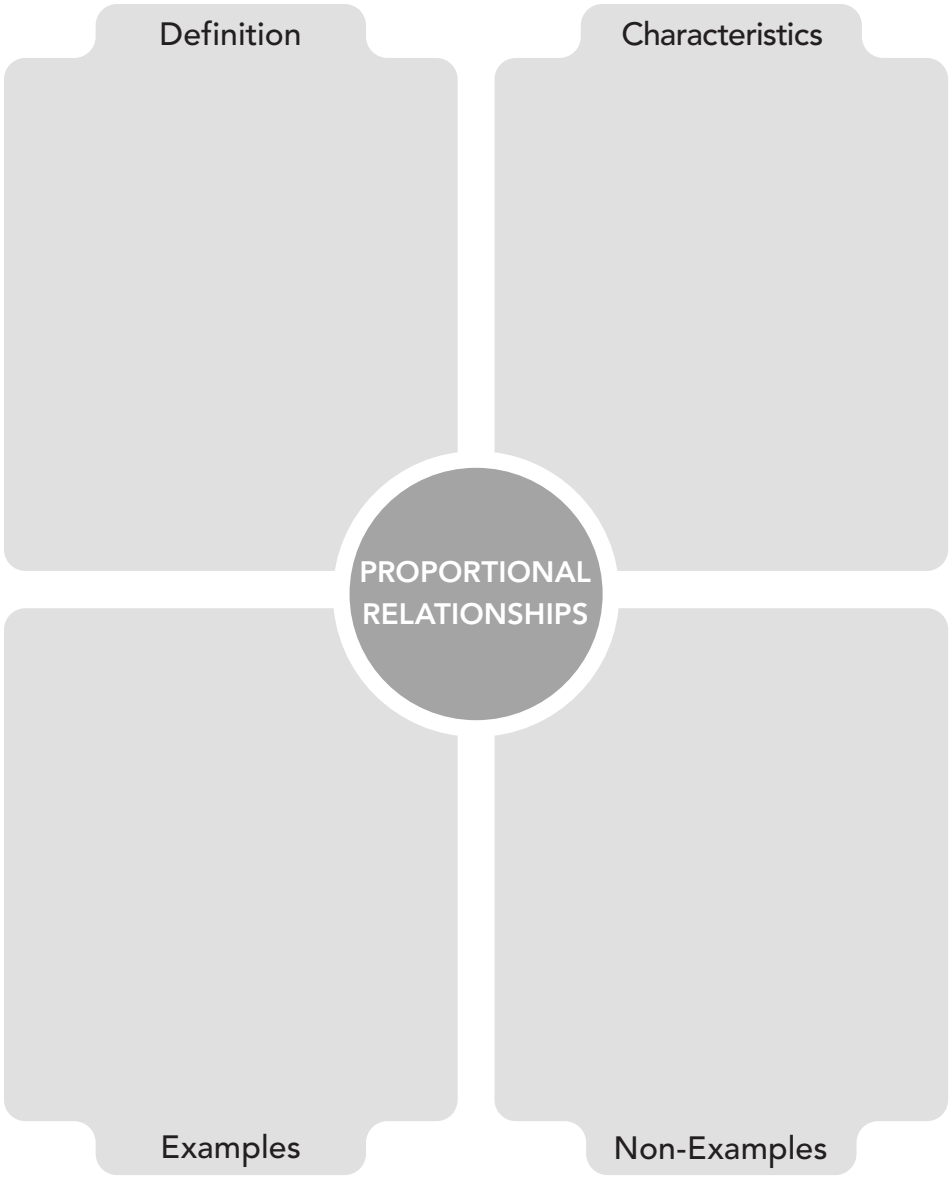
NOTES

TALK the TALK

Proportional Relationships

All of the relationships in this lesson are examples of proportional relationships.

1. **Complete the graphic organizer to summarize proportional relationships. Include characteristics, examples, and non-examples using tables, equations, and graphs.**



Assignment

Write

Explain how to compare proportional relationships represented in different forms.

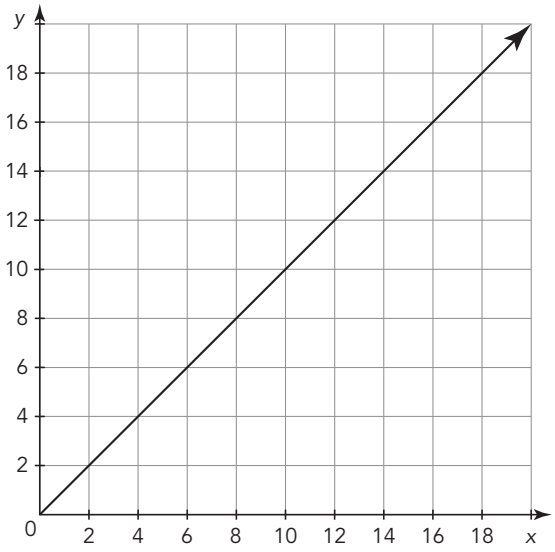
Remember

Proportional relationships can be represented using tables, graphs, and equations. In a table, all the ratios of corresponding x- and y-values must be constant. On a graph, a proportional relationship is represented as a linear graph passing through the origin. The equation for a proportional relationship is written in the form $y = kx$, where k is the constant of proportionality.

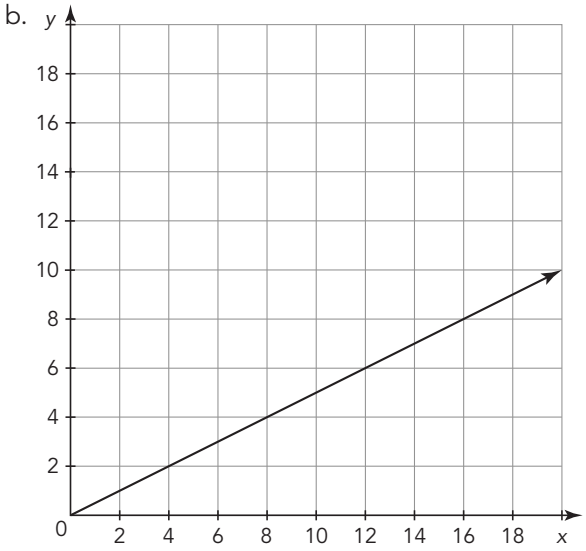
Practice

1. Determine the constant of proportionality represented in each graph.

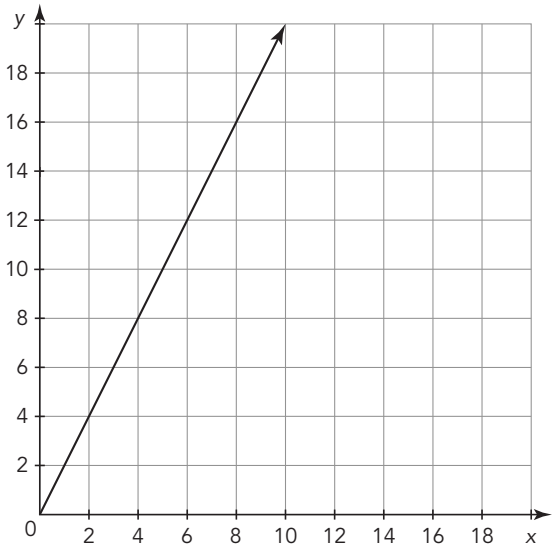
a.



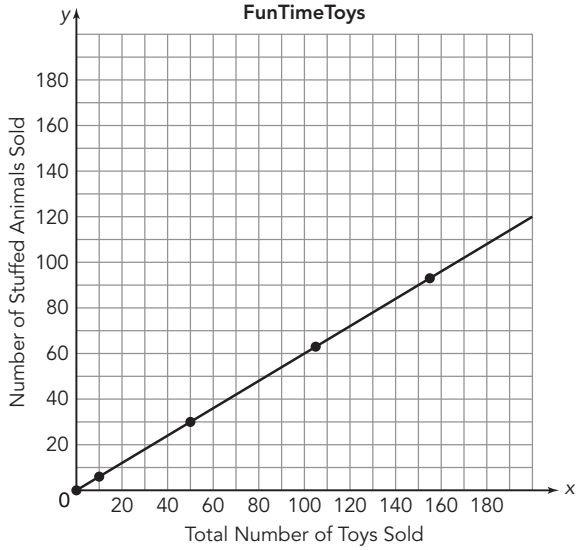
b.



c.



2. Determine the constant of proportionality for each proportional relationship. Assume that y represents all of the outputs and x represents all of the inputs.
   a. $2x = 10y$ b. $\left(\frac{3}{5}\right)y = 8x$
   c. $\frac{y}{10} = 10x$ d. $\left(\frac{1}{2}\right)x = y$
3. Melanie collects coins from all over the world. She is reorganizing her collection into coins from Europe and coins from other parts of the world. After sorting the coins, she comes to the conclusion that six out of every ten of the coins in her collection come from Europe.
   a. Write a ratio for the number of European coins to the total number of coins, the number of non-European coins to the total number of coins, and the number of European coins to the number of non-European coins.
   b. Melanie has 230 coins in her collection. Determine the number of European and non-European coins that she has in her collection.
   c. Melanie adds to her collection while keeping the same ratio of coins and now has 180 European coins. Determine the number of non-European coins and the total number of coins in her collection.
   d. Write an equation to determine the number of European coins, E, if Melanie has t total coins. Show your work and identify the constant of proportionality.
   e. Write an equation to determine the number of non-European coins, N, if Melanie has t total coins. Show your work and identify the constant of proportionality.
   f. Graph your equations from parts (d) and (e) on a coordinate plane. Label the axes of each graph.
4. Three competing toy stores review their inventory. FunTimeToys creates a graph to represent the relationship between the total number of toys sold and the number of stuffed animals sold. Toy Soldiers writes an equation and The Toy Box creates a table to represent the same information.



Toy Soldiers $y = \frac{1}{2}x$

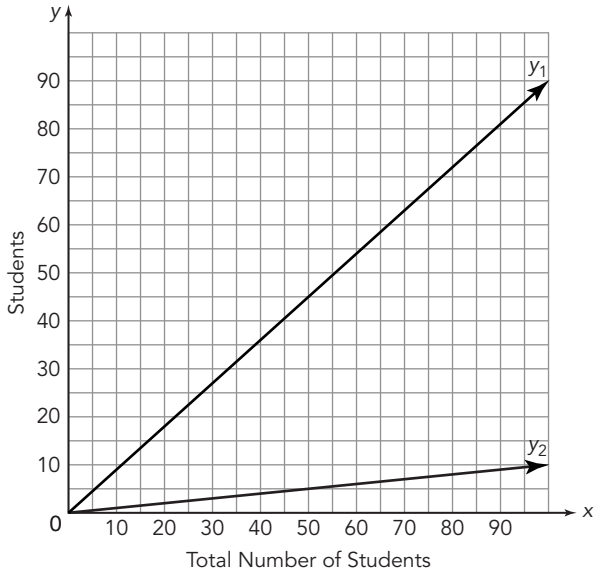
The Toy Box

Total Number of Toys Sold	Number of Stuffed Animals Sold
0	0
12	8
54	36
102	68
156	104

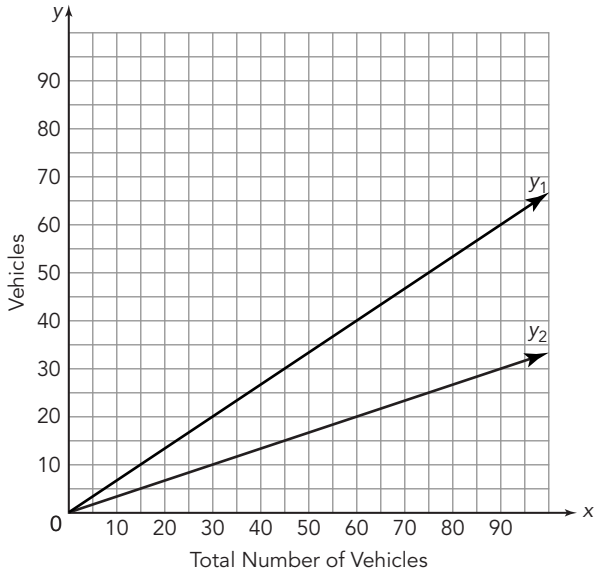
Fluffy Stuffy Stuffed Animals wants to sell their stuffed animals in a local toy store. In which store should they sell their products if they hope to make the most money? Explain your reasoning.

5. Analyze each scenario and graph.

A voice instructor notices that only one out of every ten of her students can sing soprano.



A store owner notices that in his parking lot, two out of every six vehicles are trucks.



a. Identify the proportional relationship represented by each line as it relates to the scenario. Explain your reasoning.

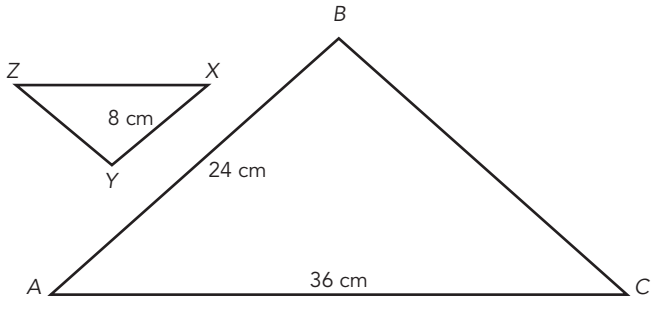
b. Write an equation that has a constant of proportionality between those represented on the graph. Explain what relationship is represented by your equation.

Stretch

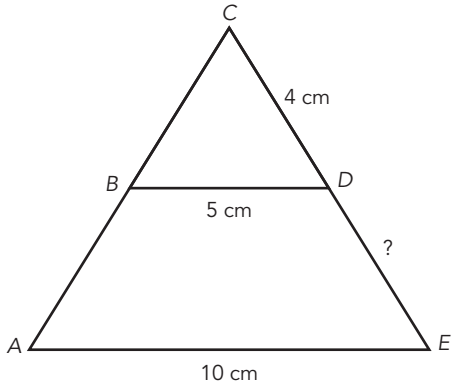
Consider the relationship between the side length of a square and the area of the square. Does this represent a proportional relationship? Use a table of values, equation, and graph to justify your answer.

Review

1. In the diagram, $\triangle ABC \sim \triangle XYZ$. State the corresponding sides and angles.

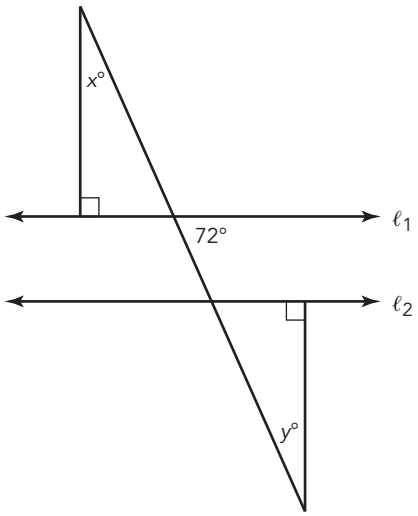


2. In the diagram, $\overline{BD} \parallel \overline{AE}$.
   a. Explain why $\triangle BDC \sim \triangle AEC$.
   b. Determine the length of $\overline{DE}$.

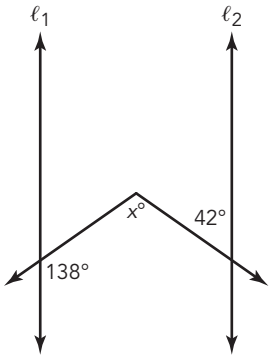


3. Solve for each unknown angle measure given that $\ell_1 \parallel \ell_2$.

a.

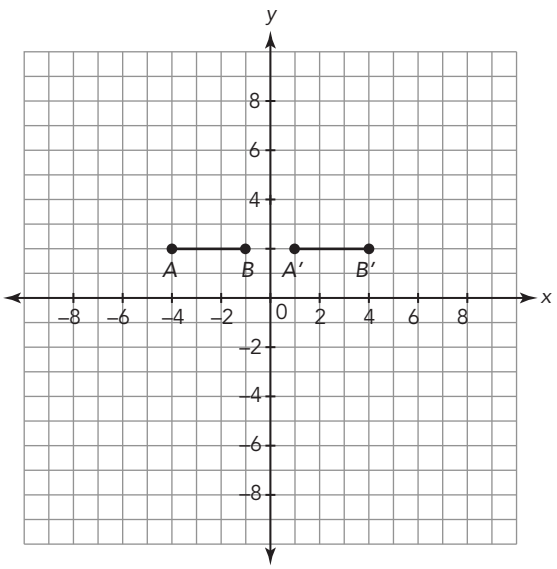


b.

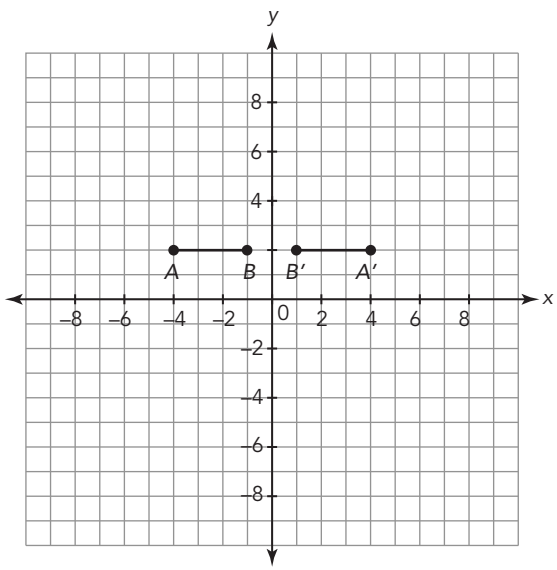


4. Describe a transformation or sequence of transformations to generate line segment $A'B'$ from original line segment AB.

a.



b.



2 Jack and Jill Went Up the Hill

Using Similar Triangles to Describe the Steepness of a Line

WARM UP

Identify the coefficients and constants in each equation.

1. $64x + 24$
2. $36 - 8z$
3. $-3a^2 + 18a$
4. $42mn + 27m - 1$

LEARNING GOALS

- Analyze the rate of change between any two points on a line.
- Use similar triangles to explore the steepness of a line.
- Derive the equations $y = mx$ and $y = mx + b$, representing linear relationships.
- Graph proportional relationships, interpreting the unit rate as the slope of the graph.

KEY TERMS

- rate of change
- slope

You have learned about rates, unit rates, and the constant of proportionality. How can you connect all of those concepts to describe the steepness of a line?

Let It Steep

Examine each triangle shown.

Figure A

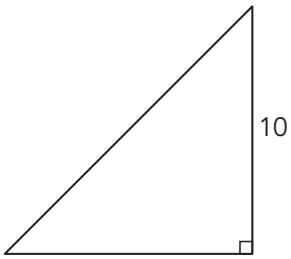


Figure B

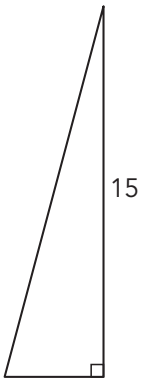


Figure C

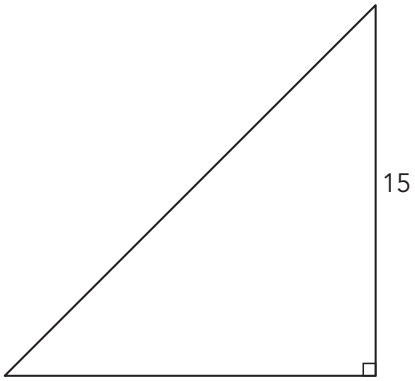
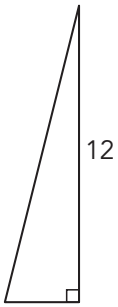


Figure D



1. **For each triangle, write a ratio that represents the relationship between the height and the base of each triangle.**

2. **Write each ratio as a unit rate.**

3. **How can you use these rates to compare the steepness of the triangles?**

ACTIVITY
2.1 Constant of Proportionality as Rate of Change

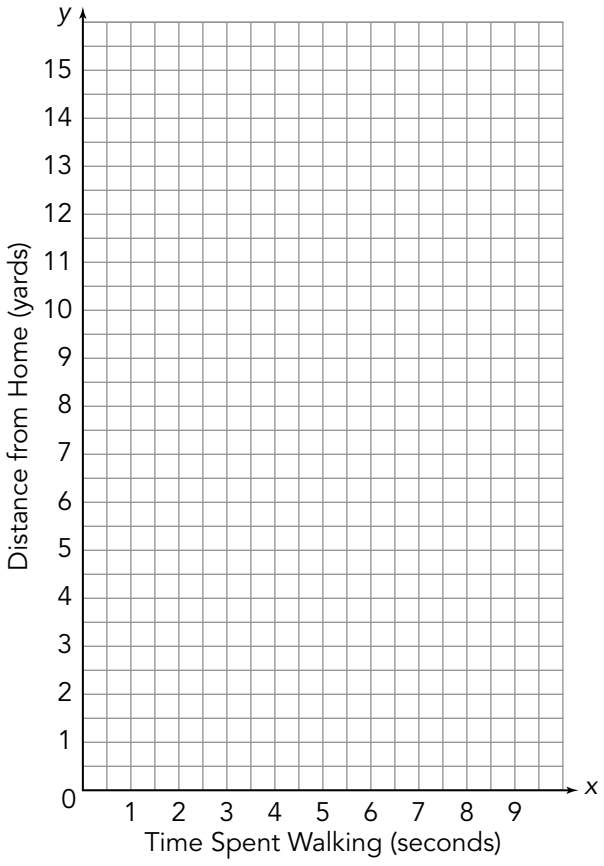
On Monday, Jack and Jill walked from their home up a hill to get to the bus stop. They walked 4 yards every 3 seconds.

1. **Write an equation to represent the distance, *d*, Jack and Jill walked over time, *t*.**

2. **Does this situation represent a proportional relationship? If so, identify the constant of proportionality.**

3. **Complete the table. Then graph the points. Finally, draw a line to represent the relationship between the time Jack and Jill walked and their distance from home.**

Time Spent Walking (seconds)	Distance from Home (yards)
	0
1	
3	
	8
7.5	
9	



NOTES

4. **What is the unit rate? Explain what the unit rate means in terms of this situation.**

5. **Explain why Tanner's reasoning is incorrect. Then explain why the graph goes up as you move from left to right.**

Tanner

This graph goes up from left to right because Jack and Jill were walking up a hill.

NOTES

The **rate of change** for a situation describes the amount that the dependent variable changes compared with amount that the independent variable changes.

6. **Consider the Jack and Jill situation.**

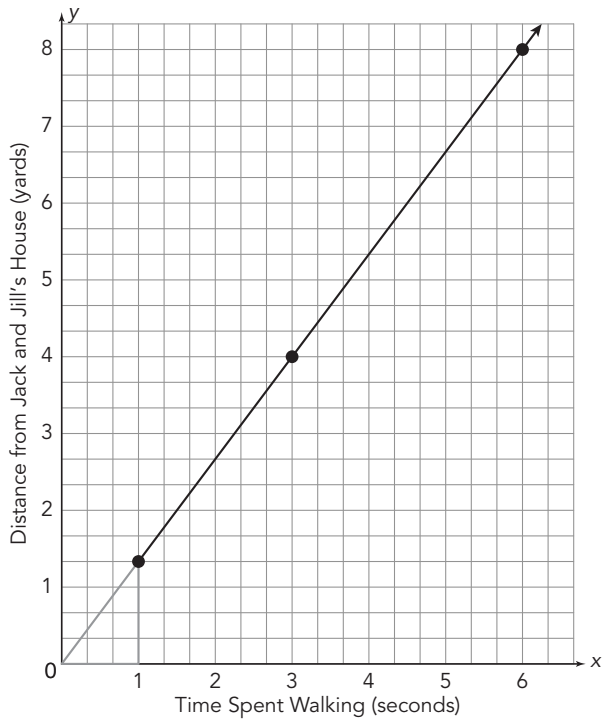
   a. **Identify the independent and dependent variables. Explain your reasoning.**

   b. **Identify the rate of change.**

7. **Consider the rate of change, the constant of proportionality, and the unit rate for this situation. What do you notice?**

8. **How would the rate of change and the graph of the relationship change if Jack and Jill walked faster? How would they change if Jack and Jill walked more slowly?**

ACTIVITY
2.2 Slope of a Line



The graph shown represents the relationship between the time Jack and Jill walk and the distance they walk from their home.

Let's analyze three different moments in time during Jack and Jill's walk to the bus stop.

$t = 1$ $t = 3$ $t = 6$

The graph shows a right triangle drawn to represent $t = 1$.

1. **Trace the triangle on a piece of patty paper. Label the horizontal and vertical sides of the right triangle with their respective lengths.**

2. **Draw right triangles to model $t = 3$ and $t = 6$ on the coordinate plane. Then trace each triangle on a separate piece of patty paper. Label the horizontal and vertical sides of the right triangle with their respective lengths.**

3. **Determine the steepness of each triangle by writing a ratio of the vertical side length to the horizontal side length. How do these ratios compare?**

4. **What is the relationship among the three right triangles? Justify your reasoning.**

5. **Identify and label the triangle that represents the unit rate. Explain how you know.**

6. **Slide the unit rate triangle along the graph of the line. What do you notice?**

7. **Slide the other two triangles along the graph of the line. What do you notice?**

Keep your patty paper drawings. You will need those in the next lesson.

In the last two activities you investigated a relationship using a rate of change of $\frac{4}{3}$ to represent Jack and Jill walking 4 yards away from their home in 3 seconds, or as a unit rate of $\frac{4}{3}$ yards per second. Because this situation is a proportional relationship, the rate of change can specifically be called the constant of proportionality, represented by the variable k.

In this activity, you created three similar triangles each using two points from the line to explore the steepness of the line. By sliding the similar triangles along the line you noticed the steepness of the line remained constant between any two points on the line. In any linear relationship, **slope** describes the direction and steepness of a line and is usually represented by the variable m. Slope is another name for rate of change. It represents the ratio of the change in vertical distance to the change in horizontal distance between any two points on the line. The slope of a line is constant between any two points on the line.

The sign of the slope indicates the direction of a line. If the slope of a line is positive, then the graph will increase from left to right. If the slope of a line is negative, then the graph will decrease from left to right.

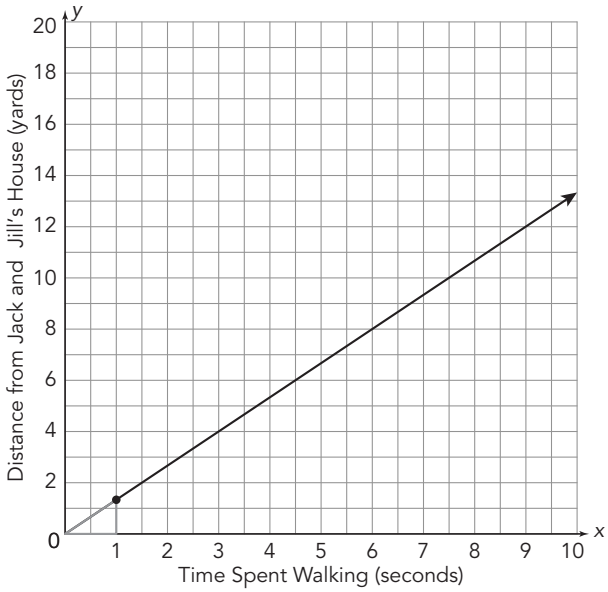
You wrote the equation $d = \frac{4}{3}t$ to represent the distance, d, Jack and Jill walked from home with respect to time, t. Let's generalize this linear relationship.

8. Let *y* represent the dependent variable, *x* represent the independent variable, and *m* represent the slope of the line.

   a. Write a general equation to relate these quantities.

   b. How is this equation similar to the equation for the constant of proportionality?

ACTIVITY
2.3
Equation for a Line Not Through the Origin



Jack and Jill's Aunt Mary lives 10 yards from their home closer to the bus stop. After spending Monday night at Aunt Mary's house, they leave for the bus stop from there Tuesday morning. They walk at the same rate from either house, 4 yards every 3 seconds.

The graph shows the line $y = \frac{4}{3}x$, which represents the relationship between the time Jack and Jill walk and their distance from their house.

1. Compare the two situations.

a. How do the slopes compare?

b. How do the starting points compare?

2. Let's graph the line to represent their walk to the bus stop from Aunt Mary's house.

a. On a piece of patty paper, trace the line $y = \frac{4}{3}x$ that represents Jack and Jill's walk to the bus stop from their house. Be sure to include the triangle representing the unit rate in your trace.

b. Translate this line to represent their walk from Aunt Mary's house and then transfer this line onto the graph.

3. Analyze the translated line.

a. Does your new line represent a proportional or non-proportional relationship? Explain how you know.

b. How does this translation affect the coordinates of the line? Complete the table to show how the translation affects the coordinates of your new line.

Time Spent Walking (seconds)	Distance from Jack and Jill's House on Monday (yards)	Distance from Jack and Jill's House on Tuesday (yards)
x	y_1	y_2
0	0	
1	$\frac{4}{3}$	
3	4	
6	8	
7.5	10	
9	12	

c. How does this translation affect the unit rate?

d. Write an equation to represent the translated line. Let y_2 represent the distance from Jack and Jill's house and let x represent their time spent walking. Explain how this line is the same and different from the line $y_1 = \frac{4}{3}x$.

You have written a general equation, $y = mx$, to relate the independent and dependent variables and the slope in a proportional linear relationship. How does this general equation change when the line is translated vertically by b units?

4. Write a general equation to represent the relationship $y = mx$ after it is vertically translated b units.

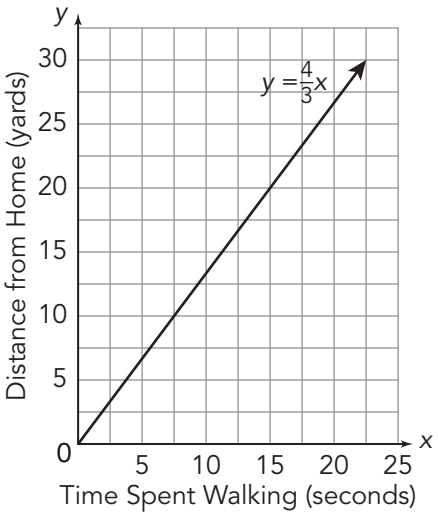
NOTES

ACTIVITY
2.4 A Negative Unit Rate

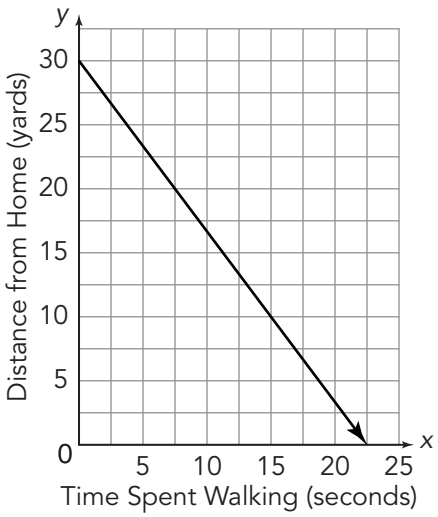
Jack and Jill are walking back home from the bus stop which is 30 yards from their house. They walk at the same rate, 4 yards every 3 seconds.

Consider the two graphs shown.

Walking to the Bus Stop



Walking Home from the Bus Stop



1. Analyze the graph of Jack and Jill walking home from the bus stop.

a. Does this situation represent a proportional or non-proportional relationship? Explain your reasoning.

b. Is the slope of the line positive or negative? Explain how you know.

2. **Compare and contrast the rate of change, or slope, of each line.**

   a. **Use patty paper to trace and create any right triangle that represents the rate of change, or slope, from the Walking to the Bus Stop graph.**

   b. **Place your patty paper on the Walking Home from the Bus Stop graph. How can you transform the right triangle you drew from the Walking to the Bus Stop graph to the Walking Home from the Bus Stop graph?**

   c. **Slide the right triangle along the line of the Walking Home from the Bus Stop graph. What do you notice?**

   d. **What is the slope of line in the Walking Home from the Bus Stop graph? Explain your reasoning.**

Remember the slope of a line represents steepness and direction.

3. **Write an equation to represent Jack and Jill's walk home from the bus stop. Let *y* represent the distance from home and *x* represent the time spent walking.**

4. **How does the equation you wrote to represent Jack and Jill's walk home from the bus stop compare to the equation that represents their walk to the bus stop?**

ACTIVITY
2.5 Describing Linear Equations

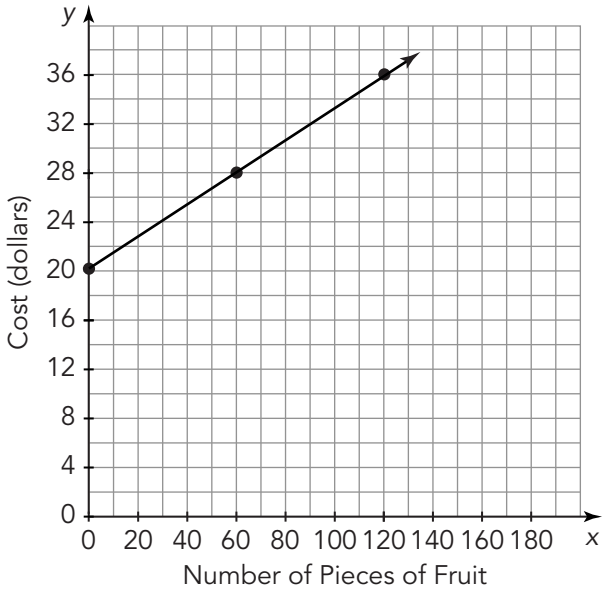
You have discovered that the equation $y = mx$ represents a proportional relationship. The equation represents every point (x, y) on the graph of a line with slope m that passes through the origin (0, 0).

An equation of the form $y = mx + b$, where b is not equal to zero, represents a non-proportional relationship. This equation represents every point (x, y) on the graph of a line with slope m that passes through the point $(0, b)$.

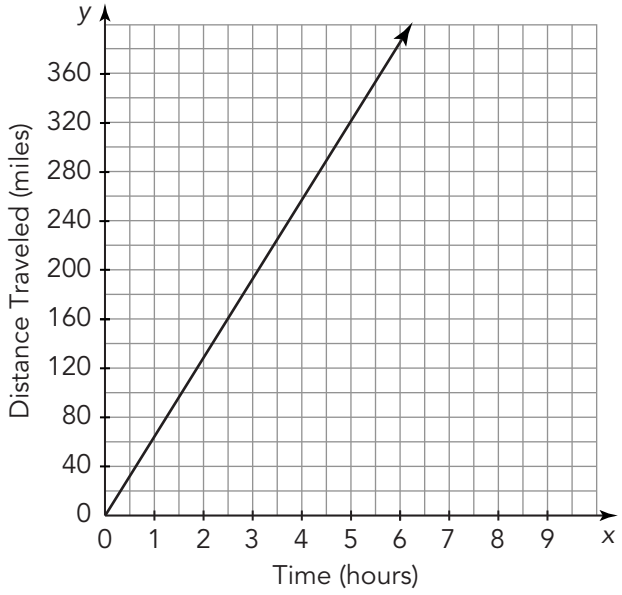
1. **Consider each graph shown.**

   - **Determine whether the graph represents a proportional or non-proportional relationship.**
   - **Write an equation in the form $y = mx$ or $y = mx + b$ to represent the relationship between the independent and dependent quantities.**

a.

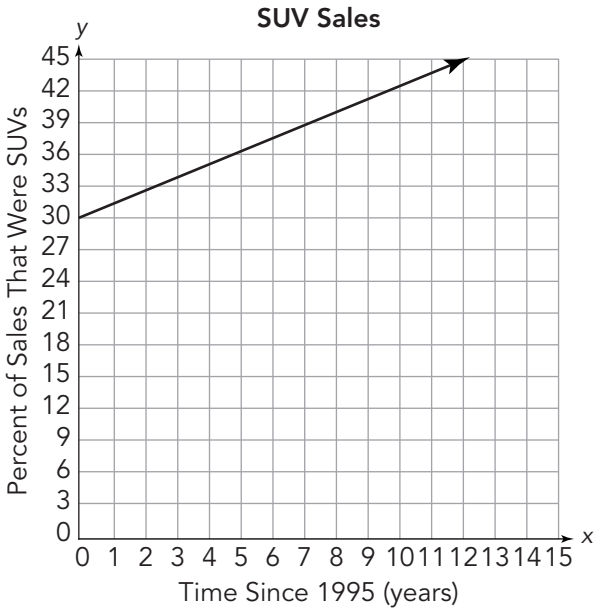


b.

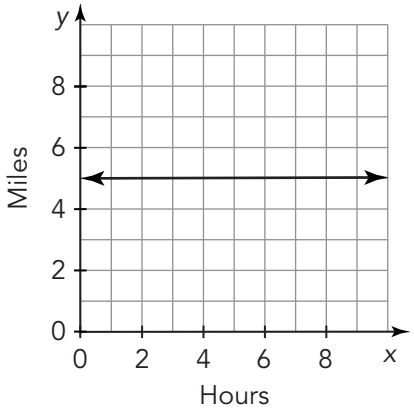


NOTES

c.



2. **Determine the slope of this graph and write an equation to represent it. Describe a situation that could be modeled by this graph.**



3. **Complete the table of values to represent the linear relationship specified. Then, write an equation to represent the relationship.**

   a. **proportional relationship**

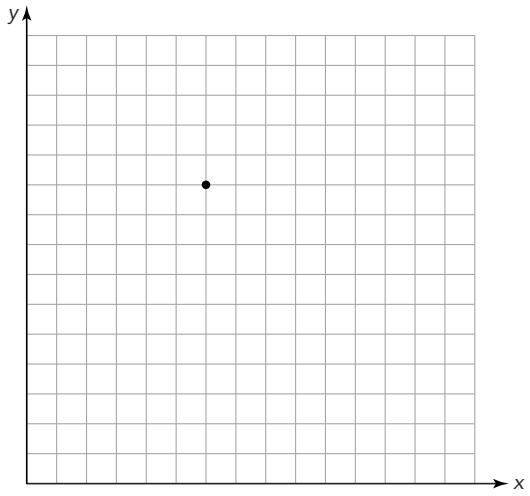
x	*y*
0	
1	
2	12
3	
4	

b. non-proportional relationship

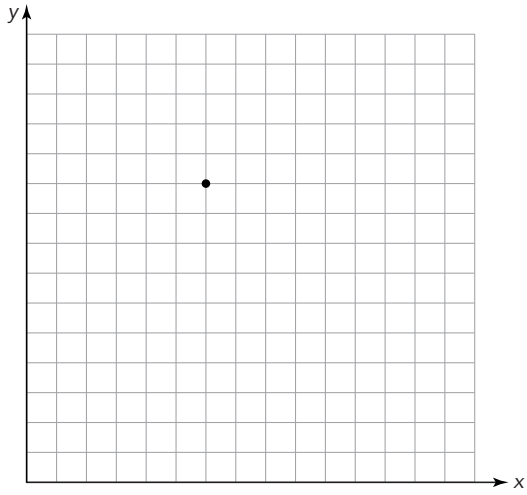
x	*y*
0	
1	
2	12
3	
4	

4. Draw a line through the point and label the graph to represent the linear relationship specified. Then, write an equation.

a. proportional relationship



b. non-proportional relationship



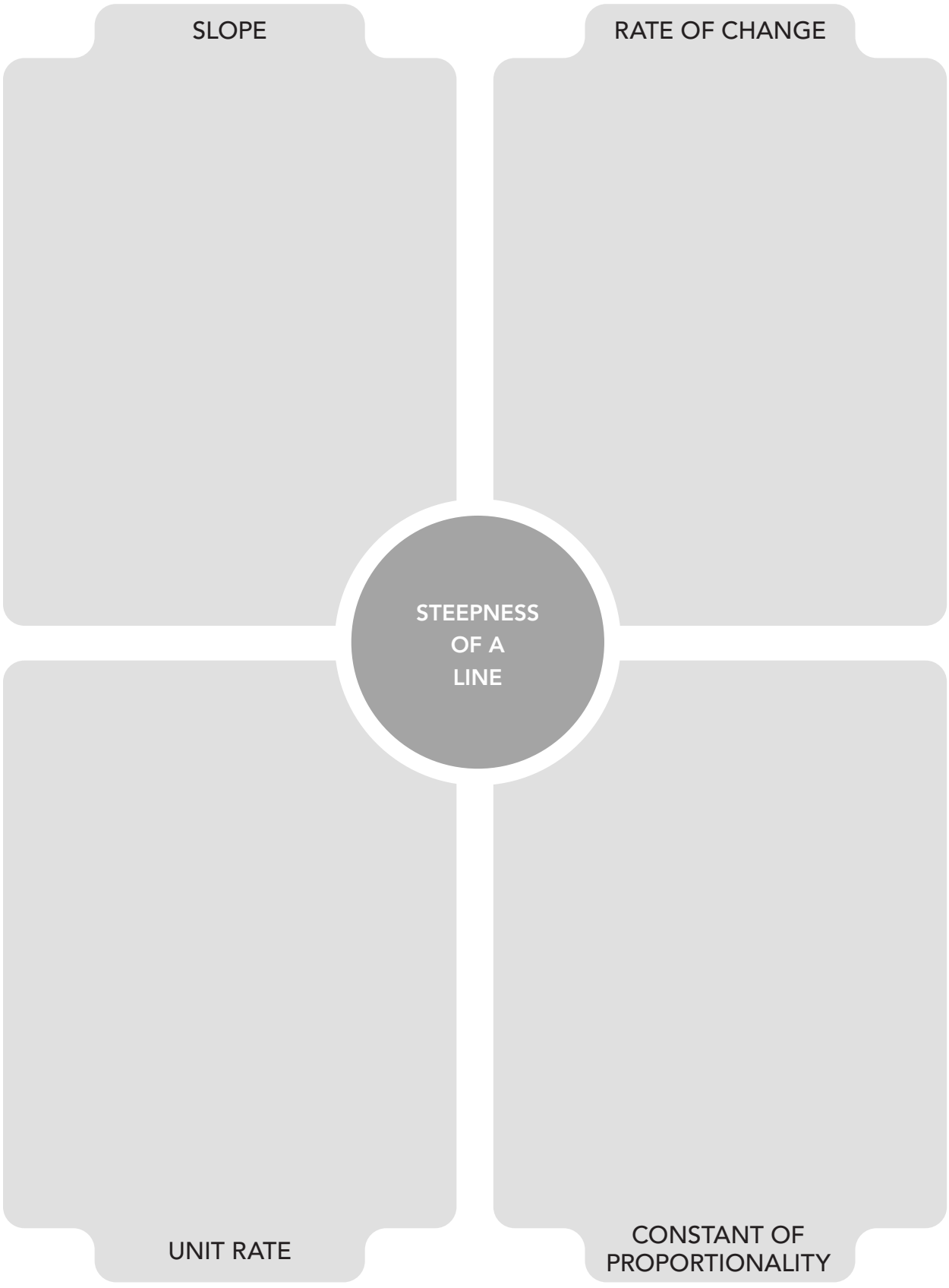
NOTES

TALK the TALK

A Web of Connections

In this lesson, you learned that the steepness of a line can be described by its slope, which is a concept that is connected to many other concepts you have learned previously.

1. **Complete the graphic organizer to describe how steepness is related to slope, rate of change, unit rate, and the constant of proportionality. Include definitions, graphs, and equations. Be sure to address both proportional and non-proportional relationships.**


SLOPE
RATE OF CHANGE
STEEPNESS OF A LINE
UNIT RATE
CONSTANT OF PROPORTIONALITY

Assignment

Write

In your own words, explain how slope is related to the right triangles formed along the line. Use examples to illustrate your explanation.

Remember

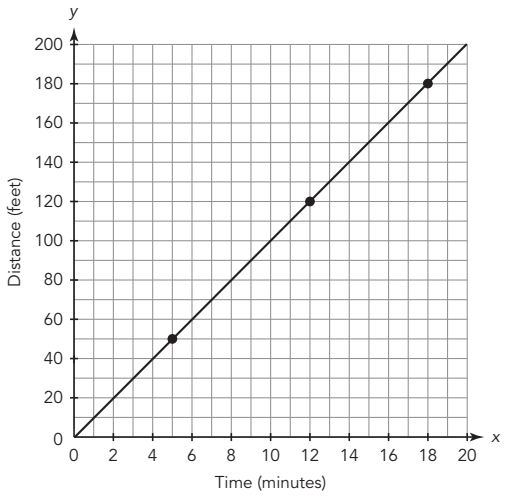
- Slope is another name for the rate of change of a linear relationship graphed as a line.
- The equation for a proportional linear relationship is $y = mx$, where m is the slope. The equation represents all of the points (x, y) on the line.
- An equation for a non-proportional linear relationship is $y = mx + b$, where m is the slope and b is the y-coordinate of the point where the graph crosses the y-axis. The equation represents all of the points (x, y) on the line.

Practice

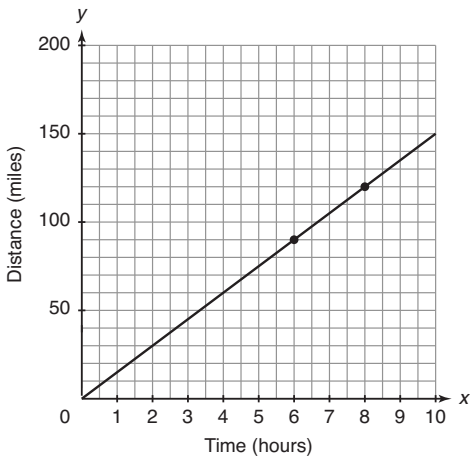
1. Maximilian is cleaning shrimp. He cleans 4 shrimp every minute. Use time in minutes as the independent quantity and the number of shrimp as the dependent quantity.
   a. Is the relationship proportional or non-proportional? Explain how you can determine this using a graph and the equation.
   b. Identify the unit rate of this relationship. Explain what the unit rate means in terms of the situation.
   c. Write an equation that determines the number of shrimp cleaned given any time.
   d. Create a graph of the relationship.

2. Consider each graph shown.
   - Determine whether the graph represents a proportional or non-proportional relationship.
   - Write an equation in the form $y = mx$ or $y = mx + b$ to represent the relationship between the independent and dependent quantities.

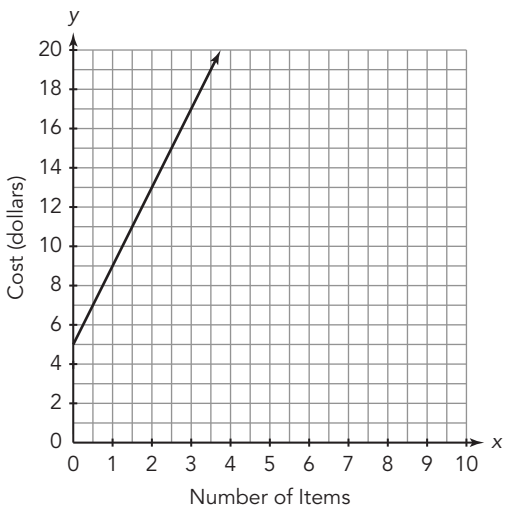
a.



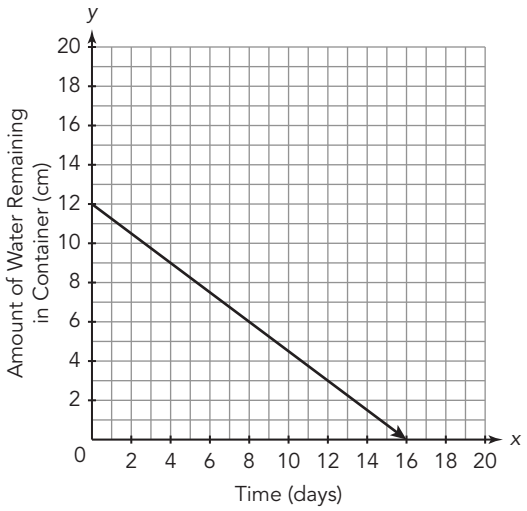
b.



c.



d.



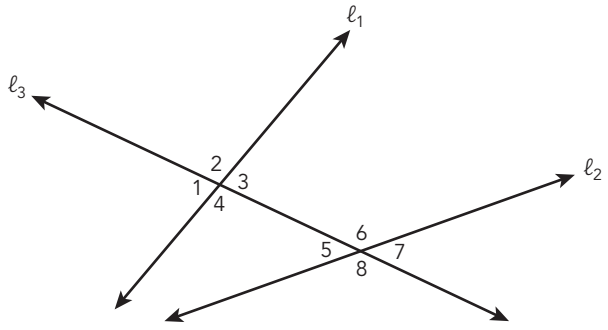
Stretch

Write an equation that determines where the graph crosses the *y*-axis, given the slope and the coordinates of one point.

Review

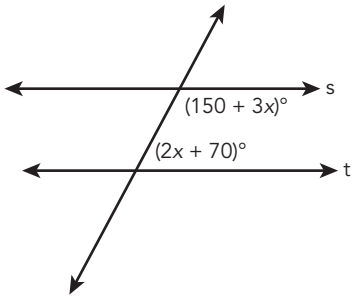
1. Determine whether each equation represents a proportional relationship.
   a. $y = 2.5x$
   b. $y = x - 4$

2. Examine the figure shown.



   a. Name 2 pairs of same-side interior angles.
   b. Name 2 pairs of congruent angles.
   c. Name 2 pairs of supplementary angles.

3. In the diagram shown, line *s* and line *t* are parallel. Determine the measures of all the angles.

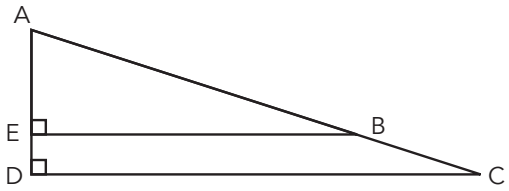


3 Slippery Slopes

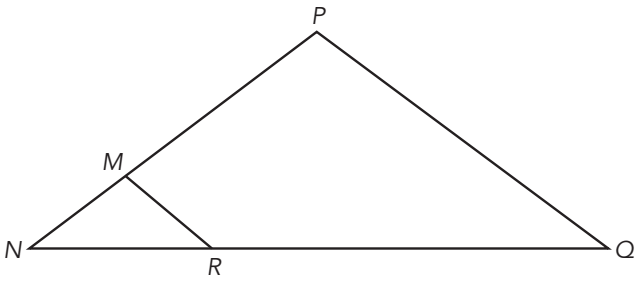
Exploring Slopes Using Similar Triangles

WARM UP

For each diagram, describe how you can show that the triangles are similar.

1. 

2. Given: $PQ \parallel MR$.



LEARNING GOALS

- Use similar triangles to show that the slope is the same between any two distinct points on a non-vertical line in a coordinate plane.
- Use right triangles to identify the slope of a line from a graph.

You have used similar triangles to describe the steepness of a line. How can you use similar triangles to explain why the slope is the same between any two distinct points on a non-vertical line?

Steep Grade

Consider the three street signs shown.

Discuss each question with your partner.

1. **Where might you see each of the signs?**

2. **What do you know about the triangles on the signs?**

3. **For the signs that include numbers, what do you think those numbers represent?**

ACTIVITY
3.1

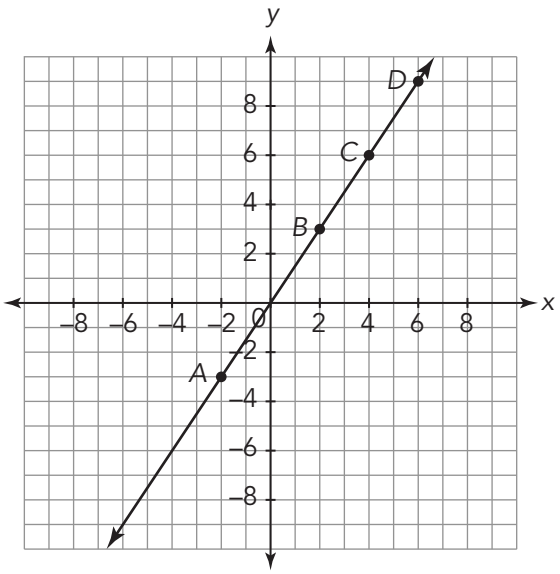
Triangles and the Equation $y = mx$

In the previous lesson, *Jack and Jill Went Up the Hill,* you used patty paper to analyze the slope of the line $y = \frac{4}{3}x$ using similar triangles formed at $x = 1$, $x = 3$, and $x = 6$.

Now, let's investigate if the slope of a line is always the same between any two points on a line.

Remember, slope describes the direction and steepness of a line.

Consider the graph of $y = \frac{3}{2}x$.



1. **Is the slope of the line positive or negative? Explain your reasoning.**

2. **Examine the slope between points *A* and *B*.**

   a. **Create a right triangle using points *A* and *B* and trace onto patty paper.**

   b. **Label the triangle with the vertical and horizontal distances.**

   c. **Label the patty paper with the slope of the line between points *A* and *B*.**

3. Does the orientation of the right triangle matter? Place your patty paper on the graph, use point *A* as the center of rotation, and rotate your triangle 180°.

   a. Compare and contrast these two triangles. How are they the same? How are they different?

   b. Does the new triangle give you the same slope? Explain your reasoning.

4. Create right triangles using points *B* and *C*, and then *B* and *D*.

   a. Label the horizontal and vertical distances.

   b. Label the patty paper with the slope of the line.

5. Compare the triangles created on the line. How can you verify that all of the triangles are similar?

6. What is the slope of the line?

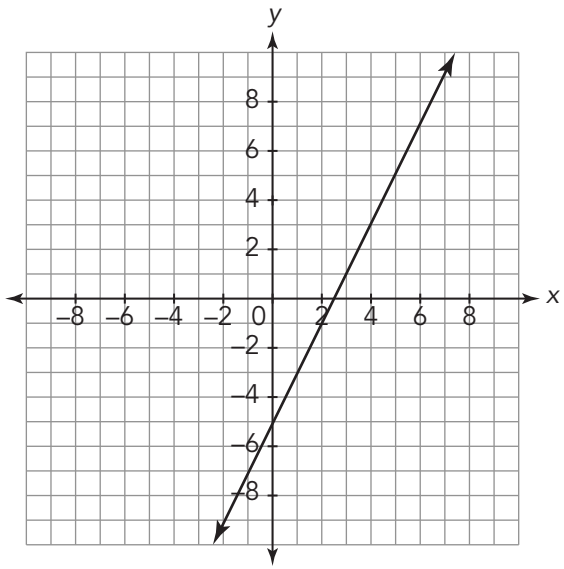
7. Cooper claims that all right triangles formed on a given line are similar. Is Cooper correct? Explain your reasoning.

NOTES

ACTIVITY 3.2

Triangles, Slope, and the Equation $y = mx + b$

Consider the graph shown.



1. **Is the slope of the line positive or negative? Explain your reasoning.**

2. **Create at least three similar triangles using points on the line.**

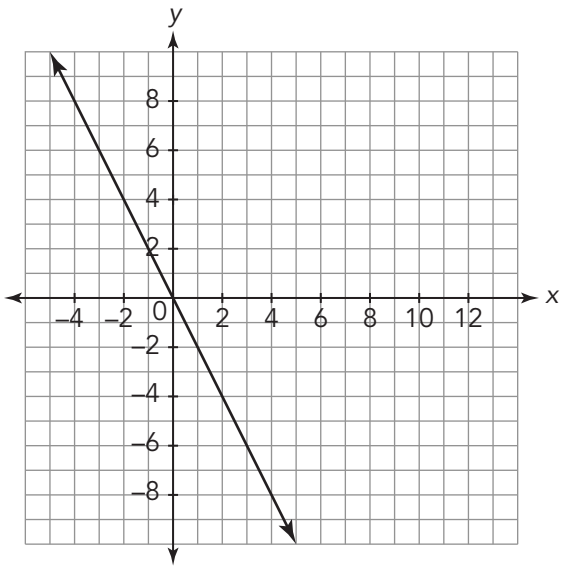
   a. **Use any method to justify that these triangles are similar.**

   b. **Determine the slope of the line.**

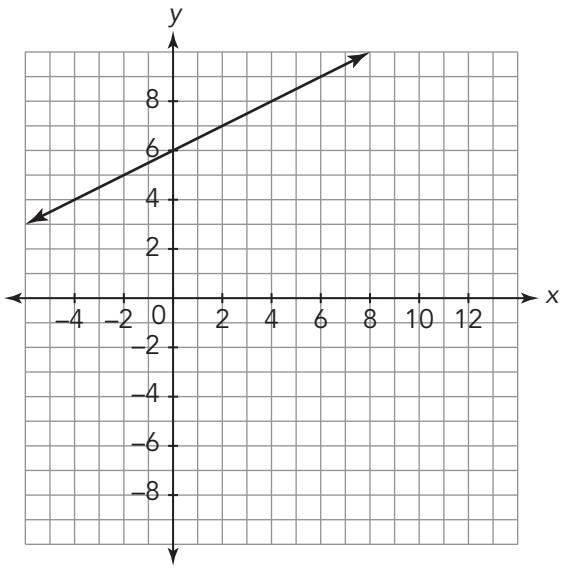
3. How many similar triangles can be formed on the graph of a line? How do you know?

4. Consider each graph shown. Determine the slope of each line and then use similar triangles to justify that the slope is the same between any two points.

a.



b.

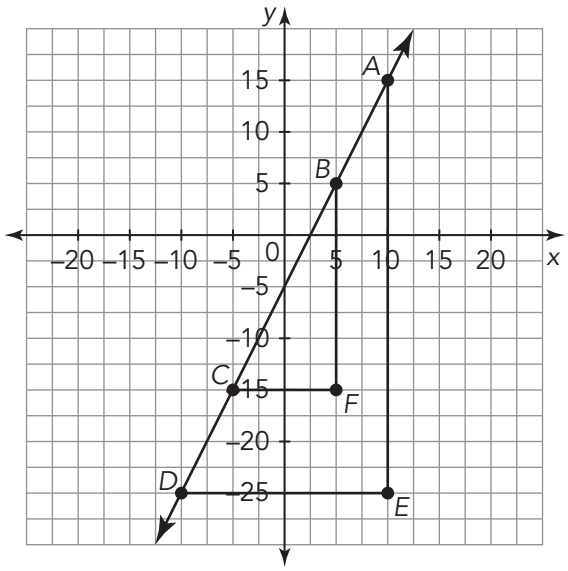


NOTES

TALK the TALK

Connecting Similar Triangles and Slope of a Line

Audra was absent for this lesson on the connection between similar triangles and the slope of a line. Write an explanation of what you learned in this lesson. Be sure to include how you can use a graph to determine the slope of a non-vertical line, and how you can use similar triangles to show the slope is the same between any two points on the line.



Assignment

Write

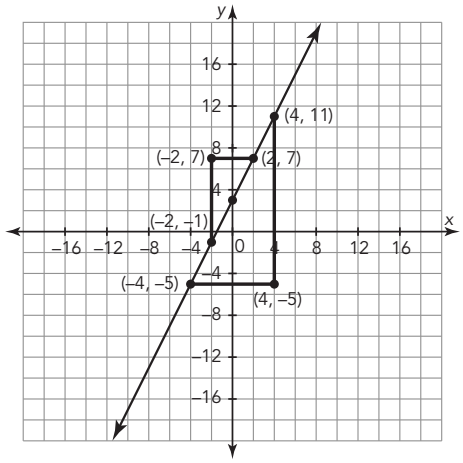
Explain why the slope between any two points on a line is always the same.

Remember

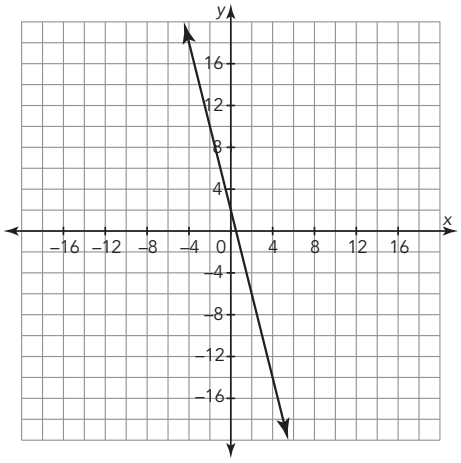
The properties of similar triangles can be used to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane.

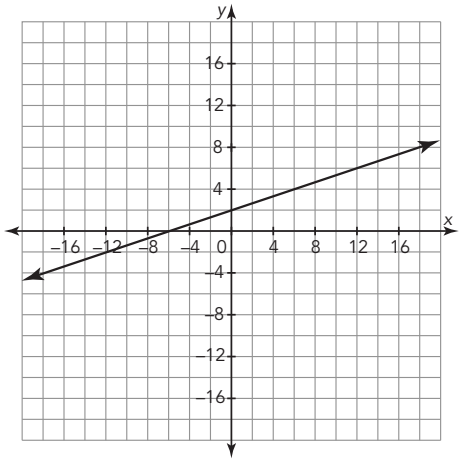
Practice

1. Consider the graph of the equation $y = 2x + 3$.
   a. The points on the line were used to create triangles. Describe the relationship between the two triangles.
   b. How can transformations be used to verify the relationship between the triangles?
   c. Use the similar triangles to determine the slope between any two points on the line.



2. Consider each graph shown. Determine the slope of each line and then use similar triangles to justify that the slope is the same between any two points.





Stretch

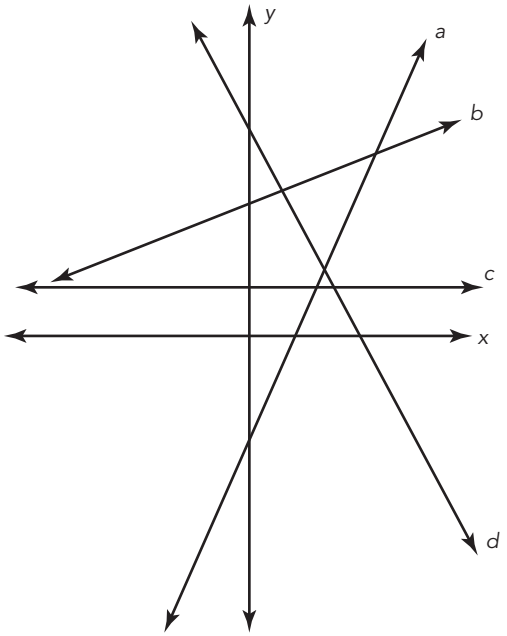
Create a table of values for the equation $y = x^2$. Use the points with x-values of 0, 1, 2, and 3 to create triangles with the length of each base equal to 1 unit.

- Describe the relationship between the heights of the resulting triangles.
- Are the triangles similar? Explain your reasoning.

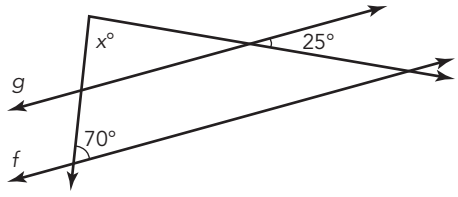
Review

1. Determine the unknown angle measure for each triangle.
   a. $m\angle A = 46°$, $m\angle B = 90°$, $m\angle C = ?$
   b. $m\angle P = ?$, $m\angle Q$: 10°, $m\angle R = 110°$

2. Consider the graph of lines *a*, *b*, *c*, and *d*.
   a. Which line(s) have positive slope?
   b. Which line(s) have negative slope?



3. Solve for the unknown angle measure given that $f \parallel g$.



Topic 1

From Proportions to Linear Relationships

Name _____ Date _____

I. Modeling with Integer Rates of Change

A. Solve each problem.

1. Violet is trying to start an Intramural Club at her school. The principal tells her she must get signatures from students to show support. Each filled sheet contains 25 signatures.

a. Write an equation to represent the number of signatures Violet gets given a certain number of filled sheets.

b. The principal tells Violet she must have 7 sheets filled with signatures. If she fills all of these, how many signatures will she have in all?

c. On Tuesday, Violet has 225 signatures. How many sheets has she filled?

d. What is the unit rate in this situation? What does it represent?

2. Ada has started a business making doghouses. Her local hardware store saw her work and wants to buy as many as she can build for $45 per doghouse.

a. Write an equation to represent the amount of money Ada receives given a certain number of doghouses built.

b. Ada believes she can build 5 doghouses in a week. How much money will she receive from the hardware store if she meets this goal?

c. Ada surpassed her goal and received $360 from the hardware store. How many doghouses did she build?

d. What is the rate of change in this situation? What does it represent?

3. Marcos uses a fitness tracker to determine the number of calories he burns while running. He burns about 110 calories per mile of running.

a. Write an equation to represent the number of calories Marcos burns given a certain number of miles he runs.

b. Marcos runs 5 miles on Saturday. How many calories did he burn while running?

c. After a run on Sunday, Marcos's fitness tracker shows he burned 385 calories. How many miles did he run?

d. What is the rate of change in this situation? What does it represent?

4. Dr. Betz, a vet, is running a free rabies clinic for her town. She estimates it will take her six minutes for each animal she treats.

a. Write an equation to represent the time in minutes Dr. Betz works at the clinic given a certain number of animals treated.

b. After treating 11 animals, how many minutes has Dr. Betz worked at the clinic?

c. Dr. Betz has been working at the clinic 1 hour and 42 minutes. How many animals has she treated?

d. What is the constant of proportionality in this situation? What does it represent?

5. Elizabeth wants to increase the number of kumquat trees in her orchard, which she has divided into equal size units of land. Each kumquat tree will take up four units of land.

a. Write an equation to represent the number of units of land used given a certain number of kumquat trees planted.

b. Elizabeth plants 25 kumquat trees. How many units of land will be used?

c. If one hundred thirty-two units of land in the orchard are used for kumquat trees, how many kumquat trees did Elizabeth plant?

d. What is the unit rate in this situation? What does it represent?

6. Antonio works at the circus making balloon animals, charging $3 for a balloon animal.

a. Write an equation to represent the total amount Antonio receives for a certain number of balloon animals made.

b. Antonio sells twenty-one balloon animals by lunchtime. Determine the total amount of money he receives.

c. How many balloon animals would Antonio need to sell in order to make $117?

d. What is the constant of proportionality in this situation? What does it represent?

Name _____ Date _____

7. Russell will only read what he considers are "perfect books." A perfect book has exactly 350 pages.

a. Write an equation to represent the number of pages Russell reads given a certain number of "perfect books" read.

b. During July, Russell read 9 "perfect books." How many pages did he read in July?

c. In August, Russell read of total of 5600 pages. How many "perfect books" did he read in August?

d. What is the unit rate in this situation? What does it represent?

8. For each painting that Alita's art studio displays, she puts up two small signs interpreting the painting and presenting the painter's biography.

a. Write an equation to represent the number of signs Alita puts up given a certain number of paintings on display.

b. If there are 11 paintings on display, determine the total number of signs.

c. Alita put up 52 signs around the art studio. How many paintings are on display?

d. What is the rate of change in this situation? What does it represent?

9. Michelle works at a souvenir shop, where she earns $8 an hour.

a. Write an equation to represent the amount Michelle earns given a certain number of hours she works.

b. Michelle worked 25 hours this week. How much did she earn?

c. If Michelle wants to earn $300 next week, how many hours must she work?

d. What is the unit rate in this situation? What does it represent?

10. Autumn creates custom bracelets as a hobby and sells them for $7.00 per bracelet.

a. Write an equation to represent the amount of money Autumn makes given a certain number of bracelets sold.

b. Autumn sells 10 bracelets. How much money does Autumn make?

c. Autumn has made $126. How many bracelets has she sold?

d. What is the rate of change in this situation? What does it represent?

11. Hunter has lost his locker combination. It takes him 10 seconds to try each of the combinations he can think of.

a. Write an equation to represent the number of seconds that have passed given a certain number of combinations tried.

b. Hunter has tried 30 combinations. How many minutes has he spent trying combinations?

c. It took Hunter five and a half minutes to open his locker. How many combinations did he try?

d. What is the rate of change in this situation? What does it represent?

12. A computer keyboard manufacturer needs to keep track of the number of keyboards produced and the number of square buttons used in the process. Each keyboard needs fifty-five square buttons for letters, numbers, punctuation, and other functions.

a. Write an equation to represent the number of square buttons used to produce a certain number of keyboards.

b. An assembly machine produced 28 keyboards in an hour. How many square buttons were used?

c. Another assembly machine used 3300 square buttons during production. How many keyboards did it produce?

d. What is the constant of proportionality in this situation? What does it represent?

Name _____ Date _____

II. Modeling with Fractional Rates of Change

A. Solve each problem.

1. Stephen is making curtains for several windows in his aunt's house. He determines that he needs 8.5 yards of fabric for each window.

a. Write an equation to represent the number of yards of fabric needed given a certain number of windows.

b. Stephen counts 9 windows downstairs in his aunt's house. How much fabric will he need to make curtains for those windows?

c. Stephen orders 161.5 yards of fabric for all the windows in his aunt's house. How many windows are in his aunt's house?

d. What is the rate of change in this situation? What does it represent?

2. Melissa is given a bunch of nickels as her change after buying a snack. To figure out how much money she has been given, she starts counting the nickels.

a. Write an equation to represent Melissa's total change in dollars given a certain number of nickels received.

b. Melissa has counted 6 nickels so far. How much change is this in dollars?

c. Melissa was supposed to get back $0.45 in change. If she received correct change, how many nickels should she have received?

d. What is the constant of proportionality in this situation? What does it represent?

3. A citizen's group pays Ryan to collect signatures to stop a local park from being sold to an industrial developer. He earns $0.15 per signature.

a. Write an equation to represent how much money Ryan earns given a certain number of signatures collected.

b. How much will Ryan earn if he collects 60 signatures?

c. How many signatures did Ryan collect if he earned $35.25?

d. What is the rate of change in this situation? What does it represent?

4. Walter is swimming laps during swim team practice. He knows it takes him about 1.75 minutes to swim each lap.

a. Write an equation to represent the total time in minutes Walter swims given a certain number of laps.

b. Walter's coach asks him to swim 16 laps. How many minutes did he swim?

c. At the end of swim team practice, Walter had been swimming for a total of 38.5 minutes. How many laps did he swim?

d. What is the unit rate in this situation? What does it represent?

5. Takira is a translator who was hired to translate documents for a legal firm. In order to meet her deadline, she can only spend $\frac{1}{2}$ hour on each document she translates.

a. Write an equation to represent the number of hours spent on the project given a certain number of documents translated.

b. If Takira completes 14 documents on Tuesday, how many hours has she spent on the project?

c. By the time she reaches her deadline, Takira has worked 19 hours on the project. How many documents did she translate?

d. What is the constant of proportionality in this situation? What does it represent?

6. The Drama Club is selling small bags of popcorn at an outdoor movie to raise money for their club. The club raises $3.75 for each bag it sells.

a. Write an equation that represents the total amount raised by the club given a certain number of bags of popcorn sold.

b. The club sells 215 bags of popcorn before intermission. How much money did it raise?

c. At the end of the movie, the club had raised $1200. How many bags of popcorn did it sell?

d. What is the unit rate in this situation? What does it represent?

Name _____ Date _____

7. Maria plants a tree and waters it every day with $\frac{1}{3}$ gallon of water.

a. Write an equation that represents the total number of gallons of water the tree receives given a certain number of days since being planted.

b. How much water has the tree received 9 days after being planted?

c. As of today, Maria's tree has received $5\frac{1}{3}$ gallons of water. How many days has it been since the tree was planted?

d. What is the rate of change in this situation? What does it represent?

8. Ebony runs laps around the track at school. Each lap is 0.25 mile.

a. Write an equation to represent the total distance in miles Ebony runs given a certain number of laps.

b. Ebony has finished 8 laps so far. How far has she run?

c. Ebony's pedometer says that she has run a total of 2.5 miles since she started running laps. How many laps has she run?

d. What is the unit rate in this situation? What does it represent?

9. Coach Antonio is forming a baseball team. The tryouts are tough. The coach predicts that only $\frac{2}{3}$ of the players trying out will make the team.

a. Write an equation to represent the number of players who are predicted to make the team given a certain number of players who try out.

b. If there were eighty-one players who tried out, how many players are predicted to make the team?

c. If the coach's prediction is true and twenty-four players actually make the team, how many players tried out?

d. What is the unit rate for this situation? What does it represent?

10. Felix opens a brand new savings account to store money earned at his new part-time job. At this new job he gets a weekly paycheck of $140 and he plans to deposit $32.75 from each paycheck he gets.

a. Write an equation to represent the amount of money saved given a certain number of deposits.

b. How much money will be in Felix's savings account after he me makes 15 deposits?

c. How many deposits will Felix need to make in order to save a total of $786?

d. What is the rate of change in this situation? What does it represent?

11. For her consulting business, Joanna frequently drives to other cities to visit clients. Her frequent traveler pass allows her to pay a discounted toll rate of $0.10 per mile on the toll road.

a. Write an equation to represent the amount of the toll bill given a certain number of miles driven on the toll road.

b. Joanna travels one hundred eighty miles on the toll road. Determine her toll bill.

c. On one trip, Joanna paid $6.50 in tolls. How many miles did she travel on the toll road?

d. What is the rate of change in this situation? What does it represent?

12. Inez is the head coach of the Rockford IceHogs. She is trying to calculate the number of games the IceHogs need to win to make the playoffs. The team has not played very well this season and she predicts they will win $\frac{1}{8}$ of their remaining games.

a. Write an equation to represent the number of games the team is predicted to win given a certain number of games played.

b. If the IceHogs play 32 more games, how many of those games does the coach predict they will win?

c. If the coach's prediction comes true and the IceHogs win five games, how many more games did they play this season?

d. What is the rate of change for this situation? What does it represent?

Name _____ Date _____

III. Modeling using the Distributive Property over Division

A. Solve each problem.

1. Noah is going to purchase two items at an electronics store. The first is a computer for which Noah will be in debt for $550. He is still trying to decide how much he wants to spend on the second item, a printer. The bank has offered him 4 months of no interest. How much will he owe each month if he is in a 4-month payment plan, making equal payments each month?

a. Write an equation to represent the amount Noah will owe each month given a certain price for the printer.

b. If the printer purchase adds $170 of debt, how much will he owe each month?

c. If Noah pays $160 each month by participating in the bank's plan, how much debt is added for the printer purchase?

d. What is the rate of change in this situation? What does it represent?

2. The Harrison campsite has 10 volleyball courts. Every year, all the campers are invited to participate in a volleyball competition, but typically several of the campers opt out of playing and come to watch instead. The camp director divides the willing participants evenly among the courts where they decide who will play on what team. This year, there are 110 campers at the site.

a. Write an equation to represent the number of campers per court given a certain number of campers who opt out.

b. How many participants will be playing on each court if 40 campers decide to opt out of the competition and watch?

c. If six campers will be playing on each court, how many campers opted out?

d. What is the rate of change in this situation? What does it represent?

3. For the past 5 weeks, Santo has saved his allowance. He received 300 dollars in allowance, but he paid his little brother to do his chores for him.

a. Write an equation to represent the amount Santo saved per week given a certain amount paid to his brother.

b. If he paid his brother a total of $50, how much did he save each week?

c. If he saved $42 per week, how much did he pay his brother?

d. What is the rate of change in this situation? What does it represent?

4. You would like to find the average change in a stock value for 2 consecutive days. On Day 1 the stock decreased by $2.

a. Write an equation to represent the average change in value given a certain change in value on Day 2.

b. What is the average change in value if the stock decreases by $6 on Day 2?

c. If the average change in value is a decrease of $2, what was the change in value of the stock on Day 2?

d. What is the rate of change in this situation? What does it represent?

5. Your school is getting more balances to use in the science labs. The school already had 25 balances. All of the balances must be distributed evenly across the 5 labs.

a. Write an equation to represent the number of balances per lab given a certain number of additional balances received by the school.

b. If your school gets 60 more balances, how many will each lab get?

c. How many balances would your school need to receive to reach the goal of 19 balances per lab?

d. What is the rate of change in this situation? What does it represent?

6. Michael donates clay to his local school's art program. The school already has 65 pounds of clay. The clay is evenly distributed among 5 art students.

a. Write an equation to represent the number of pounds of clay each student receives given a certain number of pounds of clay donated by Michael.

b. If Michael donates one hundred ninety-five pounds of clay, how many pounds of clay are given to each student?

c. How many pounds of clay did Michael donate if each student is given forty-one pounds of clay?

d. What is the rate of change in this situation? What does it represent?

Name _____ Date _____

7. A local radio DJ has chartered 2 buses for a trip to the Rock and Roll Hall of Fame. The first one hundred tickets won their seats via a radio call-in contest, but the DJ is selling bus tickets to other interested rock fans. The DJ plans to distribute passengers evenly among the 2 buses.

a. Write an equation to represent the number of passengers per bus given a certain number of bus tickets sold.

b. If 56 bus tickets are sold, how many passengers will ride on each bus?

c. If the capacity of each bus is 88 passengers, how many tickets can the DJ sell in order to fill both buses completely?

d. What is the rate of change in this situation? What does it represent?

8. Mary breaks down paper products for a recycling company. Mary can typically break down about 100 pounds of paper in an hour. She had been given a large bin of paper products to work on this morning, but since she is only working part-time today, she gave 300 pounds of the paper to a co-worker.

a. Write an equation to represent the time in hours it takes Mary to break down the paper products given a certain number of pounds of paper she started with.

b. How many hours will it take Mary to process the remaining items if she started with seven hundred pounds of paper products?

c. If Mary processes the remaining items in three hours, how many pounds of paper products was she originally given?

d. What is the rate of change in this situation? What does it represent?

9. The Glenwood Lightning youth soccer team always has orange slices as their half-time snack. Another team had 12 orange slices left-over from their snack, so they gave the orange slices to the Glenwood Lightning. At half-time, the other team's left-over orange slices and all the orange slices brought by the parents of the team members were divided equally among the 8 players on the team.

a. Write an equation to represent the number of orange slices each player will get given a certain number of orange slices brought by the parents of the team members.

b. The parents brought 44 orange slices. Determine how many slices each player got.

c. If each player was given 6 orange slices, determine how many orange slices the parents brought.

d. What is the rate of change in this situation? What does it represent?

10. The waste water coming out of a factory is stored in a concrete pool where the sun can evaporate 7 tanks of water before Saturday. On Saturday, 2 identical valves are opened in the bottom of the pool to empty it into a river. Inspectors are interested in the amount of water drained per valve this way.

a. Write an equation to represent the number of tanks drained per valve given a certain number of tanks of waste water put into the pool before Saturday.

b. If 39 tanks of waste water were put into the pool this week, then how many tanks per valve were drained?

c. How much waste water would have to be produced to result in 12 tanks per valve drained?

d. What is the rate of change in this situation? What does it represent?

Name _____ Date _____

11. You are the bookkeeper for a small business. At the end of each month, you are required to total the amount of payments the business receives and distribute the money evenly to the 3 business accounts. In the first week of the month the business receives a total of $1260 in payments.

a. Write an equation to represent the amount of money added to each account given a certain amount of money received after the first week.

b. During the second week, the business receives another $1830 in payments. How much will be added to each of the businesses accounts so far this month?

c. At the end of the month, a total of $1430 had been added to each account. How much was received in payments after the first week of the month?

d. What is the rate of change in this situation? What does it represent?

12. Estelle is making 6 charm bracelets. She bought several packs of charms that she plans to distribute evenly among the 6 bracelets. However, after she opened the packs, she noticed that 24 of the charms were either damaged or broken.

a. Write an equation to represent the number of charms Estelle can put on each bracelet given a certain number of original charms.

b. If Estelle had a total of one hundred two charms to begin with, how many did she attach to each bracelet?

c. If Estelle uses thirty charms for each bracelet, how many charms did she start with?

d. What is the rate of change in this situation? What does it represent?

U.S. Shirts

Using Tables, Graphs, and Equations

1

WARM UP

Determine the value of y in each equation for the given value of x.

1. $y = -2x + 4$, $x = 3.5$

2. $y = \frac{1}{2}x + 11$, $x = -1$

3. $x + y = 1$, $x = 0$

4. $2x - y = 5$, $x = 4$

LEARNING GOALS

- Construct a table of (x, y) values and a graph to model a linear relationship between two quantities.
- Use different representations to model a problem situation.
- Analyze the characteristics of different linear representations.
- Compare linear representations using tables, graphs, and equations.

You have analyzed linear relationships by considering points on the line and rate of change. How can you compare two linear relationships in a problem situation?

Cost Analysis

This past summer you were hired to work at a custom T-shirt shop, U.S. Shirts. One of your responsibilities is to calculate the total cost of customers' orders. The shop charges $8 per shirt plus a one-time charge of $15 to set up a T-shirt design.

1. **Describe the problem situation and your responsibility in your own words.**

2. **Is the relationship between the number of shirts ordered and the total cost of an order proportional or non-proportional? Explain how you know.**

ACTIVITY
1.1 Modeling a Linear Relationship

Let's analyze various customer orders with U.S. Shirts.

1. **What is the total cost of an order for:**

   a. **3 shirts?**

   b. **10 shirts?**

   c. **100 shirts?**

   d. **Explain how you calculated each total cost.**

2. **How many shirts can a customer buy if they have:**

   a. **$50 to spend?**

   b. **$60 to spend?**

   c. **$220 to spend?**

   d. **Explain how you calculated the number of shirts that the customer can buy.**

Variable quantities are quantities that change, and constant quantities are quantities that don't change.

3. **Identify the variable quantities and constant quantities in this problem situation. Include each quantity's units.**

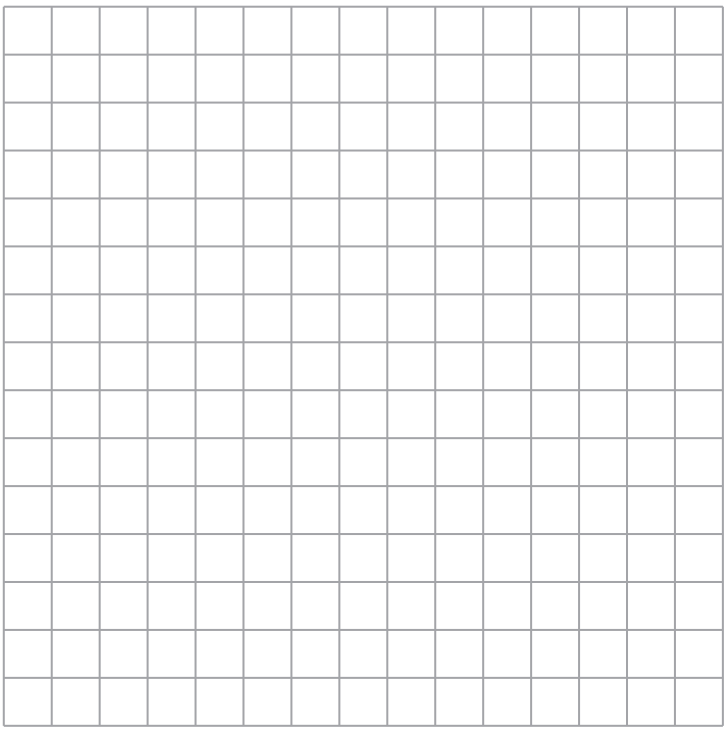
4. **Identify the independent and dependent variables in the situation. Explain your reasoning.**

5. **Complete the table of values for U.S. Shirts. Round to the nearest penny.**

Number of Shirts Ordered	Total Cost (dollars)

6. **Create a graph of the data from your table on the grid shown. First, choose your bounds and intervals by completing the table shown. Remember to label your graph clearly and provide a title for your graph.**

Variable Quantity	Lower Bound	Upper Bound	Interval
Number of shirts			
Total cost			



Remember, you can draw a line through your points to model the relationship. You then need to decide whether or not all points on your line make sense in terms of the problem situation.

7. **Define the variables and write an algebraic equation for this problem situation.**

ACTIVITY
1.2 Hot Shirts

In your own words, describe this problem situation and how it will affect the business at U.S. Shirts.

Previously, you explored a job at U.S. Shirts. One of U.S. Shirts' competitors, Hot Shirts, advertises that it makes custom T-shirts for $5.50 each with a one-time setup fee of $49.95. Your boss brings you the advertisement from Hot Shirts and asks you to figure out how the competition might affect business.

1. **Determine the total customer cost of an order for:**

   a. **3 shirts.**

   b. **10 shirts.**

   c. **50 shirts.**

   d. **100 shirts.**

2. **Determine the number of shirts that a customer can purchase from Hot Shirts for:**

   a. **$50.**

   b. **$60.**

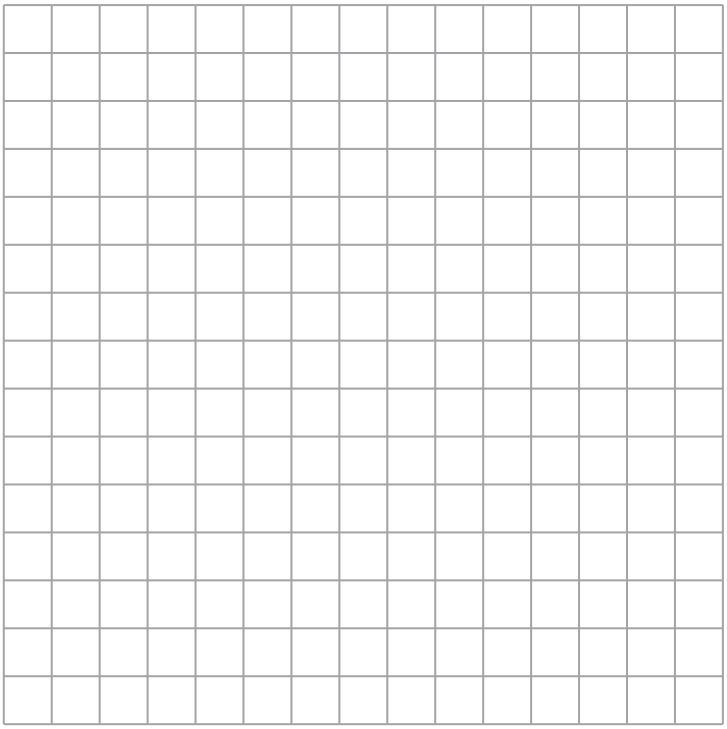
   c. **$220.**

3. **Complete the table of values for Hot Shirts. Round to the nearest penny.**

Number of Shirts Ordered	Total Cost (dollars)

4. **Create a graph of the data from the table on the grid shown. First, choose your bounds and intervals by completing the table shown. Remember to label your graph clearly and provide a title for your graph.**

Variable Quantity	Lower Bound	Upper Bound	Interval
Number of shirts			
Total cost			



5. **Define the variables and write an algebraic equation for this problem situation.**

ACTIVITY
1.3

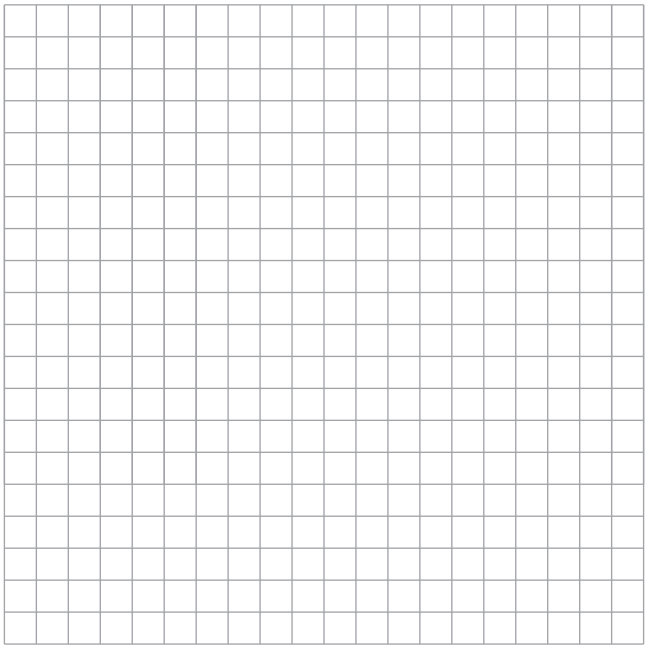
Comparing Linear Relationships

You have explored the costs of ordering T-shirts from two companies, U.S. Shirts and Hot Shirts. Your boss has asked you to determine which company has the better price for T-shirts in different situations.

1. **Compare the two businesses for orders of 5 or fewer shirts, 18 shirts, and 80 shirts. Is U.S. Shirts or Hot Shirts the better buy for each? What would each company charge? Describe how you calculated the values.**

2. **Create graphs for the total cost for U.S. Shirts and Hot Shirts on the grid shown. Use the bounds and intervals for the grid in the table shown. Label each graph and provide a title.**

Variable Quantity	Lower Bound	Upper Bound	Interval
Number of shirts	0	100	5
Total cost	0	1000	50



3. **Estimate the number of shirts for which the total cost is the same. Explain how you determined the number of shirts.**

NOTES

TALK the TALK

Business Report Presentation

Consider the graphs for U.S. Shirts and Hot Shirts. Notice that the graphs intersect at about (14, 127). This point of intersection indicates where the total cost for each company is the same. Therefore, when U.S. Shirts sells 14 shirts, the total cost is $127, and when Hot Shirts sells 14 shirts, the total cost is $127.

1. **Prepare a presentation for your boss that compares the costs of ordering from each company.**

   - **Include a statement describing when it's better to buy from U.S. Shirts than from Hot Shirts.**
   - **Include a statement listing the cost per shirt and startup fee for each business.**
   - **Try to answer your boss's question: "Will Hot Shirts' prices affect the business at U.S. Shirts?"**

Assignment

Write

Describe how tables, graphs, and equations are related. Then describe the advantages of each representation.

Remember

In mathematics, when representing quantities in a table it is important to include a row to identify the quantities and units of measure. Typically, the independent quantity is represented in the left column and the dependent quantity is represented in the right column.

When graphing a relationship, the convention is to represent the independent quantity on the horizontal axis of a graph and the dependent quantity on the vertical axis. You should include labels on each axis.

When writing an equation in the form of $y = mx + b$, the x-value represents the independent quantity and the y-value represents the dependent value. It is important to define the variables you choose.

Practice

1. Great Freights, a local shipping company, bases its charges on the weight of the items being shipped. In addition to charging \$0.40 per pound, Great Freights also charges a one-time fee of \$10 to set up a customer's account.
   a. How much does Great Freights charge a new customer to ship a package that weighs 20 pounds?
   b. How much does Great Freights charge a new customer to ship a package that weighs 50 pounds?
   c. Estimate the weight of a package if Great Freights charges a new customer \$45 to ship the package.
   d. Write an equation for the problem situation.
2. Twin brothers, Mike and Mark, are looking for week-long winter break jobs. They are both offered jobs at grocery stores. Mike is offered a job at Fresh Foods making \$10 per hour. Mark is offered a job at Groovy Groceries making \$8 an hour, plus a one-time hiring bonus of \$100. Each twin believes that he has been offered the better job.
   a. How much does Mike earn at Fresh Foods if he works 20 hours? 40 hours? 60 hours? Show your work.
   b. Explain how you determined Mike's earnings in part (a).
   c. How much does Mark earn at Groovy Groceries if he works 20 hours? 40 hours? 60 hours? Show your work.
   d. Explain how you determined Mark's earnings in part (c).
   e. Create a table using the data and your answers from parts (a) and (c).
   f. Create a graph of the data in the table in part (e). First, choose your bounds and intervals. Remember to label your graph clearly and name your graph.
   g. After how many hours will the twins earn the same amount of money? Explain your reasoning.
   h. Whose job is better, Mike's or Mark's? Explain your reasoning.

Stretch

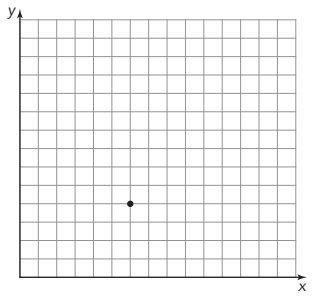
Two catering companies have different one-time fixed fees. Company A charges a fixed fee of $75, and Company B charges a fixed fee of $100. Each company also has a cost per person.

Suppose the independent quantity is the number of people and the dependent quantity is the cost. The graphs for the two companies never intersect. What does this tell you about how much each company charges?

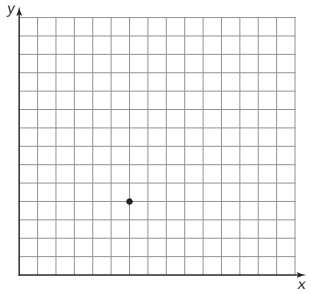
Review

1. Draw a line through the point and label the graph to represent each linear relationship. Then, write an equation to represent the relationship.

   a. linear proportional relationship



   b. linear non-proportional relationship

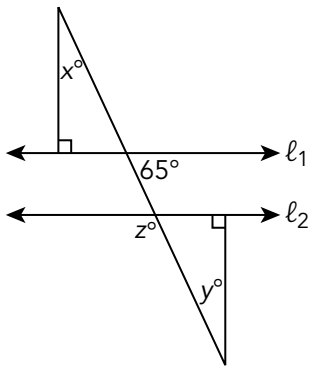


2. Use the equation $y = -3x$ to complete the table of values. Graph the equation. Then use the points on the graph to sketch similar triangles that may be used to show the rate of change of the line is the same between any two points.

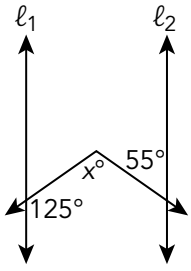
x	*y*
−2	
−1	
0	
1	
2	

3. Solve for each unknown angle measure given that $\ell_1 \| \ell_2$.

   a.



   b.



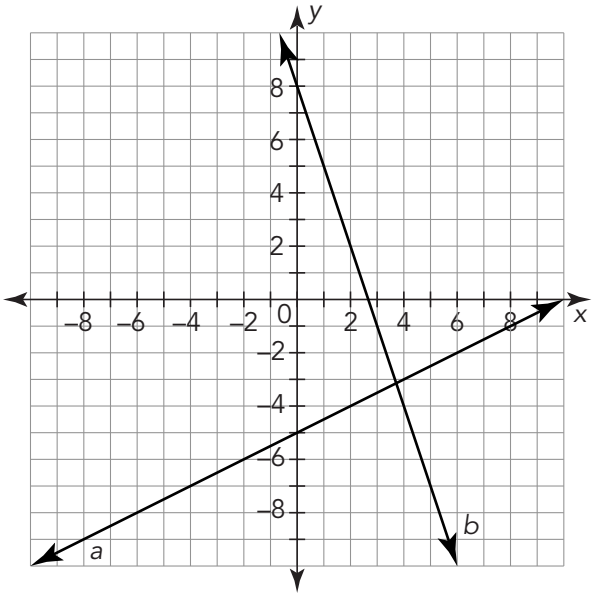
2

At the Arcade

Linear Relationships in Tables

WARM UP

Use similar right triangles to determine the slope of each line.



LEARNING GOALS

- Determine the rate of change of a linear relationship by reading (*x*, *y*) values from a table.
- Develop a formula to calculate the slope of a line given a table of values.
- Use the slope formula to calculate the rate of change from a table of values or two coordinate pairs.
- Determine whether a table of values represents a linear proportional or linear non-proportional relationship.

KEY TERM

- first differences

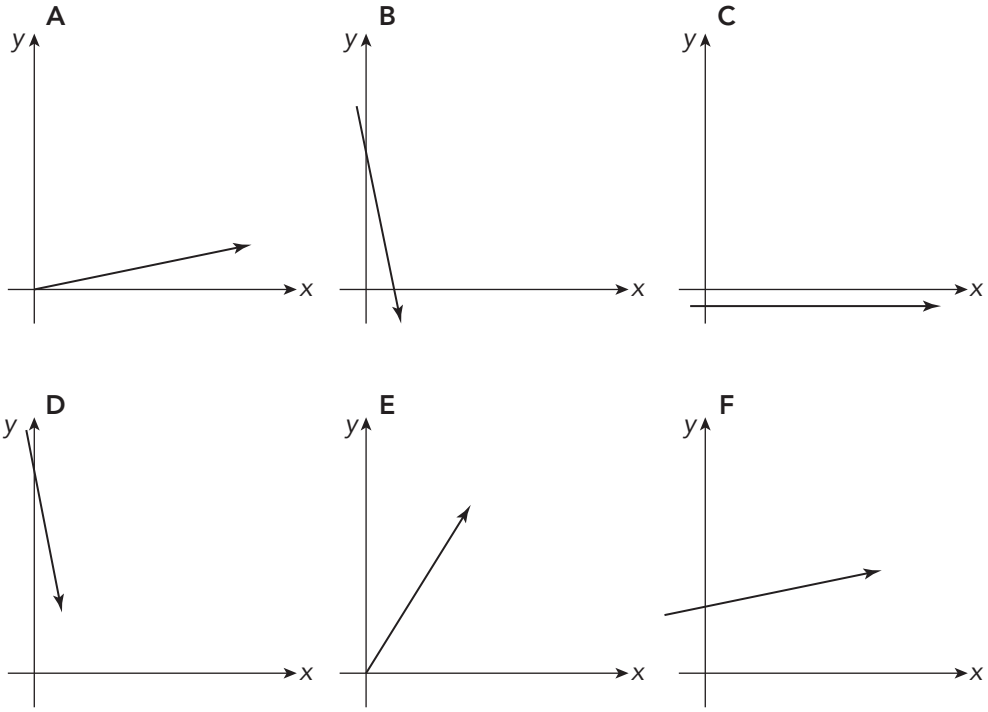
You have used graphs to analyze and compare linear relationships. You have used similar right triangles to determine slopes of lines graphed on a coordinate plane. How can you calculate the slope of a linear relationship given a table of values without creating a graph?

Slope Matching

Remember, the rate of change, or slope, of a line represents a ratio of the change in the dependent quantity to the change in the independent quantity.

You have used slope to describe the steepness and direction of a line. Consider each graph shown.

1. **Identify the graph(s) whose line may have the given slope. Then, describe your strategy for matching the graphs to the given slopes.**



a. $\frac{1}{4}$

b. 0

c. $\frac{5}{4}$

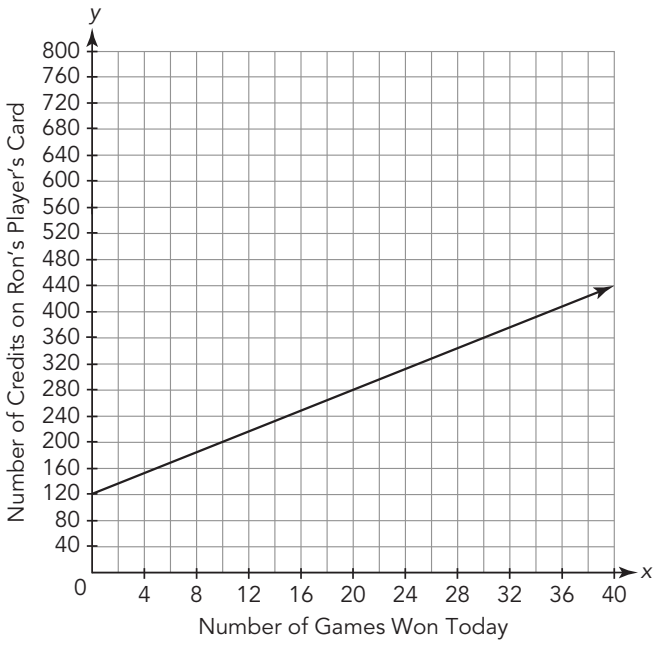
d. -3

2. **How did you use the graphs to estimate their slope?**

ACTIVITY
2.1 Analyzing a Linear Relationship from a Table

Ron has a player's card for the arcade at the mall. His player's card keeps track of the number of credits he earns as he wins games. Each winning game earns the same number of credits, and those credits can be redeemed for various prizes. Ron has been saving his credits to collect a prize worth 500 credits.

The table and graph show the number of credits Ron had on his game card at various times today when he checked his balance at the arcade.



Number of Games Ron Won Today	Number of Credits on Ron's Player's Card
0	120
12	216
18	264
25	320
40	440

1. **Is this relationship proportional or non-proportional? Explain how you know.**

2. **Explain the meaning of the ordered pair (0, 120) listed in the table.**

3. **Use the graph to determine the slope of the line. Then explain the meaning of the slope in terms of this problem situation.**

NOTES

4. **Analyze Rhonda's reasoning. Explain why her reasoning is incorrect.**

Rhonda

$$\frac{440 \text{ credits}}{40 \text{ games won}} = \frac{11 \text{ credits}}{1 \text{ game won}}$$

The slope is 11.

5. **Before Ron started winning games today, how many games had he won for which he had saved the credits on his player's card? Show your work.**

6. **After Ron won his fortieth game today, how many more games does he need to win to collect a prize worth 500 credits? Show your work and explain your reasoning.**

7. **Summarize what you know about this scenario based on your analysis. Be sure to include each item listed.**

   - **the initial values of the independent and dependent variables in the context of the problem**
   - **a sentence explaining the rate of change in terms of the context of the problem**
   - **the final values of the independent and dependent variables in the context of the problem**

ACTIVITY
2.2

Calculating Rate of Change from a Table

So far, you have determined the rate of change from a graph using similar triangles and writing a ratio of the vertical distance to the horizontal distance. However, you can also determine the rate of change, or slope, from a table.

1. Complete the steps to determine the slope from a table.

Number of Games Ron Won Today	Number of Credits on Ron's Player's Card
0	120
12	216
18	264
25	320
40	440

a. Choose any two values of the independent variable. Calculate their difference.

b. Calculate the difference between the corresponding values of the dependent variable. It is important that the order of values you used for determining the difference of the independent variables be followed for the dependent variables.

c. Write a rate to compare the change in the dependent variable to the change in the independent variable.

d. Rewrite the rate as a unit rate.

2. Examine each example. Follow the arrows to calculate the slope. Was the slope calculated correctly in each case? Explain any errors that may have occurred when the arrows were drawn.

Example 1

Number of Games Ron Won Today	Number of Credits on Ron's Player's Card
0	120
12	216
18	264
25	320
40	440

Example 2

Number of Games Ron Won Today	Number of Credits on Ron's Player's Card
0	120
12	216
18	264
25	320
40	440

Example 3

Number of Games Ron Won Today	Number of Credits on Ron's Player's Card
0	120
12	216
18	264
25	320
40	440

There is a formal mathematical process that can be used to calculate the slope of a linear relationship from a table of values with at least two coordinate pairs.

The slope can be calculated using two ordered pairs and the formula:

$$m = \frac{y_2 - y_1}{x_2 - x_1},$$

where the first point is (x_1, y_1) and the second point is (x_2, y_2).

WORKED EXAMPLE

You can calculate the slope of a linear relationship from a table of values. Consider the table showing the number of credits Ron had on his game card at various times at the arcade.

Number of Games Ron Won Today	Number of Credits on Ron's Player's Card
0	120
12	216
18	264
25	320
40	440

Step 1: From the table of values, use (12, 216) as the first point and (25, 320) as the second point.

Step 2: Label the points with the variables.

$$\underset{(x_1,\ y_1)}{(12,\ 216)} \qquad \underset{(x_2,\ y_2)}{(25,\ 320)}$$

Step 3: Use the slope formula.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{320 - 216}{25 - 12}$$
$$= \frac{104}{13}$$
$$= 8$$

The slope is $\frac{8 \text{ credits}}{1 \text{ game}}$ or 8 credits per game.

Does it make a difference which points you choose?

3. Repeat the process to calculate the slope using two different values from the table. Show your work.

4. How is using the slope formula given a table related to using similar triangles given a graph?

ACTIVITY
2.3 Practice with Linear Relationships in Tables

You can now use the slope formula to calculate the slope of a line given a table of values.

1. Calculate the slope of each linear relationship using the formula. Show all your work.

a.

Number of Carnival Ride Tickets	Cost (dollars)
4	9
8	12
16	18
32	30

b.

x	*y*
−1	13
0	−2
4	−62
10	−152

c.

Days Passed	Vitamins Remaining in Bottle
7	25
8	23
9	21
10	19

d.

x	*y*
7	9
18	9
29	9
40	9

e. (10, 25) and (55, 40)

f. (4, 19) and (24, 3)

2. Which relationships in Question 1 are proportional relationships? Explain your reasoning.

3. Complete each sentence to describe how you can tell whether the slope of a line is positive or negative by analyzing given points.

   a. If the slope of a line is positive, then as the value of x increases the value of y _____.

   b. If the slope of a line is negative, then as the value of x increases the value of y _____.

4. Consider the relationship represented in each table shown.

$x = 1$	
x	y
1	−5
1	10
1	15
1	30

$y = 2$	
x	y
5	2
6	2
7	2
8	2

   a. Sketch a graph of each relationship. Which relationship is represented by a horizontal line? a vertical line?

   b. What can you conjecture about the slopes of these lines?

ACTIVITY
2.4
Determining If a Relationship Is Linear

You previously used similar right triangles to show that if you are given a line on a graph, then the slope is the same between any two points on that line. The converse is also true. If the slope between every ordered pair in a table of values is constant, then the ordered pairs will form a straight line.

So, in order to determine if a table of values represents a linear relationship, show that the slope is the same between every set of ordered pairs.

A conditional statement uses the words "if" and "then" to show assumptions and conclusions. For example, if today is Monday, then tomorrow is Tuesday. A converse statement switches the order. For example, if tomorrow is Tuesday, then today is Monday. For any conditional statement the converse may or may not be true.

1. Calculate the slope between the given ordered pairs to determine if they form a straight line. Show your work.

x	*y*
4	13
9	28
11	34
16	47

a. (4, 13) and (9, 28)

b. (9, 28) and (11, 34)

c. (11, 34) and (16, 47)

d. Will the ordered pairs listed in the table form a straight line when plotted? Explain your reasoning.

2. **Determine whether the ordered pairs listed in each table will form a straight line when plotted. Show your work. Explain your reasoning.**

a.

x	*y*
2	7
6	13
8	16
20	34

b.

x	*y*
1	33
2	40
3	47
4	54
5	61

Consecutive means one right after the other, such as 12, 13, and 14.

When the values for the independent variable in a table are consecutive integers, you can examine only the column with the dependent variable and calculate the differences between consecutive values. If the differences are the same each time, then you know that the rate of change is the same each time. The relationship is a linear relationship.

WORKED EXAMPLE

The differences have been calculated for the table shown.

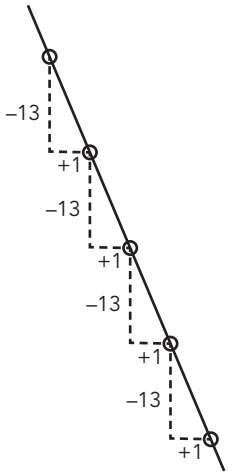
x	*y*
1	99
2	86
3	73
4	60
5	47

$86 - 99 = -13$

$73 - 86 = -13$

$60 - 73 = -13$

$47 - 60 = -13$



The differences between consecutive values for the dependent variable are the same each time. Therefore the rate of change is the same each time as well. The ordered pairs in this table will therefore form a straight line when plotted.

In this process, you are calculating *first differences*. **First differences** are the values determined by subtracting consecutive *y*-values in a table when the *x*-values are consecutive integers. The first differences in a linear relationship are constant.

3. **Use first differences to determine whether the ordered pairs in each table represent a linear relationship. Show your work and explain your reasoning.**

a.

x	*y*
1	25
2	34
3	45
4	52
5	61

b.

x	*y*
1	12
2	8
3	4
4	0
5	−4

c.

x	*y*
1	1
2	4
3	9
4	16
5	25

d.

x	*y*
1	15
2	18
3	21
4	24
5	27

NOTES

TALK the TALK

Walk the Walk

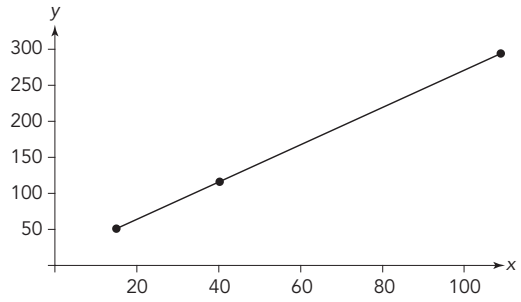
The table shows the distance Angel walked compared to the number of steps she took.

Number of Steps	Distance Walked (ft)
16	50
40	120
110	300

1. **Calculate the slope between each set of ordered pairs. Show your work.**

2. **Is the graph of the relationship linear? What does this mean in terms of the problem situation?**

3. **The ordered pairs from the table are represented on the given graph. Show how to use the graph to verify the slope you calculated from the table.**



4. **How is calculating the slope from a table similar to calculating the slope of a linear relationship from a graph?**

Assignment

Write

Define the term *first differences* in your own words.

Remember

You can use the slope formula, $m = \frac{y_2 - y_1}{x_2 - x_1}$, to determine the rate of change between two points represented in a table of values. If the rate is constant, this formula gives the rate of change for the relationship, or slope. The slope of a horizontal line is 0. The slope of a vertical line is undefined.

Practice

1. Each table represents a linear relationship. Which table(s) represent a slope of 2?

Table 1

x	*y*
0	32
3	26
5	22
9	14

Table 2

x	*y*
1	3
2	5
3	7
4	9

Table 3

x	*y*
0	8
3	14
7	22
9	26

2. Calculate the rate of change between the points listed in each table. Determine if the table represents a proportional relationship.

a.

x	*y*
2	14
5	35
7	49
10	70

b.

x	*y*
−10	50
−2	10
4	−20
14	−70

c.

x	*y*
−1	−24
2	48
4	90
8	192

d.

x	*y*
−6	12
−3	6
3	−6
6	−10

e.

x	*y*
2	13.5
5	33.75
10	67.5
15	101.25

f.

x	*y*
−4	−38
−1	−9.5
2	19
3	27

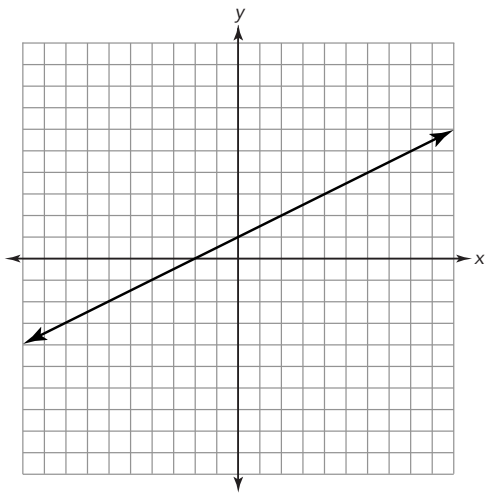
Stretch

Is the relationship described by the equation $y = x^2$ linear? Is it proportional? Describe how you determined your answers.

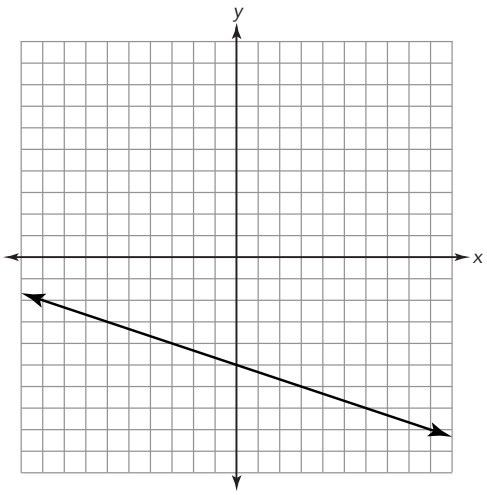
Review

1. Determine the slope of each linear relationship.

a.



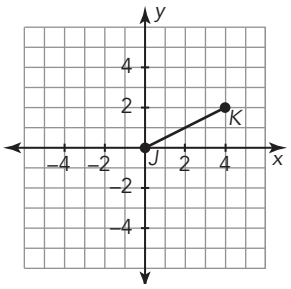
b.



c. $y = 2x$

d. $\frac{5}{6} = \frac{y}{x}$

2. Consider the graph shown.



a. Segment JK is rotated 90° clockwise resulting in segment $J'K'$. What are the coordinates of K'?

b. Segment JK is reflected across the line $x = -1$ resulting in segment $J'K'$. What are the coordinates of K'?

3

Dining, Dancing, Driving

Linear Relationships in Contexts

WARM UP

The lunch special at the pizza shop is two slices of pizza for $5.00.

1. Express the cost of the pizza as a unit rate.
2. Create a table to represent this context.

Number of Slices of Pizza	Cost (dollars)

3. Write an equation to represent this situation. Define your variables.

LEARNING GOALS

- Determine the slope from a context.
- Connect the rate of change represented in a context to the rate of change in other representations.
- Interpret the rate of change of a linear relationship in terms of the situation it models.
- Generate the values of two coordinate pairs from information given in context.
- Determine the independent and dependent quantities from contexts.

You have analyzed linear relationships in graphs and tables. How can you determine rates of change from word problems alone?

Dependent on Your Point of View

Identify the dependent quantity and the independent quantity in each problem situation.

1. **Terrence is purchasing canned vegetables at his local grocery store to donate to the local food pantry. Each can costs $0.59.**

2. **The amount of electricity used by a light changes as the knob on the dimmer switch is turned.**

3. **Stephanie is selling Girl Scout cookies to raise money for her local troop. For each box of cookies she sells, the troop receives $2.00.**

4. **How would each problem situation change if you switched the independent and dependent quantities? Would each problem still make sense?**

ACTIVITY
3.1

Choosing Independent and Dependent Quantities

NOTES

You can choose different independent and dependent quantities to model the same information, depending on what you want to know. Once you have determined the independent and dependent quantities, you need just two points to determine the slope, or unit rate.

Josh took a road trip with his family to visit Yosemite National Park in California. Some information about their trip is shown in the table.

Total Miles	Total Cost for Gas ($)	Total Gallons
2600	200	80

1. **After they arrived, Josh was curious about how many miles per gallon their car got on the trip.**
   a. **Given this question, what are the independent and dependent quantities?**

   b. **Write the ordered pairs of two points you can use to answer the question. Explain what each of your ordered pairs means in terms of the situation.**

   c. **Determine the rate. Explain what this means in terms of the problem situation.**

   d. **How many miles per gallon did their car get on the road trip?**

2. The family wants to know about how many gallons of gas on average they used for each mile of the trip.

   a. Given this question, what are the independent and dependent quantities?

   b. Write the ordered pairs of two points you can use to answer the question. Explain what each of your ordered pairs means in terms of the situation.

   c. Determine the rate. Round to the nearest hundredth. Explain what this means in terms of the problem situation.

   d. What was the family's average gallons per mile for the trip?

3. If the family had flown, they would have traveled 2100 miles and spent $3250 for tickets alone. Compare the costs per mile for flying and driving. Determine the independent and dependent quantities and rates for each relationship. Show your work.

ACTIVITY
3.2

Determining Slope from Context

For each context, complete each task.

- Identify the independent and dependent quantities.
- Write the ordered pairs of two points you can use to answer the question. Explain what each of your ordered pairs means in terms of the situation.
- Then, determine the rate described.

1. **Bella's Pizza Shop charges $4.50 for a small pizza, $7.00 for a medium pizza, and $9.00 for a large pizza. Toppings cost extra, depending on the size of the pizza ordered. Bruce ordered a large pizza with three toppings that cost a total of $12.60. What is the cost per number of toppings for a large pizza?**

2. **A maintenance crew is paving a road in 7-hour shifts. After 10 shifts, 1.25 miles of road have been paved. After 45 shifts, 5.625 miles of road have been paved. At what rate is the maintenance crew paving the road in miles per shift?**

3. **Melanie is baking breakfast rolls for a band camp fundraiser. She bakes 15 dozen breakfast rolls in 3 hours. After 8 hours, she has baked 40 dozen breakfast rolls. At what rate does Melanie bake breakfast rolls each hour?**

NOTES

4. **Aleesa's dog, Bull, has been put on a diet by his veterinarian. He weighs 149 pounds after 8 weeks on his diet. By Week 13, he weighs 134 pounds. What is his average weight loss per week?**

Solve each problem.

5. **Kathy is working after school to finish assembling the 82 favors needed for the school dance. When she starts at 3:15 PM, she counts the 67 favors that are already assembled. She works until 4:30 PM to finish the job.**

   a. **How many favors can Kathy assemble each minute?**

   b. **How many minutes does it take Kathy to assemble one favor?**

   c. **Which rate is more meaningful in this situation? Explain your reasoning.**

6. **Eddie rented a moving van to travel across the country. The odometer registered 34,567 miles after he drove for 4 hours. After 7 hours of driving, the odometer read 34,741 miles. What was Eddie's driving rate in miles per hour?**

7. **Julie used her gift card for the local coffee shop to buy iced teas for herself and five friends. After she and one friend placed their orders, the balance on Julie's gift card was $14.85. After all six members of the group got their iced teas, she had a balance of $3.97 on her gift card. Determine the cost for one glass of iced tea.**

NOTES

TALK the TALK

And Stamps and Tickets

1. A book of 20 postage stamps costs $8.80. What is the cost of one postage stamp?

2. Ticket sales for a local concert totaled $101,244 yesterday. After the ticket window closed today, the cashiers counted 968 tickets sold with a two-day total of $143,836. What is the cost of one concert ticket?

Number of Tickets Sold Today	Total Amount of Sales (dollars)

3. List two similarities between Questions 1 and 2.

4. List two differences between Questions 1 and 2.

Assignment

Write

Describe how to use the independent and dependent quantities in a word problem to determine the rate of change, or slope.

Remember

Two ordered pairs are needed to determine a unit rate given a real-world problem situation.

Practice

1. Lashawna is making jewelry to sell at a craft fair. On Monday, she makes 12 bracelets. On Tuesday, she works an additional 2.5 hours and has a total of 22 bracelets. Determine the time it takes Lashawna to make one bracelet.
2. Nina and her friends are going to the downtown rib festival. The festival organizers expect 10,000 people to attend the four-day festival. At the end of the festival, the organizers say that they have exceeded their expected attendance by 2000 people. Determine the average number of people that attended the festival per day.
3. Aiko spends 2.5 hours baking croissants for a community center bake sale. She bakes the 90 croissants in 5 batches. Determine the number of batches Aiko baked per hour.
4. Nelson is selling his photographs at an art festival. The festival is open for 6 hours each day for 3 days. At the conclusion of the festival, Nelson has sold 54 photographs. Determine the number of photographs Nelson sold per hour.
5. Clayton wants to purchase tickets for the rides at a carnival. He can choose to purchase tickets individually, or he can purchase a ticket package. The package includes 25 tickets for $18.75. Determine the cost per ticket if he purchases the package.
6. Tameca is planning a hiking trip. The trail she would like to follow is 7.5 miles long. She plans to start her hike at 10:00 am. She hopes to reach the end of the trail at 3:00 pm. Determine the number of miles per hour that Tameca plans to hike.

Stretch

Create a situation that can be represented by a linear relationship whose unit rate value doesn't change when you switch the independent and dependent quantities.

Review

Determine whether the relationships represented in the tables are linear. If so, calculate the rate of change.

1.

Number of Bull's-Eyes Made	Points Displayed
0	12,000
3	36,000
5	52,000
9	84,000

2.

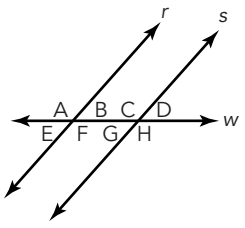
x	y
6	12
−4	7
−12	−3
−22	−8

Determine whether the slope of the line represented by each equation is positive, negative, zero, or undefined.

3. $y = -x + 5$
4. $x = 0$

In the figure, parallel lines r and s are cut by transversal w.

5. List all pairs of corresponding angles.
6. List all pairs of alternate interior angles.



Derby Day

Slope-Intercept Form of a Line

4

WARM UP

Solve each equation for y.

1. $4 = \frac{y - 5}{3}$
2. $\frac{1}{2} = \frac{y + 3}{7}$
3. $-\frac{3}{4} = \frac{y - 17}{25}$
4. $-\frac{9}{5} = \frac{y + 31}{-8}$

LEARNING GOALS

- Write the y-intercept as an ordered pair.
- Determine the y-intercept of a linear equation from a context, a table, a graph, or an equation.
- Explain the meaning of the y-intercept, or initial value, when given the context of a linear equation.
- Use the slope formula to derive the slope-intercept form of a linear equation.
- Write equations of lines in slope-intercept form.
- Analyze linear relationships using slopes and initial values.

KEY TERMS

- y-intercept
- slope-intercept form

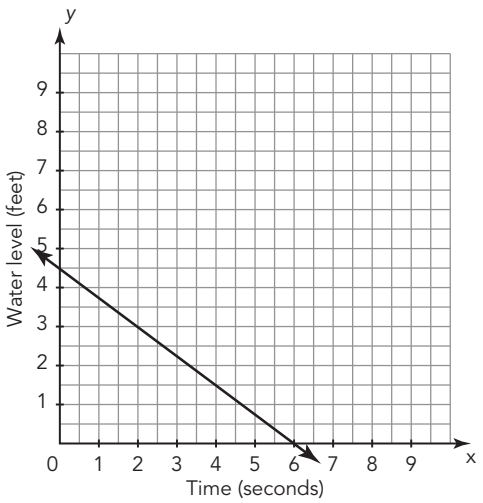
You have learned how to calculate the slope of a line given a graph, table, or context. How can you determine the initial value in a linear relationship from a table, equation, or graph?

Introducing the *y*-Intercept!

The slope is one important feature of a linear equation. Another important feature is the *y-intercept*. The **y-intercept** is the *y*-coordinate of the point where a graph crosses the *y*-axis. It is the value of the dependent quantity when the independent quantity is 0. The *y*-intercept can be written as the ordered pair (0, *y*).

For each graph, determine the *y*-intercept, write it as an ordered pair, and explain its meaning.

1.



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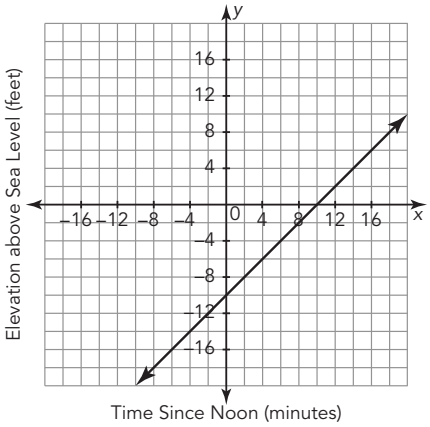

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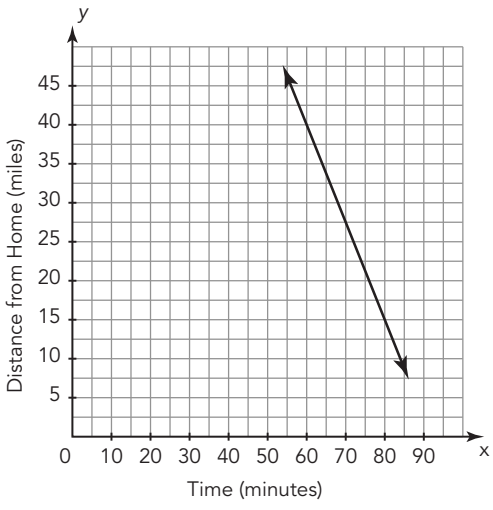


ACTIVITY
4.1 Determining the *y*-Intercept

Just as you can determine the slope of a linear equation from a table of values or a problem situation, you can also determine the *y*-intercept. Let's start with what you already know: the slope formula.

The table of values represents a linear relationship between the variables *x* and *y*.

x	*y*
2	7
3	10
4	13

WORKED EXAMPLE

You can use the slope formula to determine the *y*-intercept (0, *y*) for the graph of a linear relationship.

- First, determine the slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{10 - 7}{3 - 2} = \frac{3}{1} = 3$$

- Next, choose any point from the table.

(4, 13)

- Now, substitute what you know into the slope formula: $m = 3$, (4, 13), and (0, *y*).

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$3 = \frac{y - 13}{0 - 4}$$

- Finally, solve for the value of the *y*-coordinate.

$$3 = \frac{y - 13}{-4}$$
$$-12 = y - 13$$
$$1 = y$$

The *y*-intercept is (0, 1).

1. **How would the worked example change if different points were chosen to calculate the slope? Explain your reasoning.**

2. **Use a different point from the table to calculate the *y*-intercept. Do you get the same *y*-intercept?**

Each table represents a linear relationship. Determine the *y*-intercept using the slope formula. Write the *y*-intercept in coordinate form.

3.

x	*y*
200	14
225	16
250	18
275	20
300	22

4.

x	*y*
16	90
19	91
22	92
25	93
28	94

Each context represents a linear relationship. Determine the *y*-intercept using the slope formula. Write the *y*-intercept in coordinate form. Explain what the *y*-intercept represents in each problem situation.

5. Kim spent $18 to purchase a ride-all-day pass for the amusement park and to play 8 games. After playing a total of 20 games, she realized she'd spent $24.

6. Mitch saved money he received as gifts and put it toward buying a bike. When he added one week's allowance to his savings, he had $125. After 3 more weeks of saving his allowance, he had $161 toward the cost of his bike.

ACTIVITY
4.2 Writing Equations in Slope-Intercept Form

Now that you know how to determine the slope and *y*-intercept for a linear relationship from a table, graph, or context, you can use this information to write the equation of a line.

Let's use the slope and the *y*-intercept to determine the equation of the linear relationship represented in the table.

x	*y*
0	1
2	7
3	10
4	13

WORKED EXAMPLE

Just as you used the slope formula to determine the *y*-intercept. You can use the slope formula with an unknown point (x, y) to write an equation of the line.

- First, determine the slope and the *y*-intercept.

  $m = 3$

  y-intercept: (0, 1)

- Next, substitute the slope, *y*-intercept, and the unknown point (x, y) into the slope formula.

  $$m = \frac{y_2 - y_1}{x_2 - x_1}$$

  $$3 = \frac{y - 1}{x - 0}$$

- Finally, solve the equation for *y*.

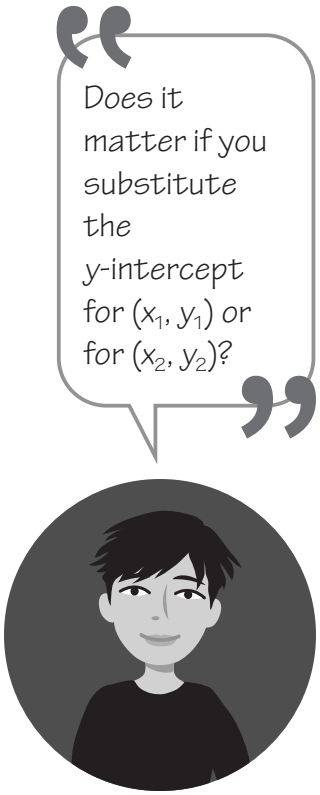
  $$3 = \frac{y - 1}{x - 0}$$

  $$3(x - 0) = y - 1$$

  $$3x = y - 1$$

  $$3x + 1 = y$$

The equation is $y = 3x + 1$.



This linear equation is written in *slope-intercept form*. The **slope-intercept form** of a linear equation is $y = mx + b$, where m is the slope of the line and $(0, b)$ is the *y*-intercept. You can use this form to write linear equations when you know the slope and the *y*-intercept.

x	y
100	10
105	6
110	2
115	−2
120	−6

1. **Determine the slope, *y*-intercept, and the slope-intercept form of the linear equation for the relationship represented in the table.**

2. **Write the equation for each linear relationship in slope-intercept form.**

   a. $m = -\frac{5}{3}$
   ***y*-intercept: (0, 8)**

   b. **slope: 6.2**
   ***y*-intercept: (0, −2.5)**

   c. **The line containing points (6, 19) and (0, −35)**

   d. **Javi regularly checks the balance on his bus pass. Friday afternoon, his balance was $26.25. Monday morning, his balance was $1.50.**

3. **Consider the equations that you wrote in Question 2.**

   a. **Write an equation that represents a line with the same *y*-intercept as part (a) but a steeper slope.**

   b. **Write an equation that represents a line with the same *y*-intercept as part (b) but a steeper slope.**

By convention, the slope-intercept form is written as $y = mx + b$, but $y = b + mx$ is also correct.

ACTIVITY
4.3

Analyzing Linear Relationships

Each year, your class sponsors a go-kart derby to raise money for a local food bank. Jamie, a member of your class, has claimed the first-place trophy each year for the last four years. Everyone in the class is determined to capture the trophy this year.

Today is Derby Day! You and each member of your group are derby drivers competing against Jamie and Liza. Who is going to win? Your teacher will distribute Derby Day cards to your group. These cards contain the information your group needs to determine the winner.

Rules:

- The members of your group must work cooperatively to answer all the questions on the cards.
- Each member of your group will be assigned Driver A, B, C, or D.
- When you get your Driver card, do not show your card to your group members. You may only communicate the information contained on the card.
- Liza's and Jamie's cards will be shared by the entire group.
- Be sure everyone in your group discusses the entire problem and its solution.

1. **Use the graph paper located at the end of the lesson and your clue cards to help you determine the outcome of the derby.**

2. **Use the table to organize the information from your graphs and to write equations for the drivers in slope-intercept form.**

Driver	Slope	*y*-Intercept	Equation
A:			
B:			
C:			
D:			
Liza			
Jamie			

3. **What was the speed of the driver who won the race? Explain your reasoning.**

4. **In what order did the drivers finish the derby? List their names or letters and the time it took them to finish.**

5. **After eight seconds, which driver had traveled the shortest distance from the starting line? Who had traveled the longest distance? Explain your reasoning.**

6. Locate and label a point when one driver passed another driver. Describe this point and explain your reasoning.

7. Is there a point when three drivers are tied? If so, describe the point.

8. If the derby were only 20 meters long, would the order of the winners change? List their names or letters and the time it would take them to finish.

9. After 16 seconds, how far had each driver traveled from the starting line?

10. How long would the derby have to be for Driver C to win?

NOTES

TALK the TALK

More or Less

Write an equation in slope-intercept form for a line with each of the given characteristics.

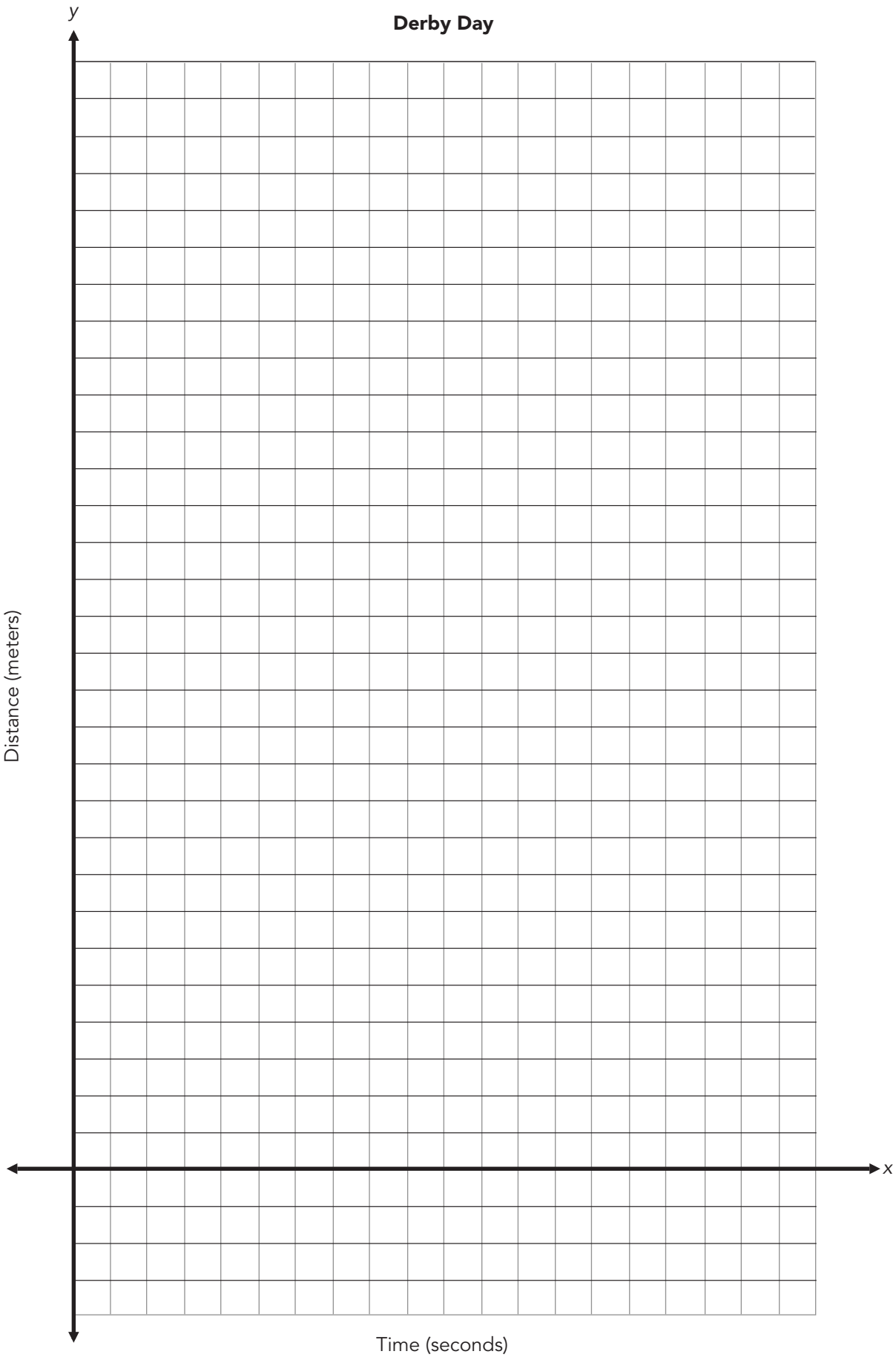
1. **The line is decreasing from left to right and has a positive *y*-intercept.**

2. **The line is decreasing from left to right. The line is steeper than the line represented by the equation $y = -3x + 8$.**

3. **The line is increasing from left to right. The line is less steep than the line represented by the equation $y = 7x - 85$.**

4. **Create a context that represents a linear relationship, with (0, 22) as its *y*-intercept and a positive slope. Then write the equation of the line in slope-intercept form.**

Derby Day



Assignment

Write

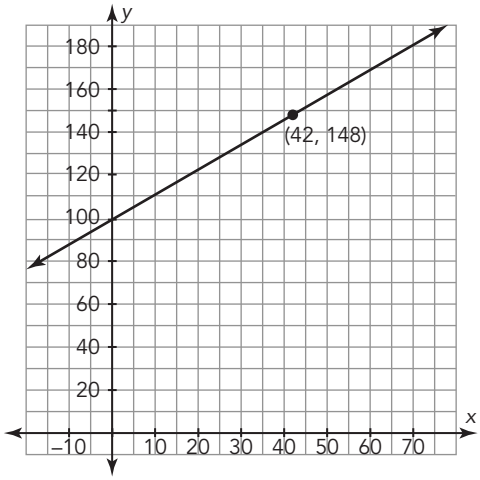
Explain how you can determine the initial value of a linear relationship, the *y*-intercept, when given two points.

Remember

The slope-intercept form of a linear equation is $y = mx + b$, where m is the slope of the line and $(0, b)$ is the *y*-intercept of the line.

Practice

1. Examine the linear graph. Determine the *y*-intercept and write the *y*-intercept in coordinate form. Then write the equation of the line in slope-intercept form.

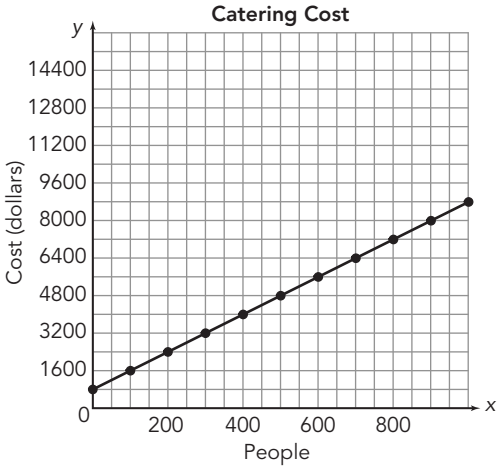


2. The table represents a linear relation. Use the table to identify the *y*-intercept. Write the *y*-intercept in coordinate form. Then write the equation in slope-intercept form.

x	*y*
20	144
24	172
28	200
32	228
36	256

3. Each context represents a linear relation. Read each and determine the *y*-intercept. Write the *y*-intercept in coordinate form. Explain what the *y*-intercept represents in the problem situation. Then write the equation in slope-intercept form.
   a. The water level of a river is 34 feet, and it is receding at a rate of 0.5 foot per day.
   b. Betty worked at a golf course during the summer after eighth grade. After working for two weeks, she added her earnings to the gifts she got for graduation and found she had $570. After four more weeks of work, she had a total of $870.

4. Define the variables and write a linear equation in slope-intercept form for each problem situation. Explain the meaning of the *y*-intercept.
   a. A catering company charges a fixed fee and an additional charge per person.
   b. A line has a constant rate of change of $\frac{3}{7}$ and passes through the point (0, −8).
   c. A group bike tour costs $75 plus $12 per bike rental.
   d. A salesperson receives a base salary and a percentage of the total sales for the year.



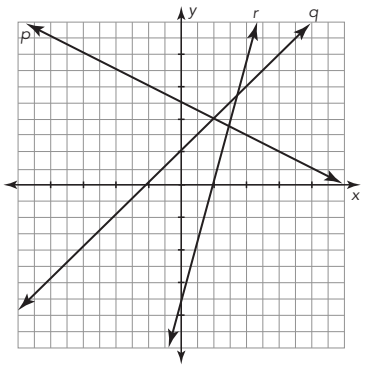
Total Sales (dollars)	Total Income (dollars)
25,000	41,250
30,000	41,500
35,000	41,750
40,000	42,000

5. The graph shows three lines. The equations of the lines are as follows.

p: $2y = -x + 10$

q: $y = x + 2$

r: $7x - 2y = 14$



   a. Determine the slope of each line.
   b. Write the lines in order from least steep to most steep.
   c. Write the equation of a line that is steeper than line *r*.
   d. Write the equation of a line with a negative slope that is steeper than line *p*.
   e. Write the equation of a line with a positive slope that is less steep than line *q*.
   f. Write a possible context for each of the lines.
6. Draw a linear graph that is decreasing and has a *y*-intercept of (0, 4). Write the equation in slope-intercept form.
7. Create a table that represents a linear relation with four values, a *y*-intercept of (0, 6), and a slope of 3.

Stretch

Determine the equation for a vertical line and the equation for a horizontal line. What are the slope and *y*-intercept for each type of line?

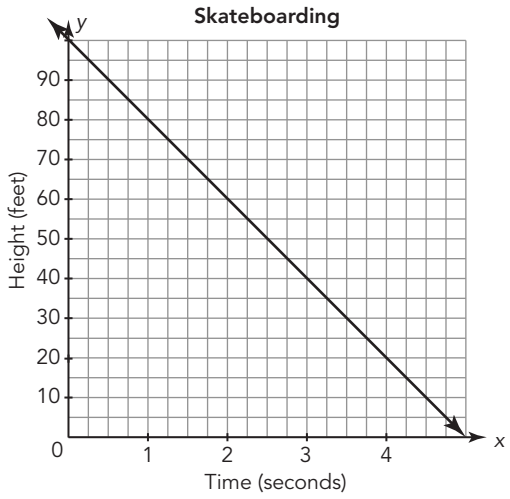
Review

Determine the rate of change for each situation.

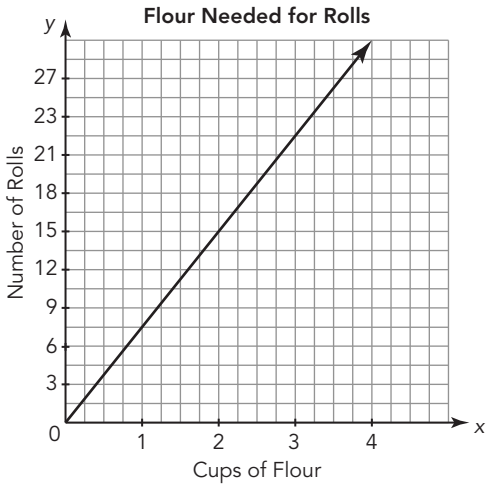
1. Rosa is ordering a submarine sandwich from the corner deli. The deli charges $6.25 for a 7-inch sub. Additional toppings cost extra. Rosa's sandwich with two extra toppings costs $7.75. What is the cost per additional topping?
2. Carmen is selling pies at the cherry festival to raise money for her local volunteer fire department. She sells 85 pies for $12 each. The supplies to make the pies cost Carmen $340. What is the unit rate of the profit made for each pie?

For each graph, determine the slope and explain what the slope means in terms of the independent and dependent quantities. Then write an equation in the form $y = mx$ or $y = mx + b$ to represent the relationship between the independent and dependent quantities.

3. Kodiak is riding her skateboard down a hill, as shown in the graph.

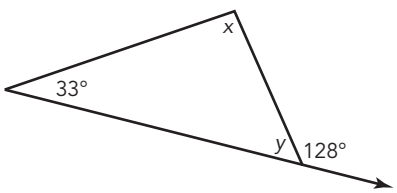


4. Andy needs a specific amount of flour to bake rolls, as shown in the graph.

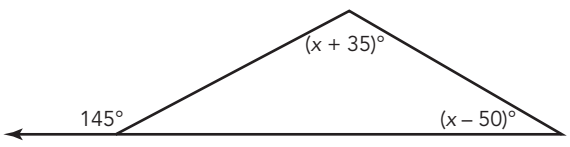


Determine the measure of each unknown angle.

5.



6.



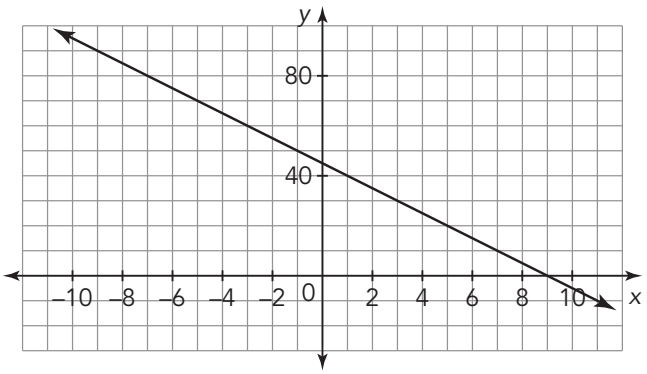
5

What's the Point?

Point-Slope Form of a Line

WARM UP

Write an equation for each linear relationship.

1. The contestant at a game show had already won a total of $2750 when the game show was continued today. He earns an additional $250 for each question he answers correctly today.
2. 

LEARNING GOALS

- Use the slope formula to derive the point-slope form of a linear equation.
- Construct an equation in point-slope form to model a linear relationship between two quantities.
- Write equations for vertical and horizontal lines.

KEY TERM

- point-slope form

You have used the slope-intercept form to represent linear relationships. Are there other forms of a linear equation that you can use? How do you write equations for horizontal and vertical lines?

Draining the Pool

Cyrus and Ava are pool cleaners who have been hired to drain the community diving pools at the end of the summer. They are comparing the rate at which the two pools drain.

1. **For each pool, write an equation to represent the linear relationship.**

   a. **Cityscape Diving Pool is at a water level of 14 feet and drains at a rate of 3 feet per hour.**

   b. **Bayside Diving Pool is at a water level of 15 feet after draining for 2 hours and at 12 feet after draining for 4 hours.**

2. **Compare your process for writing each equation. How are the processes different?**

ACTIVITY
5.1 Writing Equations in Point-Slope Form

In the previous lesson, you used the slope, the *y*-intercept, and the slope formula to write a linear equation. You can also determine the equation of a line without knowing the *y*-intercept.

WORKED EXAMPLE

To write an equation of a line from a table of values, you can use the slope formula.

x	*y*
2	6
4	5
6	4

- First, calculate the slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 5}{2 - 4}$$
$$= \frac{1}{-2} = -\frac{1}{2}$$

- Next, choose any point from the table.

(2, 6)

- Then, substitute what you know into the slope formula: $m = -\frac{1}{2}$, (2, 6), and the unknown point (x, y).

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$-\frac{1}{2} = \frac{y - 6}{x - 2}$$

- Finally, rewrite the equation with no variables in a denominator.

$$-\frac{1}{2} = \frac{y - 6}{x - 2}$$
$$-\frac{1}{2}(x - 2) = y - 6$$

The equation is $y - 6 = -\frac{1}{2}(x - 2)$.

This linear equation in the worked example is written in *point-slope form*. The **point-slope form** of a linear equation is $y - y_1 = m(x - x_1)$, where m is the slope of the line and (x_1, y_1) is any point on the line.

1. **Solve the equation in the worked example for *y* so that the linear equation is in slope-intercept form. What unique information does each form of the linear equation provide? How are they similar?**

Write the equation for each linear relationship in point-slope form.

2. The slope is −8. The point (3, 12) lies on the line.

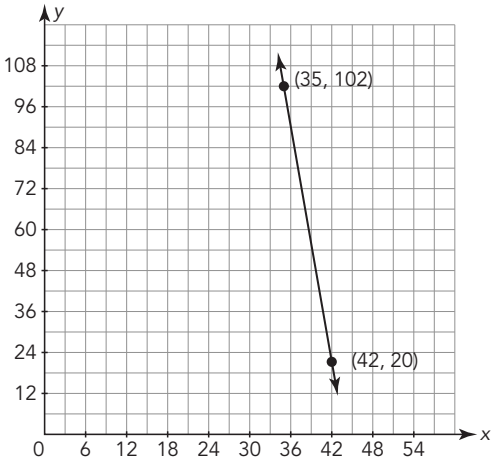
3. (429, 956) and (249, 836)

Use the given information to write an equation to represent each linear relationship in either slope-intercept form or in point-slope form. Describe your process.

4. The cost to ship a package in the mail includes a basic shipping charge plus an additional cost per number of pounds the package weighs. A three-pound package costs $6.30 to ship. A ten-pound package costs $14 to ship.

5. $m = -\frac{3}{8}$; (50, 7)

6.



7. (7, 15) and (−39, −8)

NOTES

8.

x	*y*
−5	−6
1	−6
2	−6

9. **Examine each detail about a linear relationship that you may be provided. Which form of the equation do you prefer to use in each case? Explain your reasoning.**

   a. **slope and *y*-intercept**

   b. **two points**

   c. **slope and a point other than the *y*-intercept**

ACTIVITY
5.2 Horizontal and Vertical Lines

Horizontal and vertical lines represent linear relationships, but their equations are different from the equations of lines that are not horizontal or vertical.

x	*y*
−5	−6
1	−6
2	−6

1. Consider the equation, $y = -6$, that you wrote for the table shown in the previous activity.

a. How is this equation different from the other equations? What is its slope?

b. Describe the graph of the coordinate pairs in this table. Why does the value of its slope make sense?

c. Explain why the equation makes sense in terms of the graph and the table.

2. Write an equation for each linear relationship. Describe the graph of the linear relationship. State the slope and *y*-intercept.

a.

x	*y*
−7	11
−2	11
0	11

b. A line that passes through (−15, −3.75) and (89, −3.75)

3. **Consider a new table of values representing a linear relationship.**

x	*y*
−2	5
−2	14
−2	29

   a. **Explain how this table is similar to and different from the tables in Questions 1 and 2.**

   b. **Write an equation for the linear relationship in the table.**

   c. **Describe the graph of this linear relationship.**

   d. **Use the slope formula to calculate the slope between two points in the table. What do you notice?**

   e. **What is the *y*-intercept of this linear relationship? Explain why this makes sense.**

4. **Write an equation for each linear relationship. Describe the graph of the linear relationship.**

   a.

x	*y*
$\frac{17}{2}$	−18
$\frac{17}{2}$	23
$\frac{17}{2}$	267

   b. **A line that passes through (−7, −973) and (−7, 542)**

   c. **Create an additional table of values and write the equation for a vertical line.**

In a horizontal line there is no change in the *y*-values as the *x*-values change. Therefore, the slope is 0. A horizontal line has zero steepness. In a vertical line there is no change in the *x*-values as the *y*-values change. Therefore, the slope is undefined. A vertical line has an undefined steepness.

ACTIVITY
5.3 Matching Representations

1. **Carefully cut out the graphs, tables, contexts, and equations located the end of the lesson. Match each equation with its correct graph, table, or context. Explain how you matched the equations with the representations.**

2. **Compare the graphs.**

   a. **How are they different? How are these differences reflected in the slope-intercept form of their equation?**

   b. **Identify the *y*-intercept for each graph. How can you determine this point in the slope-intercept form of the equation for each graph?**

   c. **Identify the slope for each graph. How is the slope represented in the slope-intercept form of each equation?**

3. **Analyze the equation for each table.**

   a. **Determine the coefficient of *x* for each linear relationship using the slope formula.**

   b. **How can the number that is added in each equation written in slope-intercept form be determined from the table?**

4. **Analyze the equation for each context. Explain what each term of the equation means in each context.**

NOTES

TALK the TALK

Say What?

You have learned about two forms of a linear equation: the slope-intercept form, $y = mx + b$, and the point-slope form, $y - y_1 = m(x - x_1)$.

1. **What information can you determine about each line by looking at the structure of the equation?**

   a. $y = \frac{3}{5}x - 4$

   b. $y - 6 = 2(x + 1)$

   c. $y + 4 = 2x$

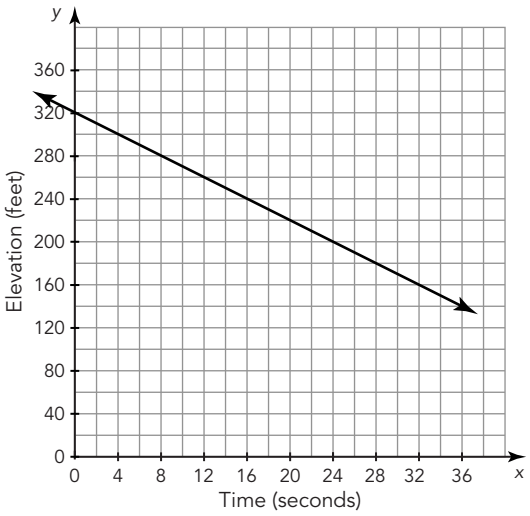
   d. $y = -\frac{2}{7}x$

   e. $y + 5 = -(x - 4)$

   f. $y = 19$

2. **Create a context that represents a linear relationship that passes through the point (2, 56) and has an increasing slope. Then write the equation of the line in point-slope form and slope-intercept form.**

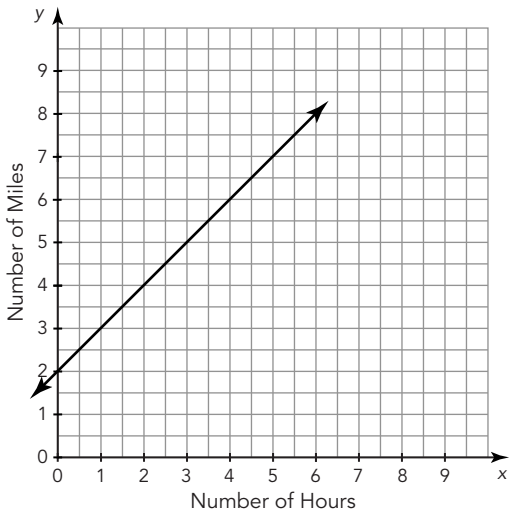
A



B

Michele read the first 40 pages of a mystery novel before she fell asleep. The next day, she read one page every two minutes until she finished the book, which was a total of 325 pages.

C



D

Time (hours)	Water Level (feet)
x	***y***
2	15
4	13.5
8	10.5
10	9

E

Number of Games Ron Won Today	Number of Credits on Ron's Player's Card
x	***y***
12	216
18	264
25	320
40	440

F

Bella's Pizza Shop charges $4.50 for a small pizza, $7.00 for a medium pizza, and $9.00 for a large pizza. Additional toppings cost extra depending on the size of the pizza ordered. Bruce ordered a large pizza with three toppings that cost a total of $12.60.

$y = 1.2x + 9$	$y = -\frac{3}{4}x + \frac{33}{2}$
$y = \frac{1}{2}x + 40$	$y - x = 2$
$y - 200 = -5(x - 24)$	$y = 8x + 120$

Assignment

Write

Compare the slope-intercept and point-slope forms of a linear equation.

Remember

The point-slope form of a linear equation is $y - y_1 = m(x - x_1)$, where m is the slope of the line and (x_1, y_1) is a point on the line. The slope of a horizontal line is 0. The slope of a vertical line is undefined.

Practice

Write an equation in point-slope form.

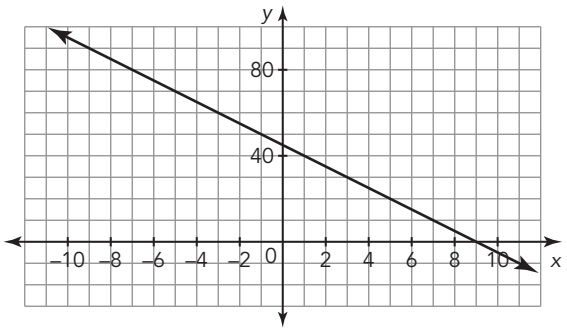
1. $m = 2$; (5, 6)
2. $m = -9.2$; (−17, 10)
3. (−2, −3) and (8, −8)
4. (79, 52) and (−87, 550)
5. A photography studio charges $50 for a sitting fee and 6 prints. Luigi increased his order to 11 prints and paid $65.
6. Zellie is taking the stairs in her building from her floor to the top of the building. After 2 minutes, she was 100 steps from the bottom floor. After 5 minutes, she was 196 steps from the bottom floor.

Write an equation in any form.

7. A newspaper charges a flat fee plus a charge per day to place a classified ad.

Number of Days	Total Charge ($)
2	8.00
4	13.00
6	18.00

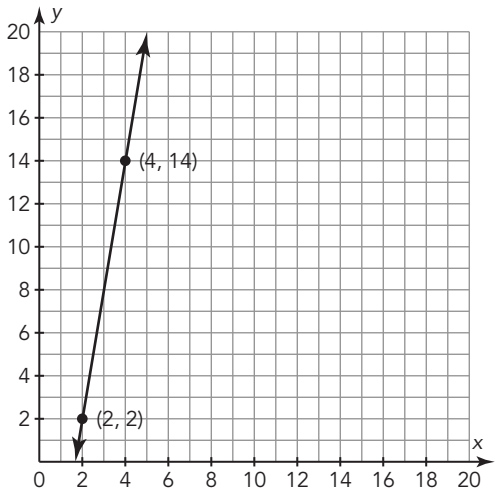
8.



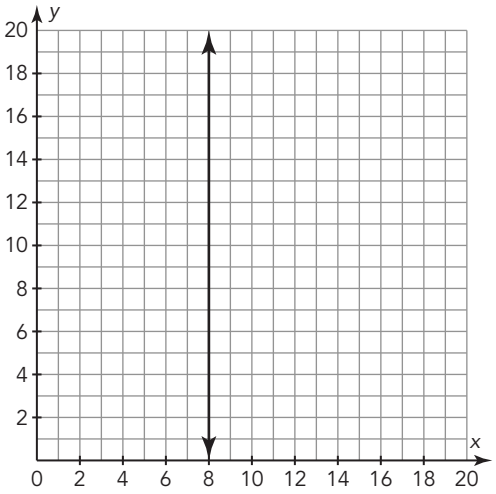
9.

x	*y*
−10	50
−2	10
4	−20
14	−70

10.



11. Pedro is traveling on a toll road. He plans to exit the road 5 miles ahead at First Avenue and pay $1.75. He changes his plans and travels 9 miles to Butler Street and pays $2.75.

12. 

Stretch

To convert an equation from point-slope to slope-intercept form, you can solve the equation for y. How do you convert from slope-intercept to point-slope form? Rewrite each equation in point-slope form using only algebraic properties. What is special about the ordered pair now visible in the equation?

1. $y = 2x - 7$
2. $y = -5x + 15$

Review

1. Write an equation in slope-intercept form with the given characteristics.
   a. The line is increasing and passes through the point $(0, -10)$. The slope of the line is less steep than the slope of the line represented by the equation $y = x + 8$.
   b. The line is decreasing and passes through the point $(0, 5)$. The slope of the line is more steep than the slope of the line represented by the equation $y = -\frac{1}{4}x - 4$.

2. For the linear equation $x = 4y - 5$, complete each task.
   a. Use a table of values to graph the linear equation.
   b. Use the points on the graph to sketch similar triangles that may be used to show that the slope of a non-vertical line is the same between any two points on the line.
   c. Verify that the slopes are the same.

3. Solve each problem.
   a. What is a 15% tip for a restaurant bill of $24?
   b. A $50 item was marked up 20%. What is the total increased cost of the item?

Topic 1

The Real Number System

Name _____ Date _____

I. Introduction to Irrational Numbers

A. Determine whether each number is a perfect square. If it is a perfect square, write the number as a product of its two factors.

1. 20
2. 36
3. 49
4. 68
5. 121
6. 169
7. 400
8. 150

B. Determine the square root for each perfect square.

1. $\sqrt{64}$
2. $\sqrt{100}$
3. $\sqrt{81}$
4. $\sqrt{16}$
5. $\sqrt{4}$
6. $\sqrt{0}$
7. $\sqrt{25}$
8. $\sqrt{144}$

C. Approximate each square root to the nearest tenth.

1. $\sqrt{130}$
2. $\sqrt{8}$
3. $\sqrt{85}$
4. $\sqrt{40}$
5. $\sqrt{24}$
6. $\sqrt{110}$

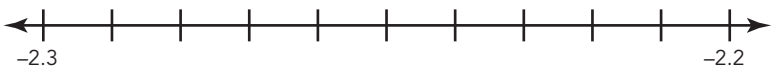
D. Classify each number as rational or irrational.

1. 0
2. -5
3. $-\sqrt{2}$
4. 1.3
5. $\sqrt{5}$
6. π
7. 0.33
8. $\sqrt{16}$
9. 6
10. $\frac{3}{4}$
11. 0.67236982158...
12. $\frac{31}{13}$

II. Graphing Real Numbers on a Number Line

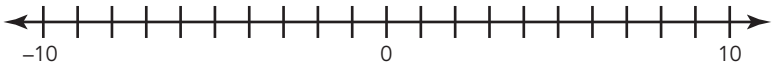
A. Plot a point on the number line to represent each given number.

1. Represent -2.257 on the number line.

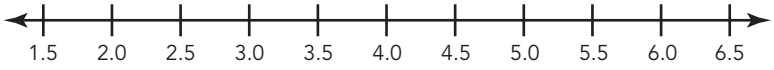


2. Represent $7\frac{1}{9}$ on the number line.

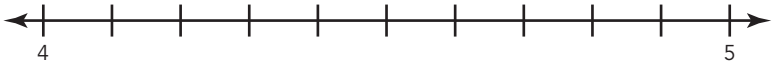
3. Represent $-\sqrt{4}$ on the number line.



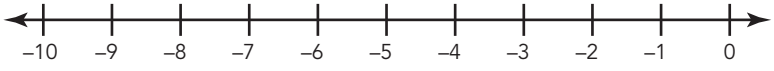
4. Represent π on the number line.



5. Represent $4\frac{7}{8}$ on the number line.



6. Represent $-\sqrt{28}$ on the number line.

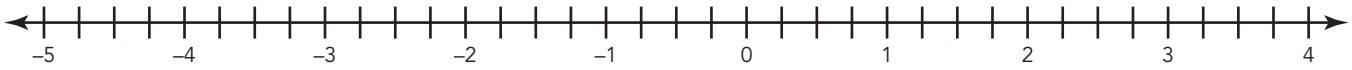


Name _____ Date _____

III. Ordering Rational and Irrational Numbers

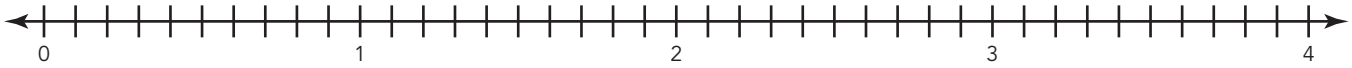
A. Plot points to represent the given numbers on each number line. Then, order the numbers from least to greatest.

1. 92%, π, $-\sqrt{2}$, $-3\frac{8}{9}$

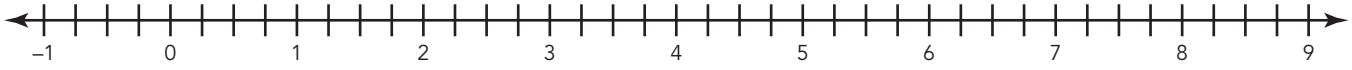


2. $-4\frac{1}{2}$, $\sqrt{16}$, 235%, π

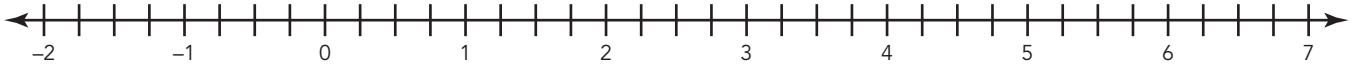
3. 143%, $\sqrt{4}$, π, 2.7



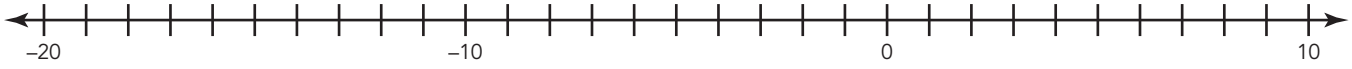
4. π, $7\frac{3}{4}$, 10%, 107%



5. π, $\sqrt{2}$, 5.67, $\frac{5}{8}$



6. 375%, $-\sqrt{25}$, $-\sqrt{74}$, 7.589



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

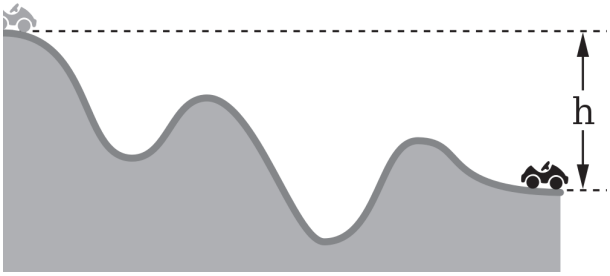
take up a lot of space, and a new coaster might have to be threaded around the existing rides and landscaping in an established park.

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

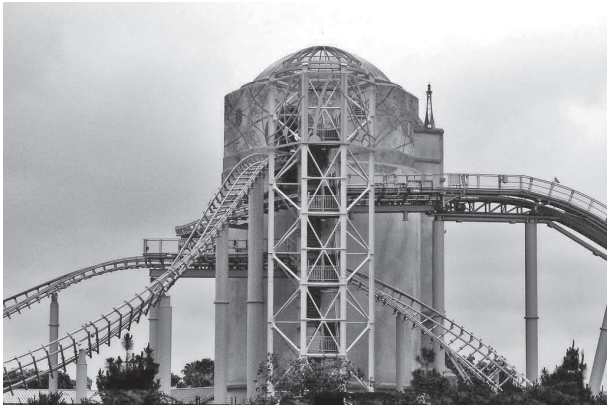
If you enjoy studying physics (and who doesn't), there are few more exhilarating classrooms than roller coasters. Roller coasters are driven almost entirely by basic inertial, gravitational and centripetal forces. All these are manipulated in the service of a great ride. Amusement parks keep upping the 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

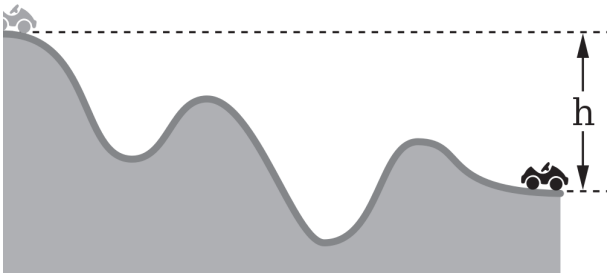
this phenomenon all the time. Think about driving your car, riding your bike or pulling your sled to the top of a big hill. The potential energy you build going up the hill can be released as kinetic energy — the energy of motion that takes you down the hill.



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

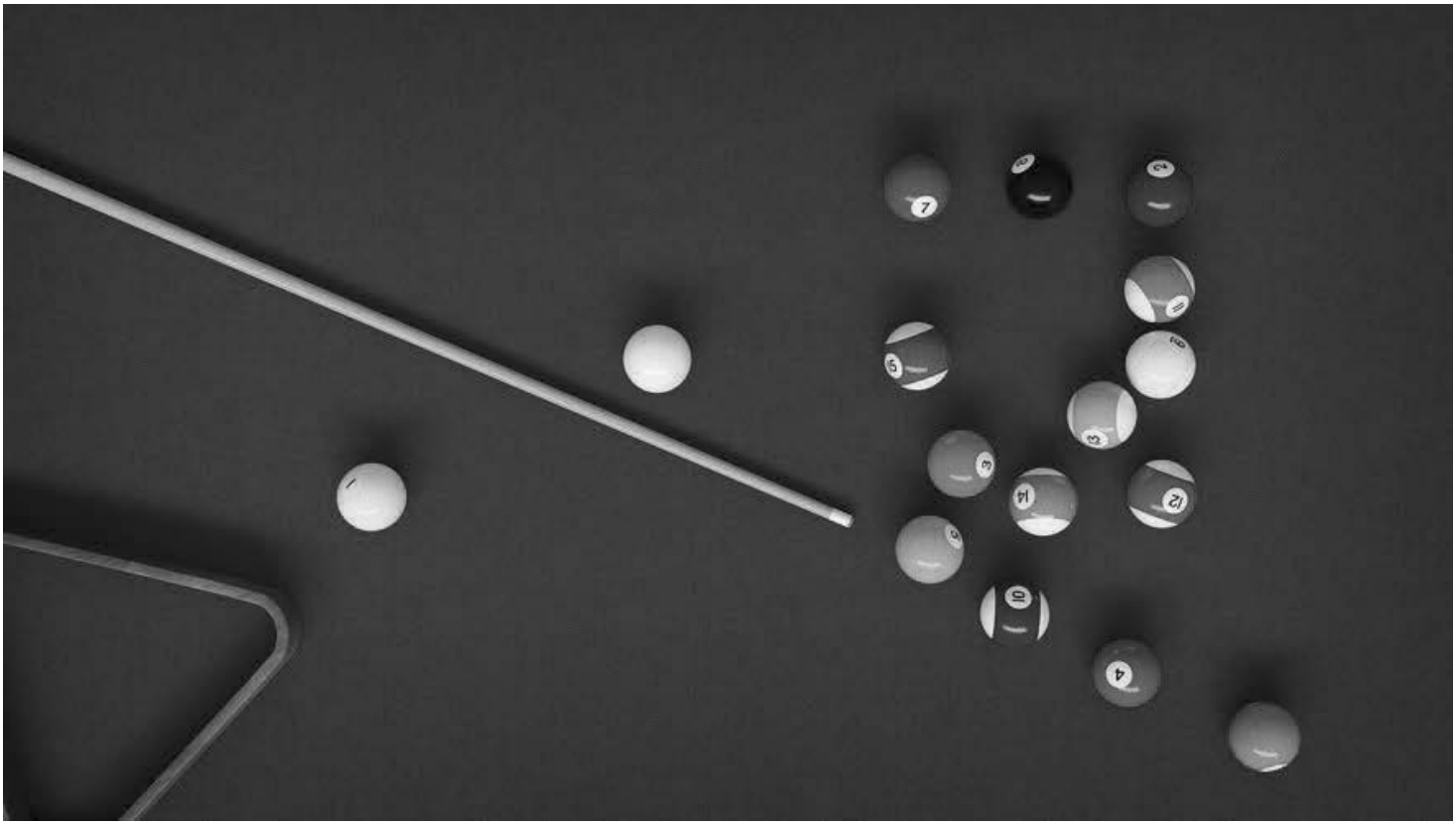
(B) the initial ascent of the coaster is not as important as the other ascents on the ride

(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

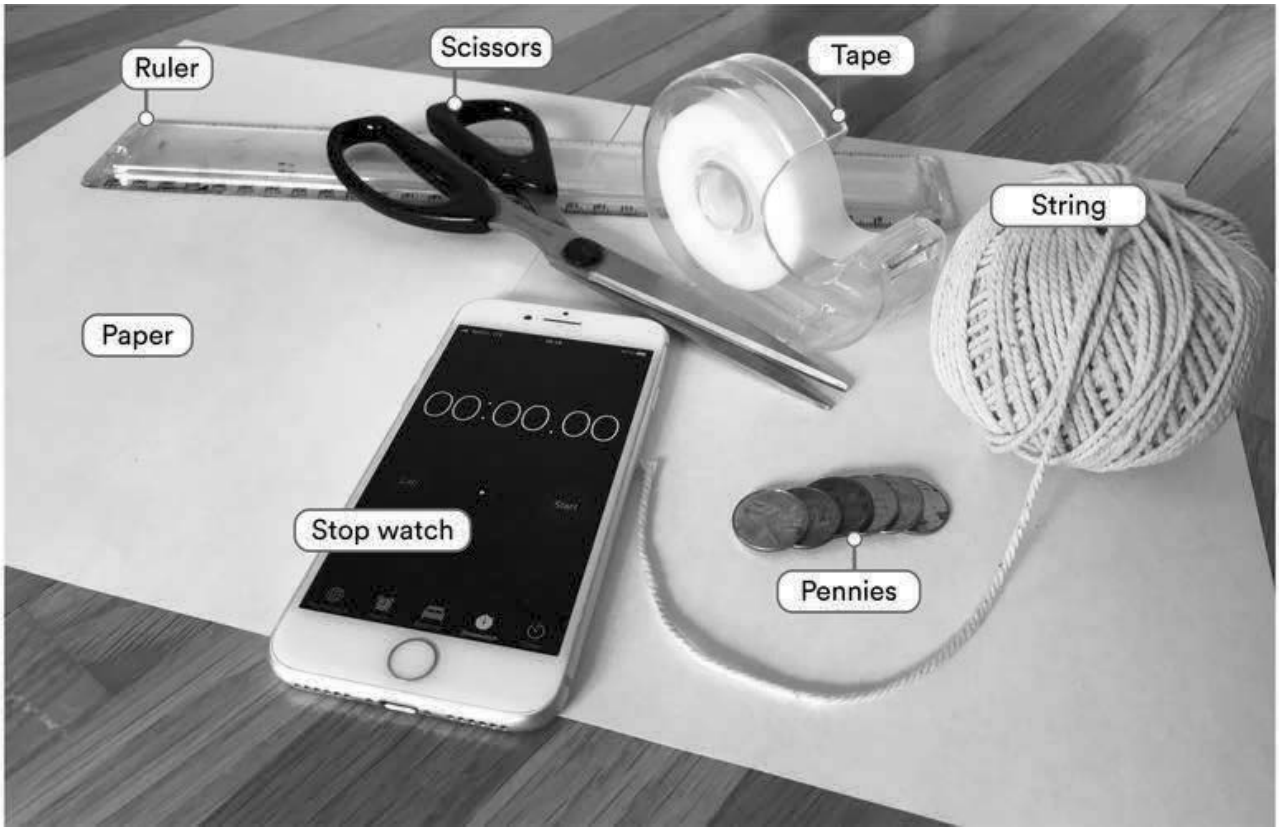
(B) to provide an example of chemical energy

(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

1) Instead of timing the period of the swing, you could time how long each pendulum swings before it comes to rest. What is the total time that each pendulum swings?

2) Instead of changing the length of the string, change the number of weights attached to the string or the initial angle of the string. Do mass or initial angle affect the period of the pendulum? Do they affect the pendulum's total time?

3) Did the longer pendulum have a longer period than the shorter pendulum? Was the longer pendulum's period not quite twice as long as the shorter pendulum's period?

A history of rockets

By NASA.gov, adapted by Newsela staff on 11.16.16
Word Count **814**
Level **910L**

TOP: A space shuttle blasts off piggybacking on a rocket. Pixabay. Graphics courtesy of NASA.

Today's rockets are the result of thousands of years of experimentation. There has always been one main principle behind rocket flight: the heating of fuel to produce motion.

In 400 B.C., Archytas, the Greek philosopher and scientist, was one of the first to successfully use this principle. He impressed his fellow citizens by flying a pigeon made of wood. The bird was suspended on wires and powered by hot steam.

The first true rockets may have emerged by accident. In the first century A.D., the Chinese had a simple form of gunpowder, which was used to make colorful explosions during festivals. The Chinese filled bamboo tubes with the gunpowder mixture and tossed the tubes into fires. They soon realized that these tubes could launch themselves just by the power produced from the escaping gas.

From Weapons To Fireworks

The first known use of true rockets was in 1232 during the battle of Kai-Keng. The Chinese fought off the Mongolian army using an early form of rocket similar to their firecracker tubes. After the

battle, the Mongols made rockets of their own. They may have been responsible for spreading the technology to Europe.

By the 16th century, rockets were no longer used as weapons. They were used in fireworks displays, though. Johann Schmidlap, a German fireworks maker, invented the step rocket. This was made from a large sky rocket that carried a smaller rocket. When the large rocket burned out, the smaller one continued to go higher. Schmidlap's idea is still used in all rockets today that go into outer space.

During the late 1600s, the English scientist Sir Isaac Newton studied motion. He developed three laws of motion, which are the starting point in explaining how rockets fly. These laws had a major impact on the design of rockets in the years that followed.

"The Rockets' Red Glare"

During the end of the 1700s and early into the 1800s, rockets were once again used as weapons. The British Colonel William Congreve set out to design rockets for the military. His rockets were highly successful. In fact, they inspired the phrase "the rockets' red glare" in a poem by Francis Scott Key, which later became "The Star-Spangled Banner."

The rockets' accuracy still had not improved much from the early days, however. An answer to this problem was found by William Hale. He invented a way to direct the escaping gas so as to make the rocket spin. The same principle is still used today.

In 1898, a Russian schoolteacher, Konstantin Tsiolkovsky, proposed the idea of space travel using rockets. In a report published in 1903, he suggested that liquid fuel - rather than a solid fuel, like gunpowder - could make rockets fly higher.

Father Of Modern Rocketry

The first successful flight with a liquid fuel rocket was achieved by Robert H. Goddard in 1926. Fueled by liquid oxygen and gasoline, Goddard's rocket flew for only two-and-a-half seconds and climbed just 41 feet. By today's standards, the flight was unimpressive. Still, Goddard's gasoline rocket started a new era in rocket flight.

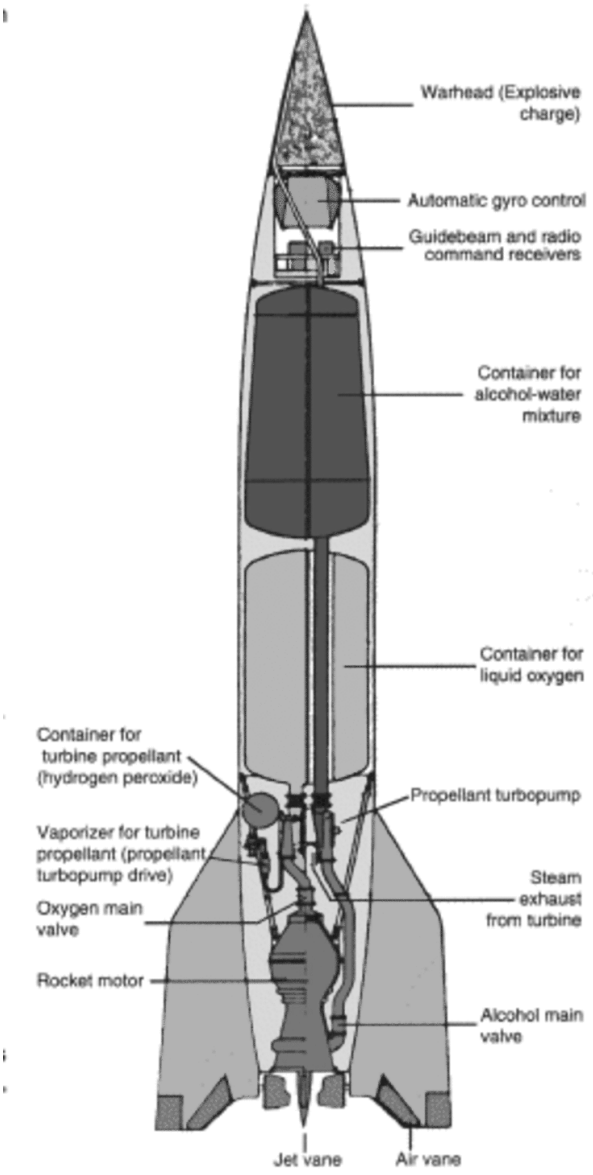
Goddard's experiments continued for many years. He developed a parachute system to return rockets and instruments safely after flight. For his achievements, Goddard has been called the father of modern rocketry.

A third great rocket scientist was Hermann Oberth. His writings inspired the creation of rocket societies around the world. In Germany, one such group was the Society for Space Travel. The formation of this group led to the development of the V-2 rocket, a weapon used by the Germans in World War II.

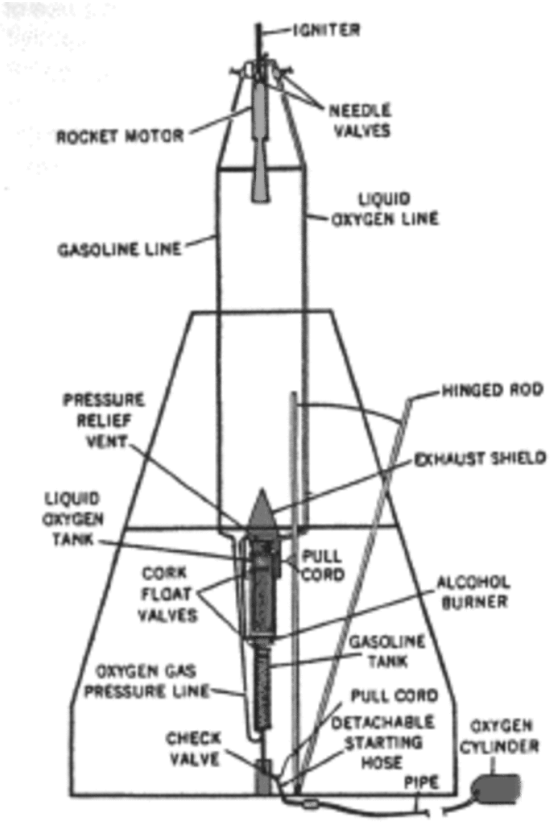
The V-2 rocket was small, but it could destroy entire city blocks. Fortunately, the V-2 came too late in the war to help the Germans win. With the fall of Germany, many German rocket scientists moved to the United States or to the Soviet Union. What followed was an intense period of competition between the two powers.

First Satellites In Space

On October 4, 1957, the Soviet Union launched Sputnik I. It was the first satellite to



German V-2 (A-4) Missile



Dr. Goddard's 1926 Rocket

successfully orbit around the Earth. Less than a month later, the Soviets launched another satellite. This one carried a dog named Laika. Laika survived in space for seven days.

A few months after the first Sputnik, the U.S. sent its first satellite into space. Explorer I was launched by the U.S. Army on January 31, 1958. That year, the United States created NASA, the National Aeronautics and Space Administration.

Soon, many people and spacecraft were being launched into space via rockets. Astronauts orbited Earth and landed on the moon. Satellites helped scientists study the weather and allowed for worldwide communication. More and bigger rockets had to be built to help launch these new tools into space.

Over time, rockets have evolved from simple gunpowder devices into giant space vehicles. They have allowed humans to explore the universe.

Quiz

1 Overall, the article is organized around:

(A) philosophers and astronauts

(B) people and weapons

(C) discoveries and scientists

(D) inventions and accomplishments

2 What is the connection between the article's introduction and the final section?

(A) The introduction describes how people started using rockets, and the final section explains the impact of rockets.

(B) The introduction explains the reason for creating rockets, and the final section describes how to make rockets.

(C) The introduction gives reasons for why rockets are important, and the final section highlights the uses of rockets.

(D) The introduction describes why people use rockets, and the final section lists examples of how rockets are used.

3 Which selection from the article is BEST illustrated by the diagram "Dr. Goddard's 1926 Rocket"?

(A) In 1898, a Russian schoolteacher, Konstantin Tsiolkovsky, proposed the idea of space travel using rockets. In a report published in 1903, he suggested that liquid fuel - rather than a solid fuel, like gunpowder - could make rockets fly higher.

(B) The first successful flight with a liquid fuel rocket was achieved by Robert H. Goddard in 1926. Fueled by liquid oxygen and gasoline, Goddard's rocket flew for only two-and-a-half seconds and climbed just 41 feet.

(C) Goddard's experiments continued for many years. He developed a parachute system to return rockets and instruments safely after flight. For his achievements, Goddard has been called the father of modern rocketry.

(D) His writings inspired the creation of rocket societies around the world. In Germany, one such group was the Society for Space Travel. The formation of this group led to the development of the V-2 rocket, a weapon used by the Germans in World War II.

4 Use the diagrams and information from the article to select the TRUE statement.

(A) Both the V-2 Missile and Goddard's rocket had warheads attached.

(B) Both the V-2 Missile and Goddard's rocket used liquid oxygen as fuel.

(C) Both the V-2 Missile and Goddard's rocket were able to launch into space.

(D) Both the V-2 Missile and Goddard's rocket had a parachute to return from flight.

How does gravity pull things down to Earth?

By Monica Grady, The Conversation on 01.16.20
Word Count **790**
Level **MAX**

Image 1. Everything in the universe has its own gravitational pull. When you throw an apple into the air, the Earth's gravity pulls it back down. But that's not the only thing that's happening: The gravity of the apple is also pulling on the Earth. Image by: Westend61/Getty Images

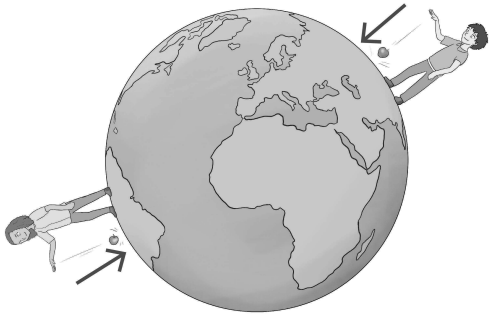
Gravity is a force, which means that it pulls on things. But the Earth isn't the only thing which has gravity. In fact, everything in the universe, big or little, has its own pull because of gravity – even you.

Isaac Newton was one of the first scientists to figure out the rules of how gravity behaves. The story goes, he was sitting under an apple tree when one of the fruits fell off. As he saw the apple fall down to the ground, he started to wonder why it didn't go up to the sky instead.

After lots of experiments, and some very clever thinking, he worked out that the force of gravity depends on how heavy objects are, and that the pull of gravity between objects gets smaller the farther apart they are. To see how gravity works in our universe, we're going to take a journey, with a few stops along the way.

First off, we'll go to the park and play a game of football. When you kick the football into the air, the Earth's gravity pulls it back down. But that's not the only thing that's happening: The gravity of the football is also pulling on the Earth. The thing is, the Earth is very heavy – much heavier than

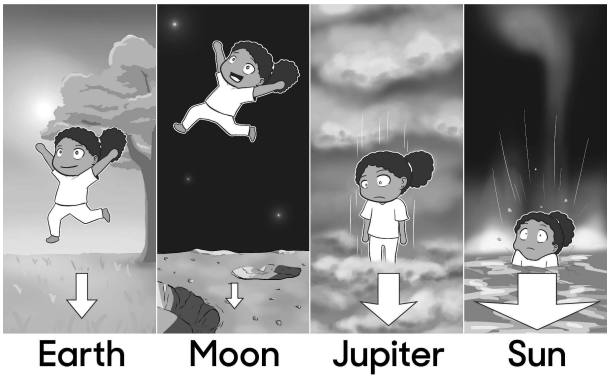
the football – so it's unaffected by the pull of the football, while the football itself is pulled back down to Earth.



Our next stop is the moon, and as we journey up into space, there's a good chance you'll see the sun. Now, the sun is much, much bigger than the Earth, which means its pull is very powerful indeed.

You might be wondering why the Earth (and all the other planets) don't just fall into the sun, the same way the football falls to Earth. The answer is that the planets are all moving, and the balance between the force of gravity and the speed of their movement (which comes from when they were first made, about 4.5 billion years ago) keeps them circling round the sun.

When we arrive on the moon, you'll see that the pull of gravity is not the same everywhere. It is related to how heavy – or how massive – an object is. If you jump on the moon, you'll be able to go much higher than you can on Earth. This is because the Earth is bigger than the moon, so the force between you and the Earth – which is what we call weight – is bigger than the force between you and the moon. On the moon, you seem to weigh less than on Earth, so you can jump higher.



Our final stop is the seaside. Sitting on the beach, you can see the sea gradually getting closer and closer to you – this is the tide coming in. After some time, the sea seems to get farther away – now, the tide is going out. But the sea is not actually moving in and out – it is moving up and down. As the sea level rises, the water gets closer to you, because the beach you are sitting on slopes upwards away from the sea. And as the sea level drops down, the water gets farther away from you.

This is also an effect of gravity, and it happens because the moon is close to the Earth. Unlike the football, the moon is heavy enough to have an effect – just a little one, because the Earth is still much heavier – but it's enough for us to notice when we watch the tides. As the water level rises, it is being pulled toward the moon, and the tide comes in. Then the tide goes out, and the water level drops, as the moon rotates around the Earth.

An interesting question is why we don't have enormous tides caused by the sun pulling on the Earth. We know that the sun is much bigger than the moon – so surely it ought to be able to pull water toward it? Actually, it does – but much less than the moon. This is because although the sun is much bigger than the moon, it is much, much farther away – and the pull of gravity gets weaker the bigger the distance between objects.

So, next time you're kicking a football around in the park, you'll know how gravity is bringing the football back down to Earth.

Quiz

1 Which statement BEST compares the force of gravity on a school bus on a school day and a weekend?

(A) The force would be lower on the school day than the weekend.

(B) The force would be higher on the school day than the weekend.

(C) The force would be different on the school day than the weekend.

(D) The force would stay the same on the school day and the weekend.

2 Which piece of evidence explains the cause of ocean tides?

(A) The planet's movement balances out the sun's gravity.

(B) The sun's gravity is strong enough to move the ocean water.

(C) The gravity from the moon pulls ocean water towards it.

(D) The Earth's gravity pulls the ocean back toward its surface.

3 When does a football hurled across a field have the lowest gravity force?

(A) when it has just left the quarterback's hand

(B) when it is traveling up the arc of its path

(C) when it is at its highest point on its path

(D) when it is on its way down the arc

4 Read the following paragraph from the article.

First off, we'll go to the park and play a game of football. When you kick the football into the air, the Earth's gravity pulls it back down. But that's not the only thing that's happening: The gravity of the football is also pulling on the Earth. The thing is, the Earth is very heavy – much heavier than the football – so it's unaffected by the pull of the football, while the football itself is pulled back down to Earth.

What conclusion is BEST supported by the paragraph above?

(A) The force of gravity is relative to an object's mass.

(B) The force of gravity gets weaker as objects move apart.

(C) The pull of an object's gravity increases in the air.

(D) The Earth has the strongest known gravitational pull.

5 Why can a person jump higher on the moon?

(A) The moon is faster than Earth.

(B) The moon is slower than Earth.

(C) The moon is larger than Earth.

(D) The moon is smaller than Earth.

6 Read the following paragraph from the article.

After lots of experiments, and some very clever thinking, he worked out that the force of gravity depends on how heavy objects are, and that the pull of gravity between objects gets smaller the farther apart they are. To see how gravity works in our universe, we're going to take a journey, with a few stops along the way.

Which answer choice is the BEST definition of the phrase "depends on" as used in the paragraph?

(A) is determined by

(B) is undecided about

(C) places trust in

(D) hangs down from

7 Why do the ocean tides ebb and flow on a regular cycle?

(A) The sun's gravitational pull changes with its rotation around Earth.

(B) The sun's gravitational pull changes with Earth's rotation around it.

(C) The moon's gravitational pull changes with its rotation around Earth.

(D) The moon's gravitational pull changes with Earth's rotation around it.

8 Read the following selection from the article.

Our final stop is the seaside. Sitting on the beach, you can see the sea gradually getting closer and closer to you – this is the tide coming in. After some time, the sea seems to get farther away – now, the tide is going out. But the sea is not actually moving in and out – it is moving up and down.

Which two words would BEST replace “gradually” and “actually” in the selection above?

(A) exactly; absolutely

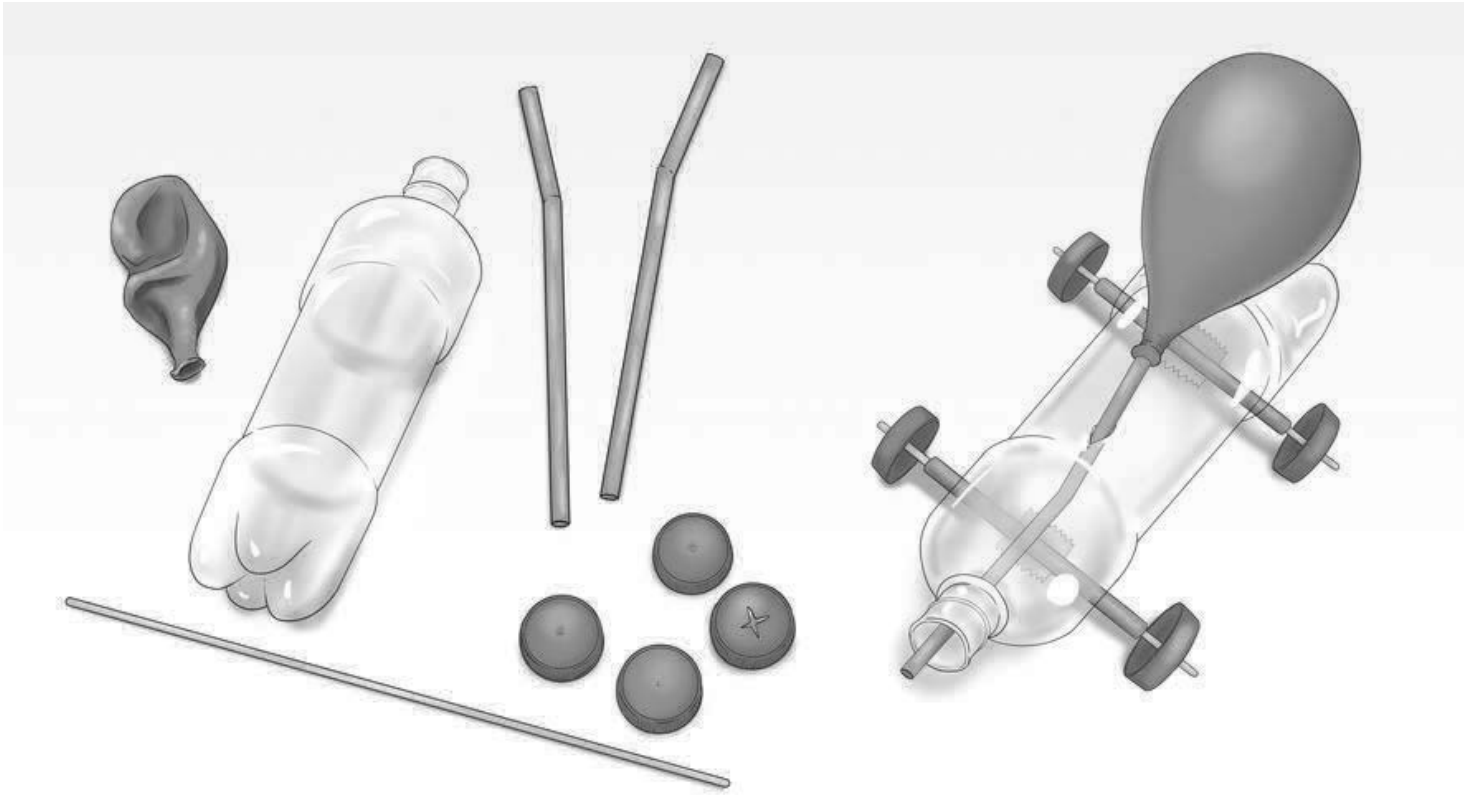
(B) slowly; really

(C) finally; easily

(D) quickly; precisely

Experiment: How to build a balloon-powered car

By Ben Finio, Scientific American on 03.31.20
Word Count **692**
Level **MAX**



Use these items to build a small car that is powered by the kinetic energy of a balloon. Newsela staff

Turn a pile of trash into a toy car — and watch it go! In this activity you will learn some physics concepts and use recycled materials to build a toy car that is propelled by a balloon. You can even find a friend, build two cars and race them against each other. Whose car will go the fastest?

Materials

Plastic bottle

Four plastic bottle caps

Wooden skewer

Two straws

Balloon

Tape

Scissors or sharp knife (Have an adult use or supervise your use of this tool.)

An adult helper

Preparation

1. Cut one of the straws in half.

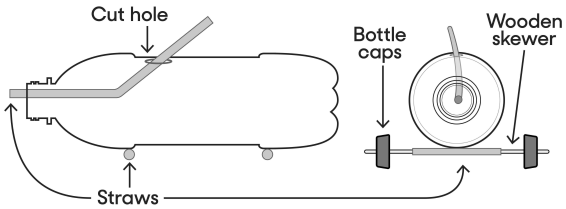
2. Tape both pieces of the straw to one side of the water bottle.

3. Cut the wooden skewer in half and push each piece through one of the straws. These will form your axles. (Have an adult help.)

4. Have an adult help use the scissors to poke a "+"-shaped hole directly in the center of each plastic bottle cap.

5. Press each bottle cap onto the ends of the wooden skewers. These will form your wheels.

Procedure



1. Put your car down on a flat surface and give it a good push. Make sure the car rolls easily and coasts for a bit before stopping. If your car gets stuck or does not roll smoothly make sure: your axles are parallel to each other; the hole in each bottle cap is centered; and the straws are securely taped to the water bottle and do not wobble. You can add some glue if tape is not sufficient.

2. Tape the neck of the balloon around one end of the other straw. Wrap the tape very tightly so the connection is airtight.

3. Cut a small hole in the top of the water bottle, just big enough to push the straw through.

4. Push the free end of the straw through the hole and out the mouth of the bottle.

5. Use tape to secure the straw to the bottle.

6. Blow through the straw to inflate the balloon, then put your finger over the tip of the straw to trap the air. What do you think will happen when you put the car down and release your finger?

7. Put the car down on a flat surface and release your finger. What happens?

See what adjustments you can do to make the car go farther. What happens if you inflate the balloon more? What happens if you adjust the direction the straw is aimed? Does it work best if the straw is aimed straight back?

Extra: There are many different ways to build a balloon car. Turn this into an engineering design project and try building your car with different materials. For example: What happens if you use a cardboard box instead of a plastic bottle for the body? What happens if you use different diameter straws? What about different materials for the wheels and axles? Get some friends and try building different cars and racing them against one another. What materials work the best?

Observations And Results

When you inflate a balloon and let it go, it zips randomly around the room. When you tape the balloon to a straw and attach it to the body of your car, however, you can control the direction of the escaping air. When the end of the straw is aimed backward, the air pushes your car forward, as described by Newton's third law of motion. Your design will be most efficient if the straw is pointed straight back and not downward or to the side. The more you inflate the balloon the more potential energy it stores, which in turn is converted to more kinetic energy, according to the law of conservation of energy — so the car will go faster.

Quiz

1) What is Newton's third law of motion and how does this law apply to the balloon-powered car?

2) Why is the design of the car most efficient if the straw is pointed backwards?

3) Choose two of the following three questions to answer:
    a. What do you think will happen if you use a cardboard box instead of a plastic bottle for the body?
    b. What will happen if you use different diameter straws?
    c. What about different materials for the wheels and axles?

Explaining energy transfer and transformation

By National Geographic Society, adapted by Newsela staff on 09.12.19

Word Count **769**
Level **940L**

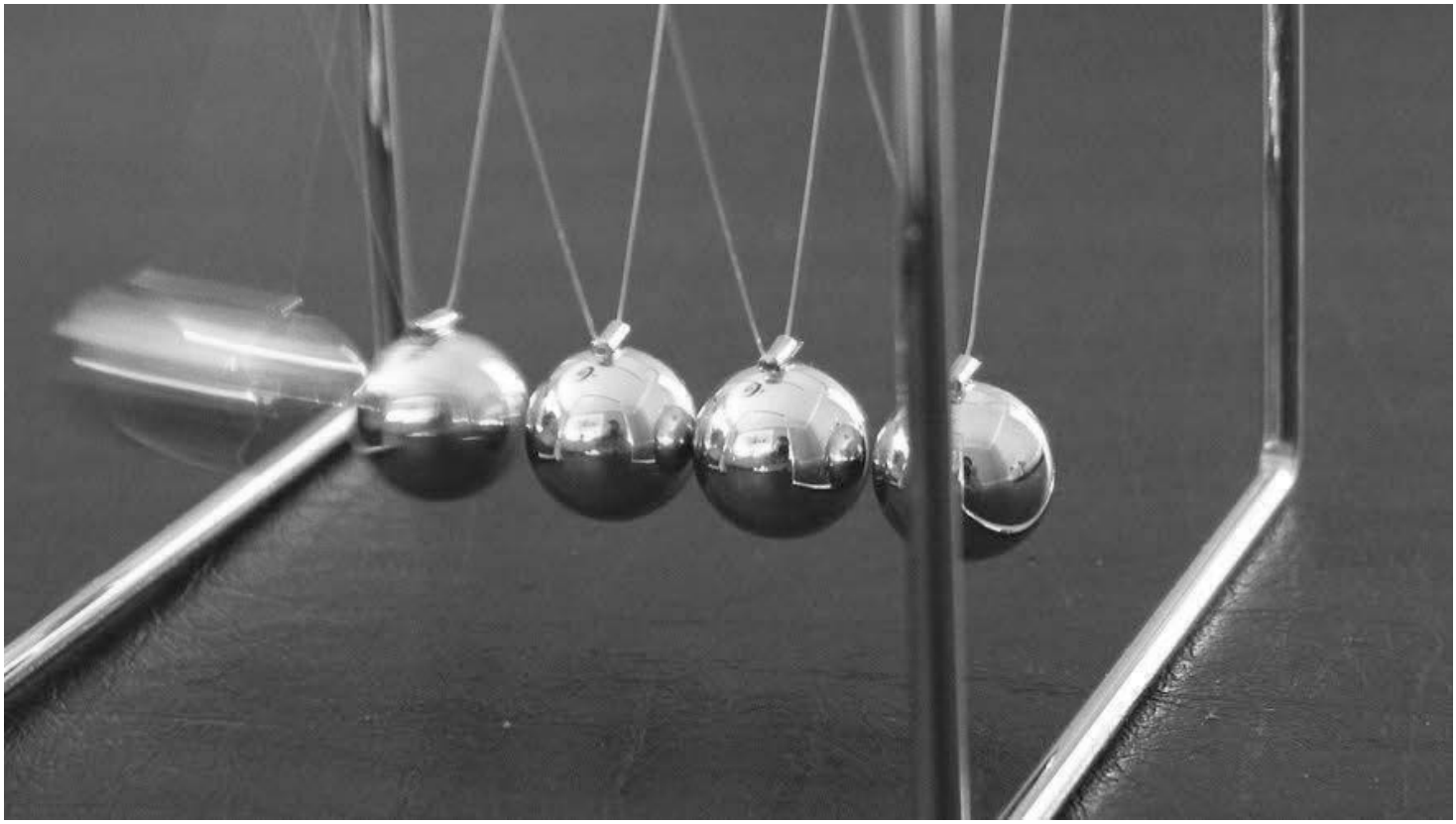


Image 1. Newton's cradle is a device that demonstrates the transfer of kinetic energy. Photo from: Wikimedia Commons

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.

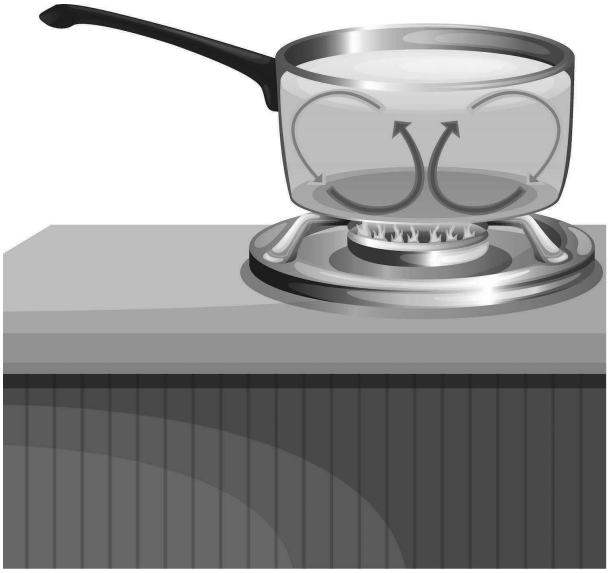
The two objects will remain at the same temperature unless something else adds or subtracts heat from them. In most cases, that something is the air in the room, which draws heat from the coffee. If allowed to sit, the coffee cup, the coffee and the spoon will all reach the same temperature as the surrounding 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.



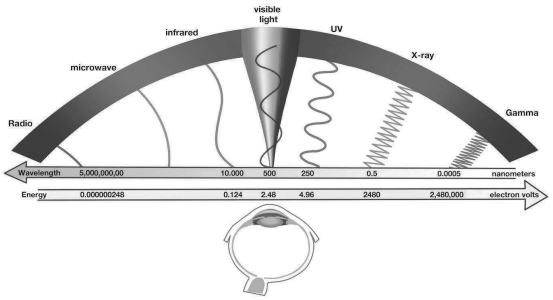
Hotter, less-dense water begins to rise and takes the place of colder, denser water at the top. The colder, denser water sinks to the bottom. There, it is heated and the cycle gets repeated. The repeated movements of water are called convection currents. As time goes on, more of these convection currents 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

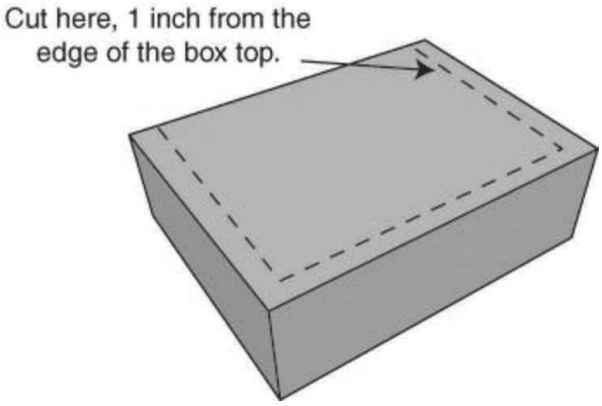
Large marshmallows

Plain chocolate bars (thin)

Aluminum pie pan

Napkins!

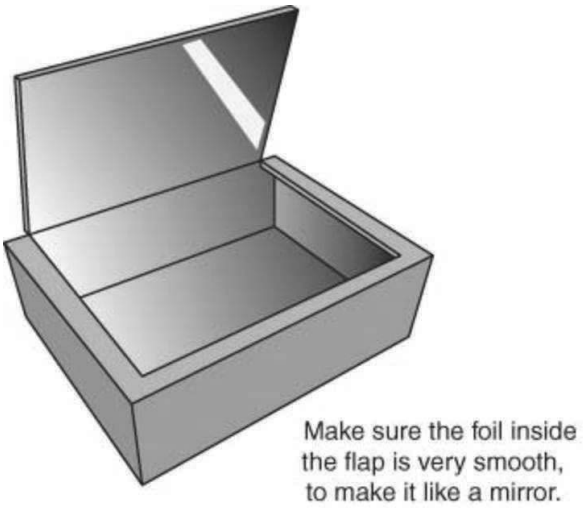
How To Make It



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.

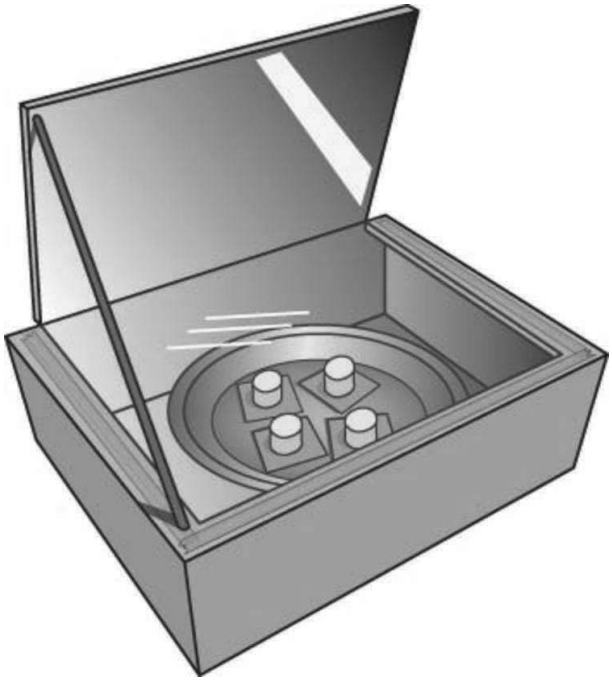
8. Place the pan in the pre-heated solar oven.

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.

NATIONAL GEOGRAPHIC

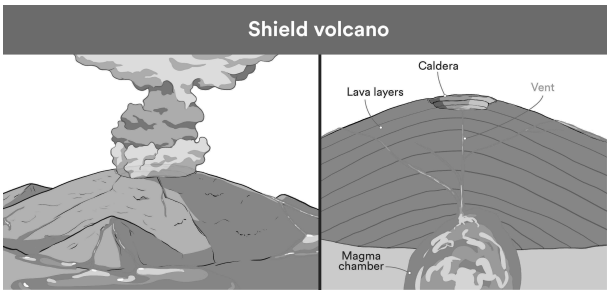
Submarine volcanoes erupt into water instead of air. For this reason, they behave quite differently than volcanoes on land. For example, it is uncommon for submarine volcanoes to have explosive eruptions. The weight of the water above them creates very high pressure. Instead of explosive eruptions, the 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.

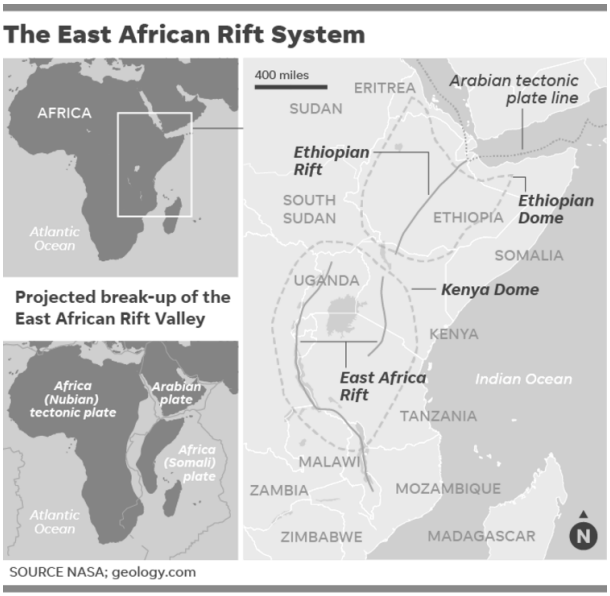
The tear continues to grow. It collapsed part of a highway. Lucia Perez Diaz is a postdoctoral researcher on tectonic plates. She works at the Royal Holloway, University of London. The crack "was accompanied by seismic activity in the area," said Lucia Perez Diaz.

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?

Quiz

1) Did the shoreline erode, or recede from the water, after you bobbed the water bottle up and down for two minutes?

2) Did most of the shoreline erode less when there was a headland, especially the shoreline closest to it?

3) Based on your observations, explain how beach formations in some parts of a beach can resist erosion from the waves more than other parts.

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

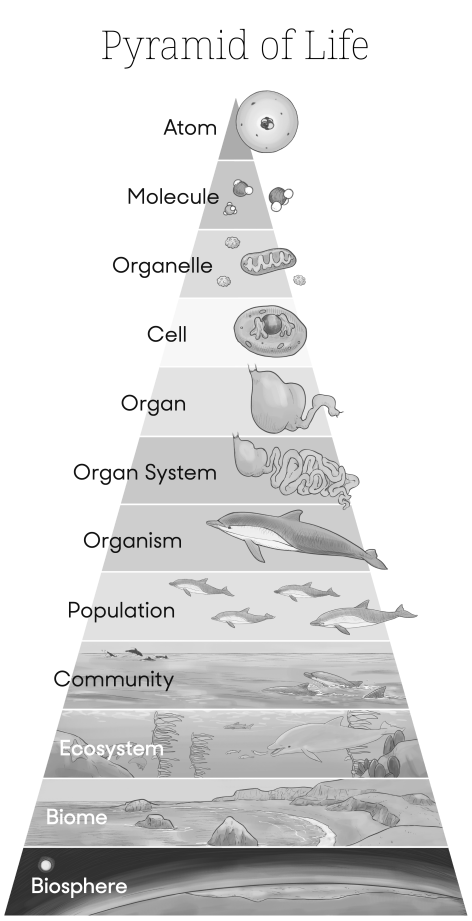
When you look at a pyramid, you'll notice that its broad base gradually narrows as it extends upward. The same holds true for the organization of life on Earth. At the base of this hierarchical structure is the most inclusive level of organization, the biosphere. As you climb the pyramid, the levels 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.

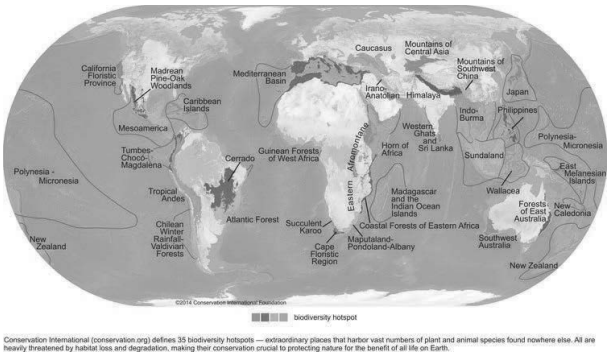
Atom: Finally, there is the ever-so-tiny atom. It takes extremely powerful microscopes to view these units of matter (anything that has mass and takes up space). Elements such as carbon, oxygen and hydrogen are composed of atoms. Atoms bonded together to make molecules. For example, a water molecule 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.

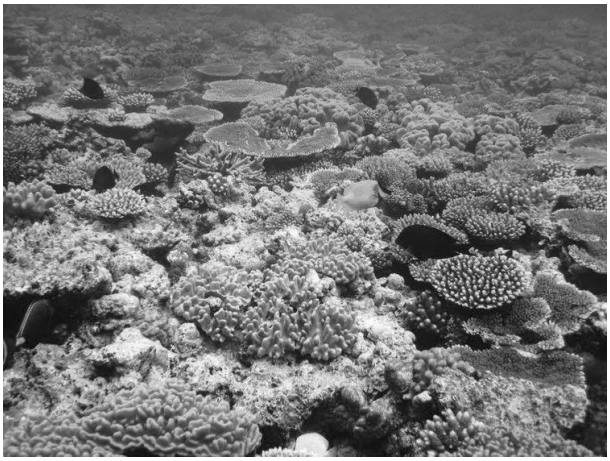
Pollution is the fifth reason. Exhaust from automobiles is a kind of pollution. So are chemicals that factories dump into rivers. Even fertilizers, pesticides and manures from farms can pollute the soil and water.

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**

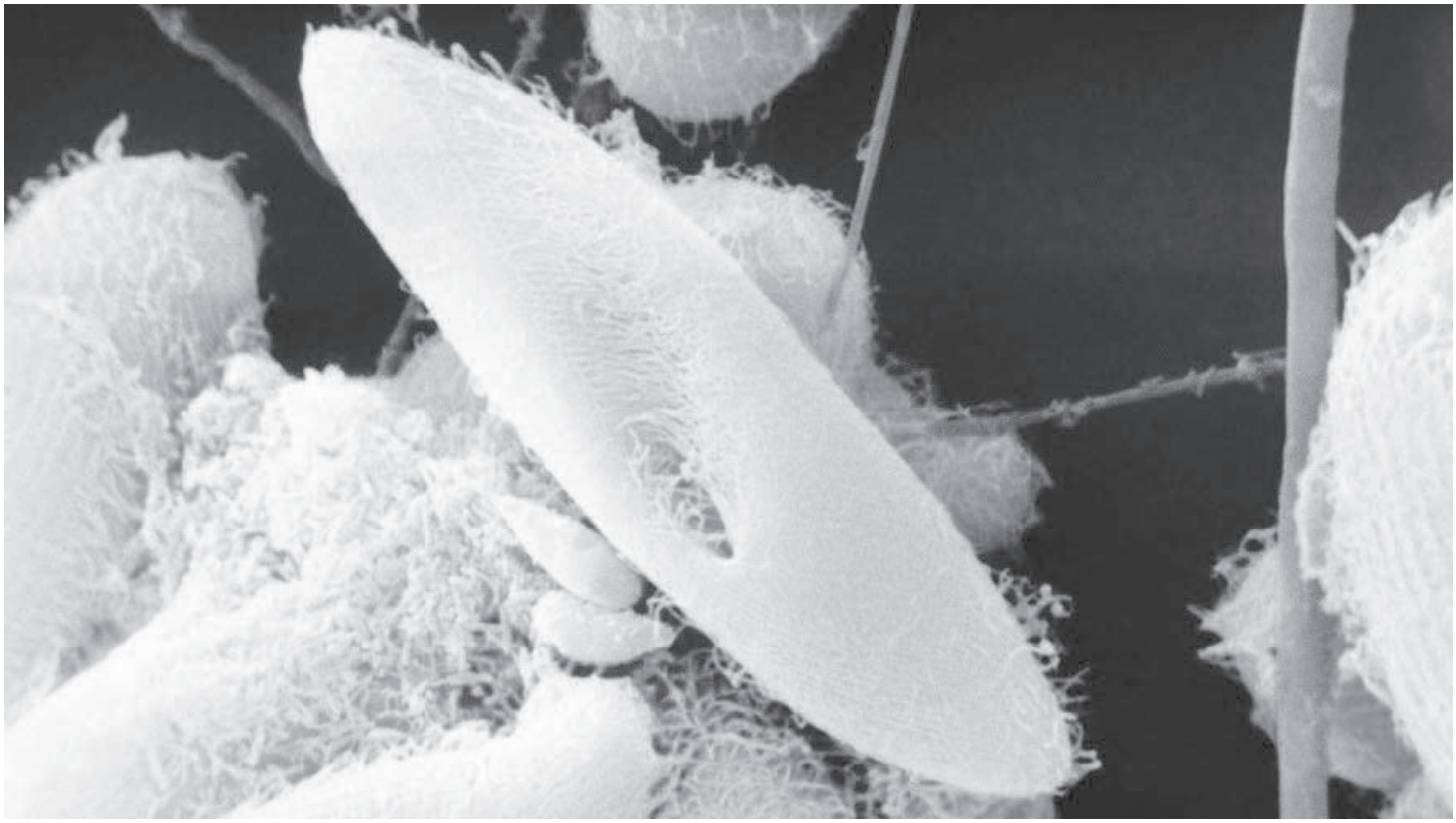


Image 1. Microscopic view of paramecia, single-celled organisms often found in ponds. Paramecia feed on other small organisms, such as bacteria. Each component of these tiny creatures, from the genetic material in its nucleus to the cilia it uses to swim, performs special functions that allow it to survive. 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.

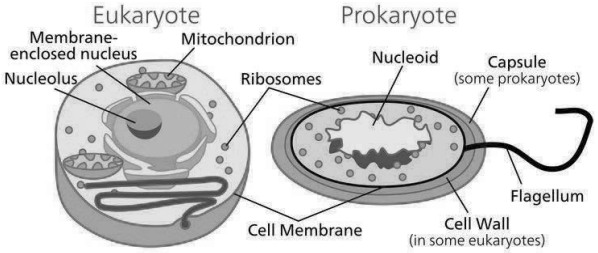
Cells get rid of waste. They help repair tissues. They generate the energy that keeps us alive. These are just some of the many tasks that cells carry out.

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.

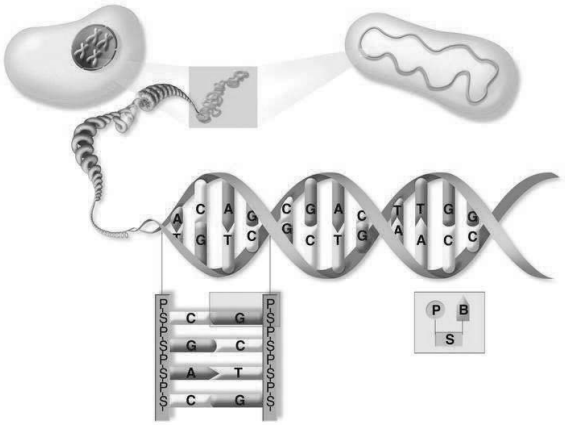
Bacteria mainly consist of these most basic parts of a cell. They may be small, but bacteria can cause human illnesses, from mild food poisoning to deadly tuberculosis. Other bacteria help keep us healthy. Many bacteria live in the human gut. They help us digest and absorb nutrients.

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.

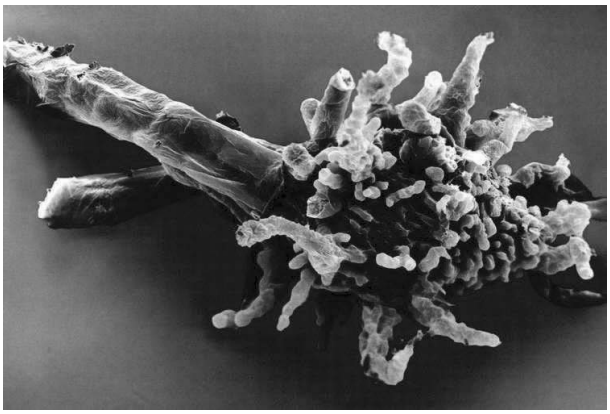
Horizontal gene transfer is more common in single-celled organisms. These organisms are called prokaryotic. They don't have a nuclear membrane, which would protect the organism's DNA from outside DNA.

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



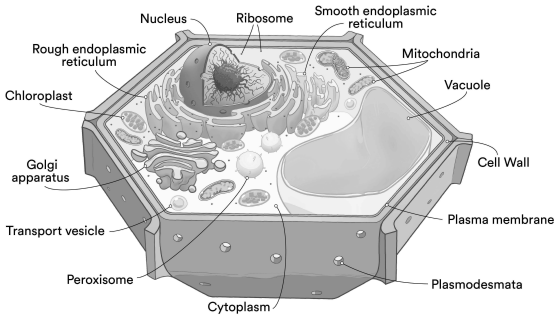
Other single-celled organisms can combine to form a multicellular structure. One example is the cellular slime mold, a type of amoeba. When there aren't many nutrients in the environment, these cells band together in a slug-like form. Together, they migrate to find food. The cellular communication between 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

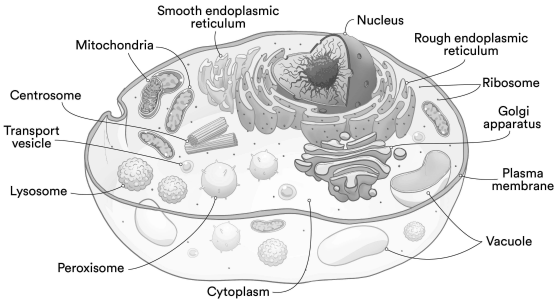
within stalk cells as they go through cell death and form a column. In this process, spore cells are lifted and then scattered to a new location.

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.

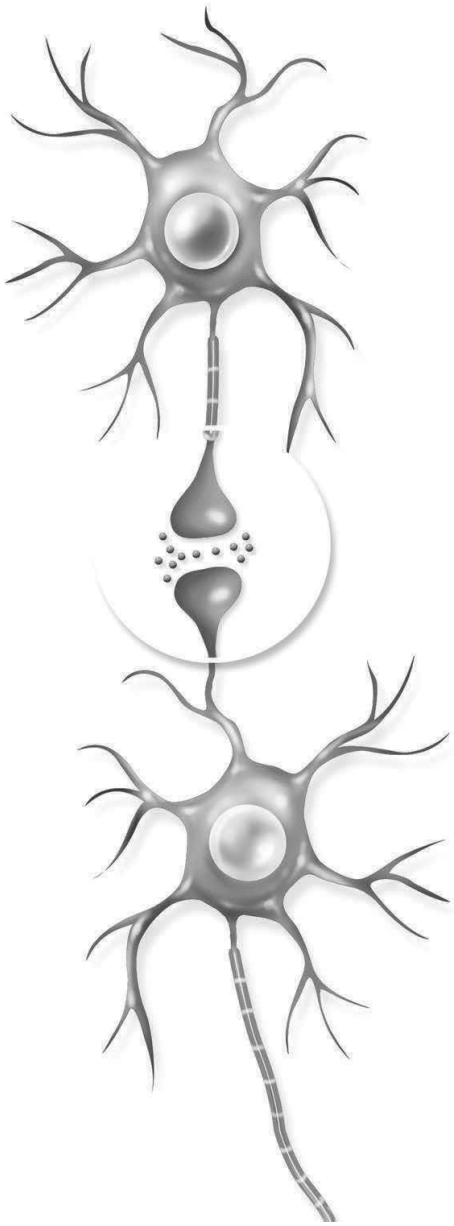
White blood cells are part of the body's immune system. The immune system is a group of cells and organs that fight to protect the body. White blood cells use lysosomes to smother and destroy bacteria. This helps prevent infection and disease.

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.

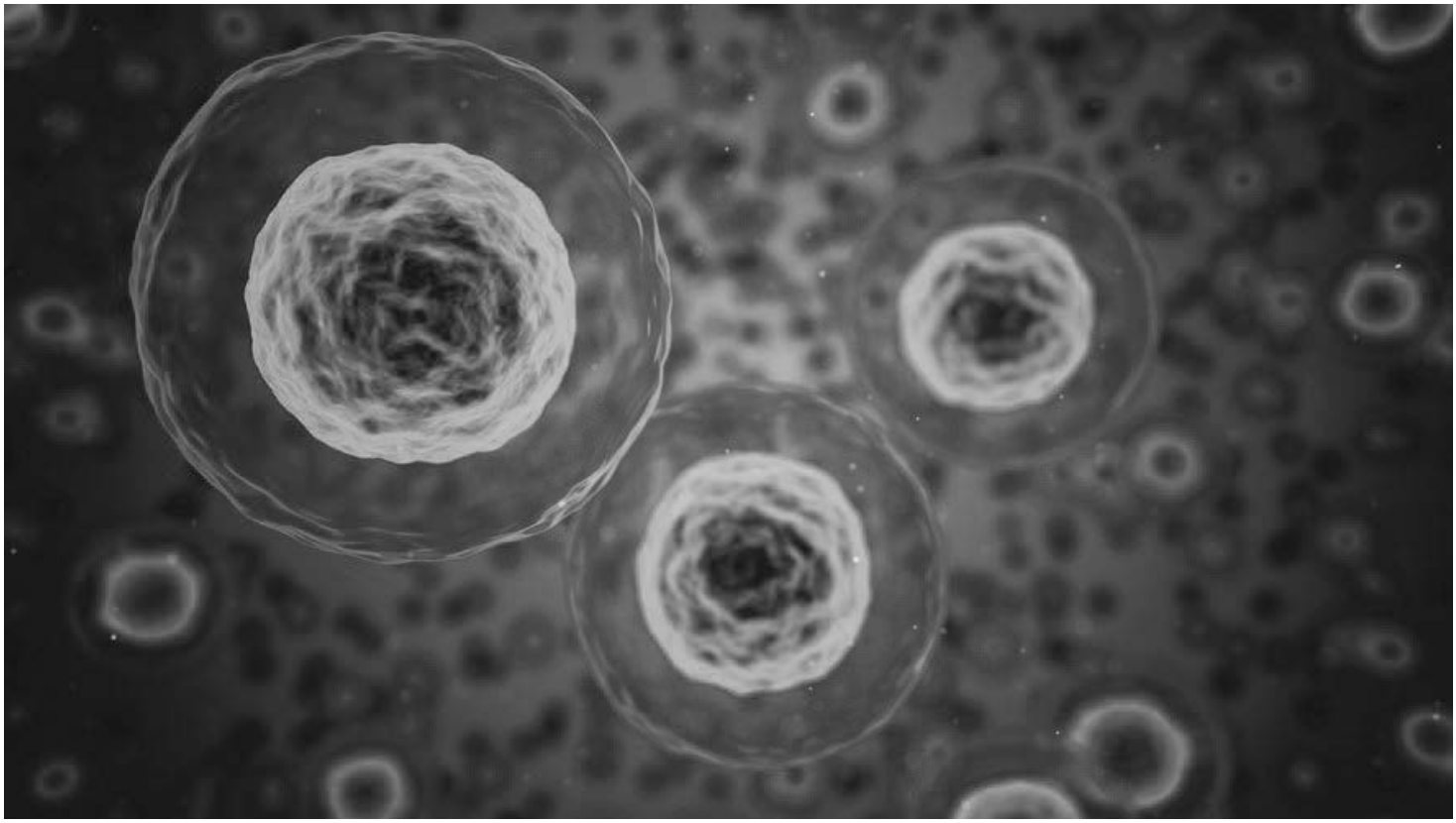
(B) Paramecia is an organism that contains multiple cells and lives in ponds.

(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.

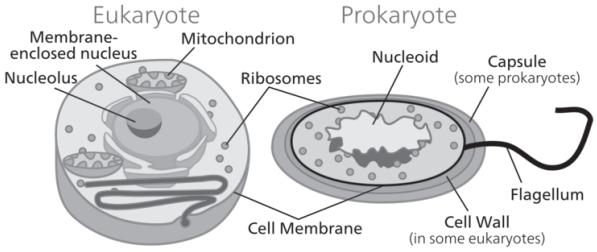
Below are 10 facts about cells, some of which are well-known while others may surprise you.

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.

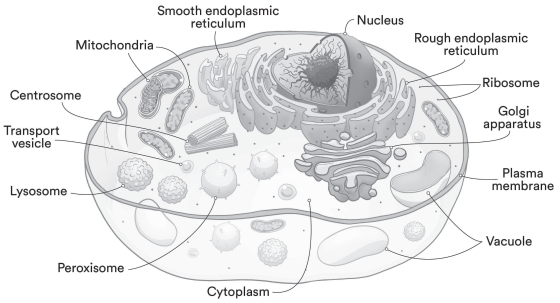
5. Cells contain genetic material.

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.

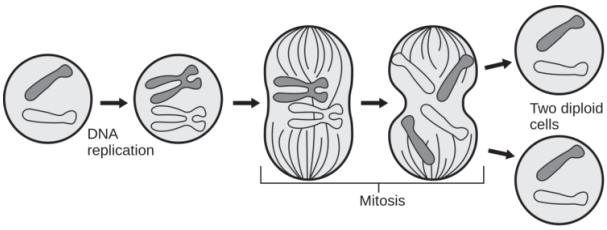
• The endoplasmic reticulum creates carbohydrates, like sugar, and fats.

• 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

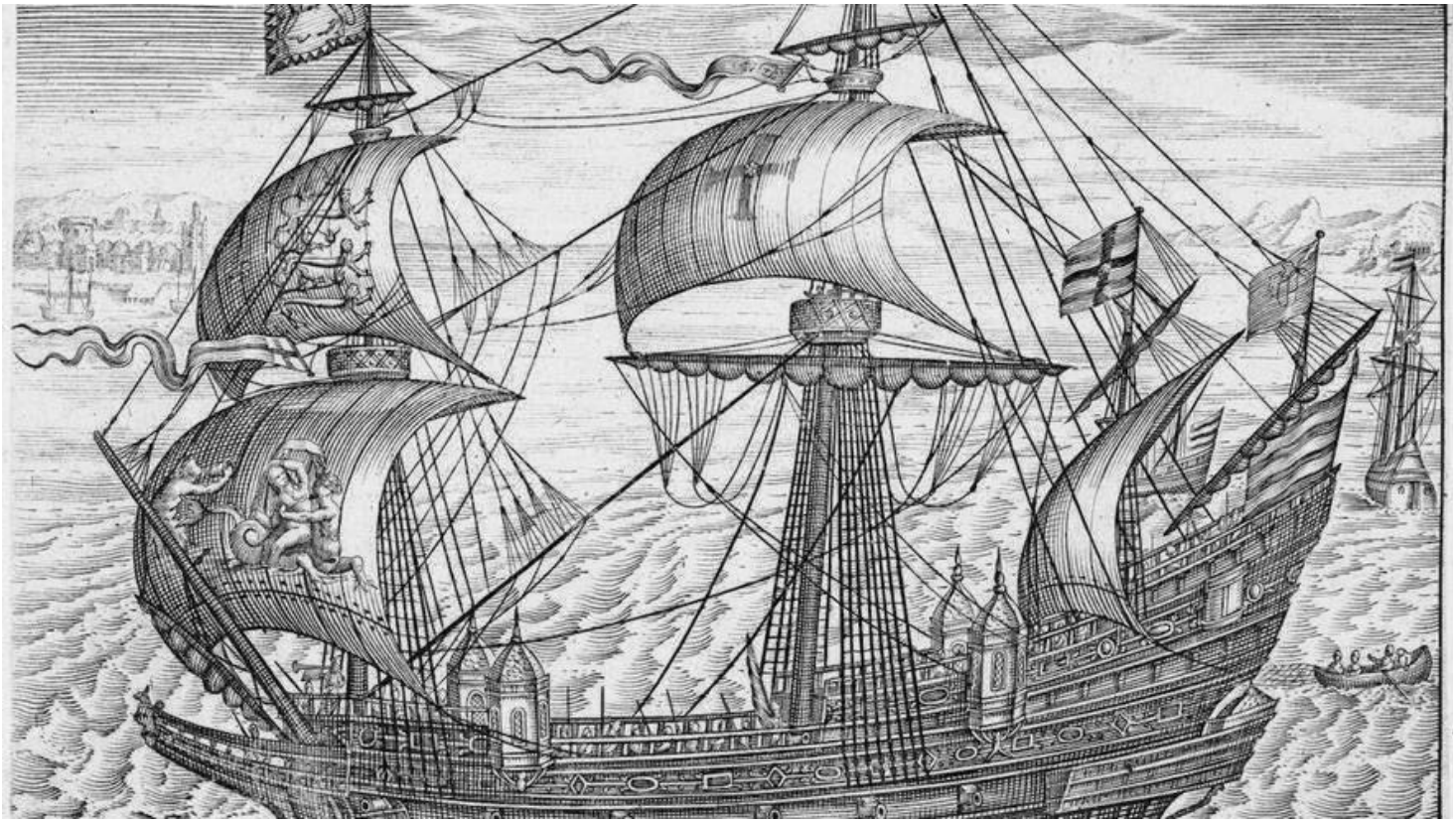
(C) by highlighting the major differences in how a cell is protected from the environment around it

(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 the 900s, the lateen sail, which enabled a ship to sail

closer to the wind, reached Europe from the Middle East. The sternpost rudder made ships more maneuverable. Around 1000, Europeans began using the magnetic compass, and within 200 years it was common. By 1280, Mediterranean mariners were using crude navigational charts. As design and construction improved, ships grew larger — first in order to accommodate guns and powder, later to carry goods for trade and the provisions needed for long voyages. Advances in building and sailing ships expanded horizons.

In the 1400s, many different factors came together, and the result was explosive. Beginning around 1400, Spain conquered the Canary Islands and slaughtered the native peoples. In 1418, Prince Henry the Navigator of Portugal began sending expeditions farther and farther down the west coast of Africa. By 1432, the Portuguese colonized the Azores. Within thirty years they had reached Guinea and begun settling on the Cape Verde Islands. In the 1480s, Portuguese explorer Bartolomeu Dias rounded the Cape of Good Hope in Africa. Beginning in 1492, Christopher Columbus began making his transoceanic voyages for Spain. In 1498, Portuguese Vasco Da Gama sailed around Africa to India.

Spain once ruled the seas

By the early 1600s, oceanic travel was flourishing. Spain was stripping the New World of its immense wealth, and Portugal traded actively with India, the Spice Islands and its New World colony, Brazil. France developed its mining and other interests in west Africa.

Spain became the richest trading power in Europe. Large flotillas of ships regularly crossed the Atlantic bearing gold, silver, jewels, cochineal, cacao, tobacco, and other valuable commodities back to Spain. Superior navigational knowledge and skill developed by long experience made Spain ruler of the seas.

The rich traffic between the New World and Spain were huge temptations for other European countries. But when England decided at last to compete for a piece of the New World and its trade, she had few mariners with deep-water experience and little knowledge of the Atlantic or the Western Hemisphere. Worse, the English government was unwilling and often unable to pay for exploration and colonization.

English mariners improve seamanship

English mariners were highly skilled navigating along the coast. However, they had little experience with ocean sailing, and were aware of their shortcomings. They began hiring Portuguese and Spanish pilots and instructors to show them how to navigate in the ocean.

They English decided to advance the science of ocean travel. They wrote textbooks on piloting and navigation, invented instruments and charts, and built oceangoing ships. Sails, armaments, and seamanship also improved.

The interest in overseas trade and expansion grew.

The British set up a colony in Virginia

The British began its first colony in the Americas, in Roanoke Virginia, in 1584. By that time, Englishmen had already circled the globe explored the barren Arctic.

By the last half of the 1500s, English ships were crisscrossing the Atlantic. Their navigational skill increased and the design of their ships had improved. England emerged as a sea power to rival Spain. Largely through their own initiative, the English raised the art of navigation to a science. A new age of discovery, exploration and expansion — one that would change the world and man's understanding of the world — was about to begin.

Quiz

1 Read the sentence from the section "The British set up a colony in Virginia."

Largely through their own initiative, the English raised the art of navigation to a science.

Which sentence from the section "English mariners improve seamanship" provides the BEST support for this conclusion?

(A) However, they had little experience with ocean sailing, and were aware of their shortcomings.

(B) They began hiring Portuguese and Spanish pilots and instructors to show them how to navigate in the ocean.

(C) They wrote textbooks on piloting and navigation, invented instruments and charts, and built oceangoing ships.

(D) The interest in overseas trade and expansion grew.

2 Which section of the article highlights the idea that exploration was driven by competition for riches?

(A) Introduction [paragraph 1]

(B) "Early sailing vessels"

(C) "Spain once ruled the seas"

(D) "English mariners improve seamanship"

3 Read the sentence from the section "Early sailing vessels."

As design and construction improved, ships grew larger — first in order to accommodate guns and powder, later to carry goods for trade and the provisions needed for long voyages.

Which two words or phrases could BEST replace "accommodate" and "provisions" in the sentence above?

(A) get used to; furnishings

(B) make room for; supplies

(C) receive; good conditions

(D) assist; large donations

4 Read the selection from the section "Early sailing vessels."

In the 1400s, many different factors came together, and the result was explosive. Beginning around 1400, Spain conquered the Canary Islands and slaughtered the native peoples. In 1418, Prince Henry the Navigator of Portugal began sending expeditions farther and farther down the west coast of Africa. By 1432, the Portuguese colonized the Azores. Within thirty years they had reached Guinea and begun settling on the Cape Verde Islands.

Why did the author use the word "explosive" in the first sentence?

(A) to suggest that explorers faced many dangers during their journeys

(B) to convey the widespread violence of the explorers

(C) to suggest that ships carried a lot of gunpowder

(D) to convey the numerous and far-reaching consequences of exploration

The thrill of time travel

By Ellen Seiden, Dig Magazine, adapted by Newsela staff on 12.12.17
Word Count **904**
Level **MAX**

Image 1: People are fascinated by the idea of traveling through time. Many movies, books and TV shows have explored what it might be like to do so. This poster was made for a movie that came out in 1960 based on the book "The Time Machine" by H.G. Wells which was published in 1895. Photo from: Movie Poster Image Art/Getty Images

What if, instead of moving from the past to the present to the future, we could manipulate time, so that we could jump, loop and travel through it in a machine, wherever and whenever we pleased?

What if we could witness historic wonders, change decisions and see people from our past? What if we could right wrongs, stop wars and bring back future cures for illnesses?

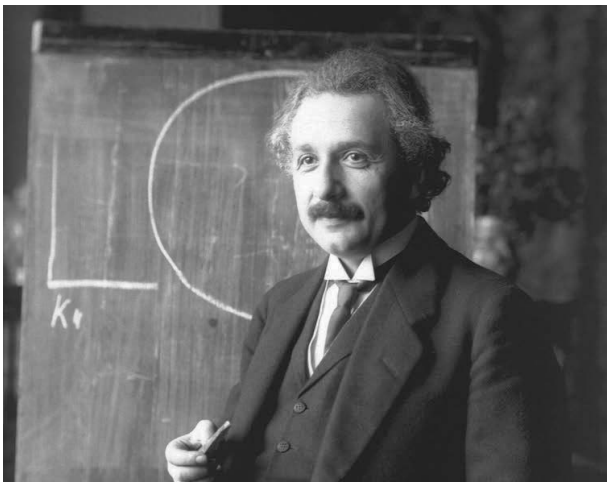
The mysterious puzzle about time's boundaries has kept philosophers debating its nature for centuries. Science fiction writers such as H.G. Wells, who wrote the 1895 novel "The Time Machine," have plotted it backwards and forwards into wildly imaginative stories. And some physicists have even attempted mathematical equations to make the dream of time travel a reality.

Time Travel Speculation

The 20th-century physicist Albert Einstein said that time and space are one. He called it "spacetime." According to Einstein, there are three dimensions in space — height, depth and breadth. A fellow scientist, Hermann Minkowski, added time as a fourth.

Einstein introduced two ideas upon which speculation about the possibility of the theory of time travel is based. The first involves relativity. Here, travel, aided by gravity, involves curved space, which causes time to twist. The second focuses on special relativity. Gravity is not involved in this theory. Rather, a traveler goes super-fast through flat spacetime into the future. A clock is onboard while the traveler is in motion, and it slows time down. Einstein considered time "relative" because, as it passes, it is measured mathematically according to wherever we are positioned on Earth or in space.

What You Can And Can't Do With Time Travel



American science fiction writer Ray Cummings wrote in his 1921 novel titled "The Time Professor" that "time is nature's way of keeping everything from happening at once." Other science-fiction writers have addressed the concept of time, and there appears to be a consensus among them about the following:

No known rules of physics prevent time travel.

You cannot change or alter the past; you can only discuss it.

You cannot go faster than the speed of light (186,000 miles per second) and survive.

A rocket ship or time machine (mass) with a human inside would take tons of energy (force) to plunge through time.

You cannot travel back to a time before the time machine was created.

To time travel, you must change your position in time and space or the machine will run into itself.

Every rule has exceptions!

The Paradoxes

According to renowned English physicist Stephen Hawking, a time machine will never be built. He affirms his belief with the statement: If such a creation were possible, then "why haven't we been invaded by hordes of travelers from the future?"

Just think: If you could go back in time, your presence in the past could cause events to go out of whack, creating questions and chaos. Suppose that while traveling back, you accidentally kill an ancestor. Does that mean you will not be born? According to people who believe in "multi-dimensional worlds," this and other time travel-related paradoxes can be avoided. These people say that when a person travels to the past, the universe immediately splits into other worlds, which are similar, but not exactly the same. They argue that nothing will change for those who travel back to the past and do not touch or alter anything.

With Science Fiction, No Limits

The first known science fiction story with this theme, "The Clock That Went Backward," by Edward P. Mitchell, was published in 1881. 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.

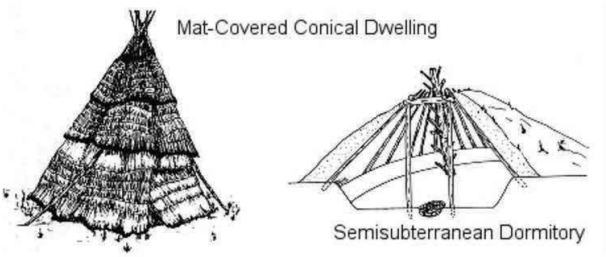
The Nez Perce diet also included wild berries. Huckleberries, cousins of the blueberry, grew low to the ground in the mountains. They were used in jams, jellies and pies. Along with a few other local berries, they were often also used by the Nez Perce to make a dish called pemmican.

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.

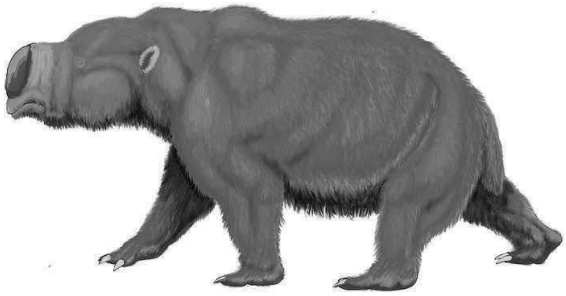
Mysteriously, many of them died off.

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

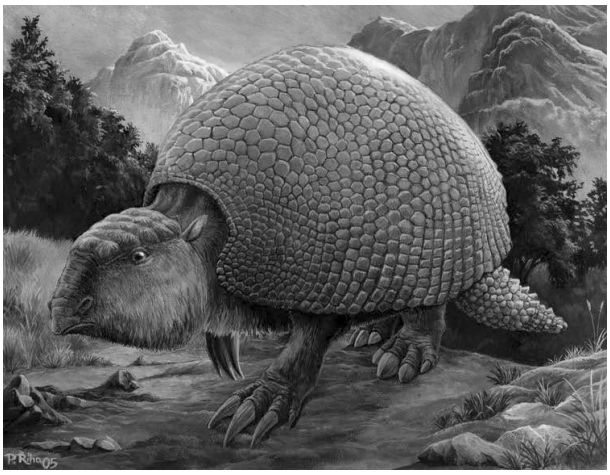
Before, we thought the megafauna died off almost immediately after humans arrived. Now, it might be that humans first spread out across Australia. They ate whatever they came across and transformed the environment. "It's undeniable that humans are preying on some of these large animals," says Miller.

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.

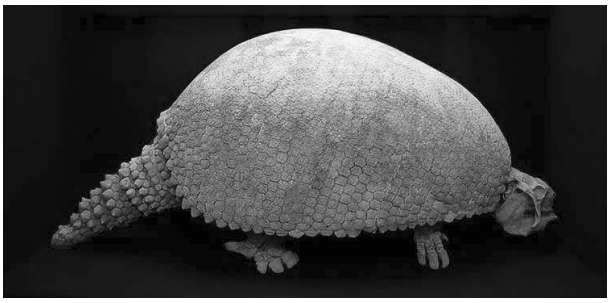
Some argue that just because a spearhead was found in the same location as a mammoth, it doesn't mean humans killed it. They could've just been scavenging its meat. And then there's the fact that plenty of other species—from short-faced bears to huge armadillos—have no evidence of humans hunting them.

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

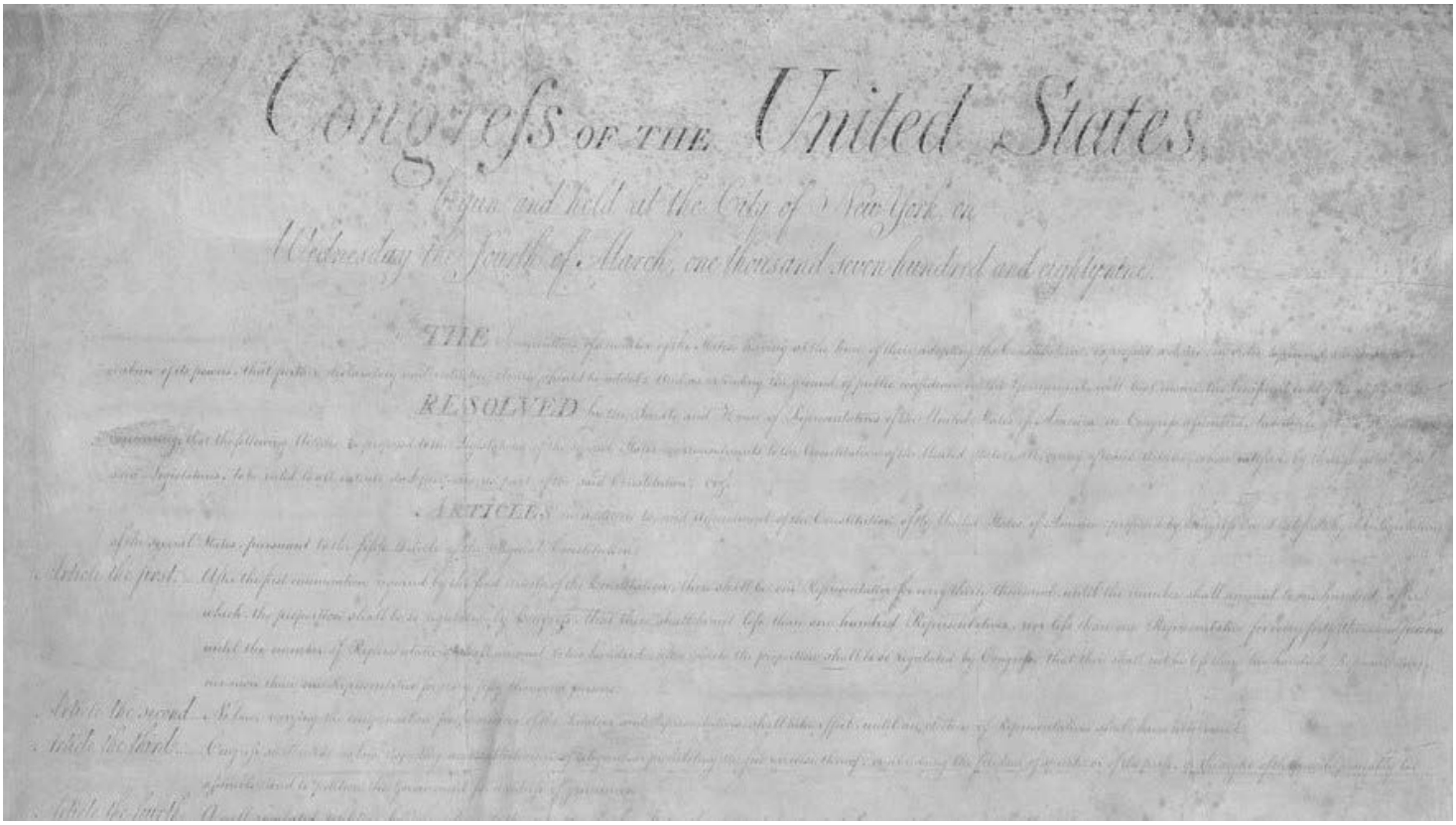
(B) by showing trade was an important part of farming in Greece

(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.

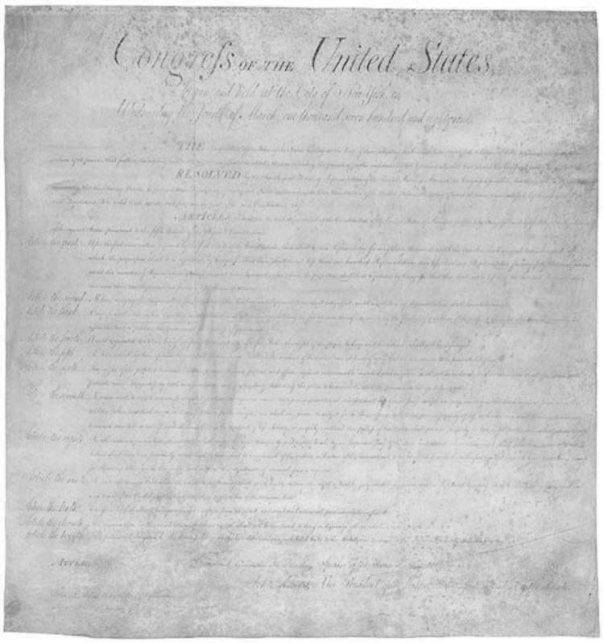
Amendment IX

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 impartial jury." 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.

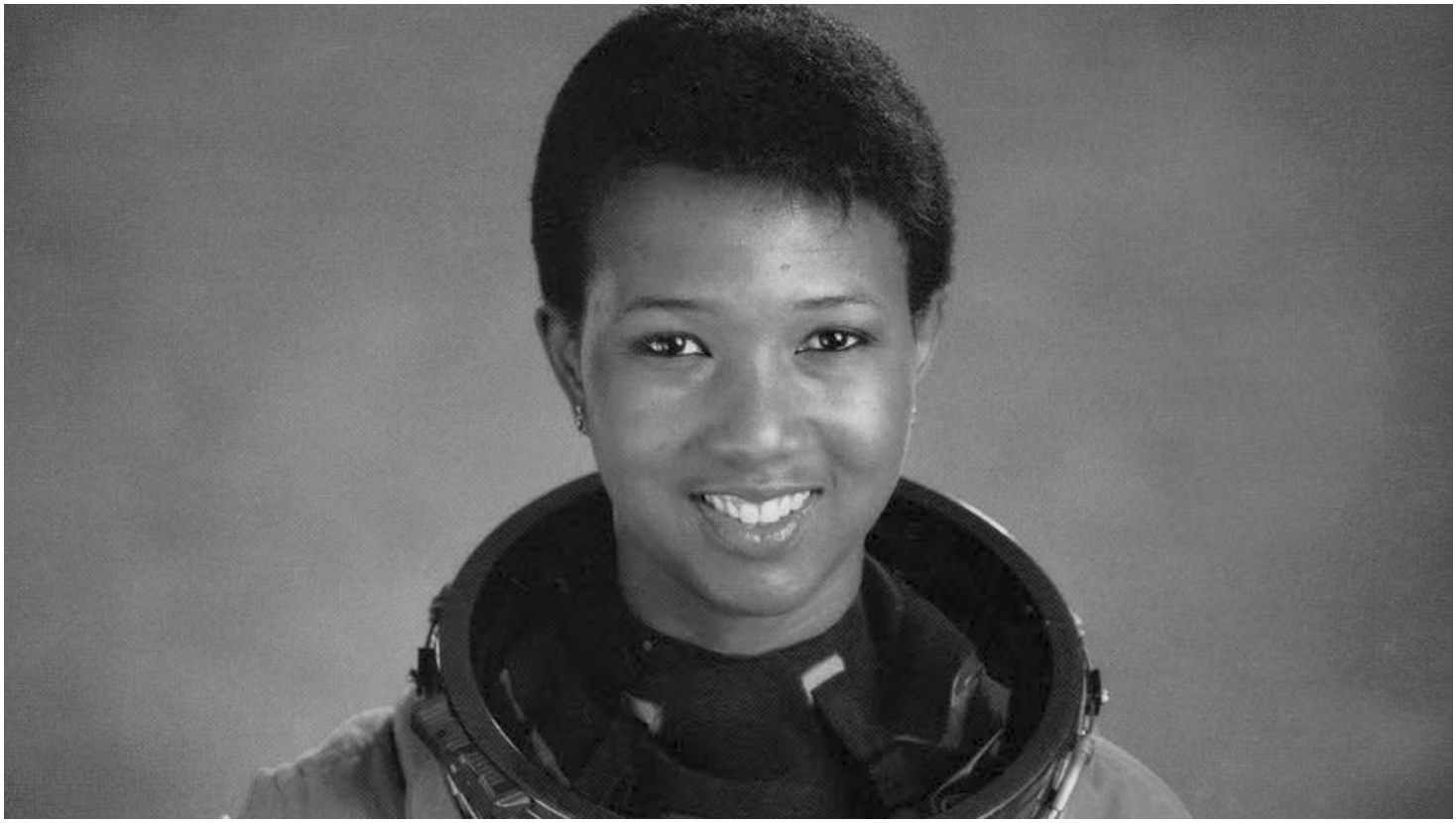
Later Years And Death

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

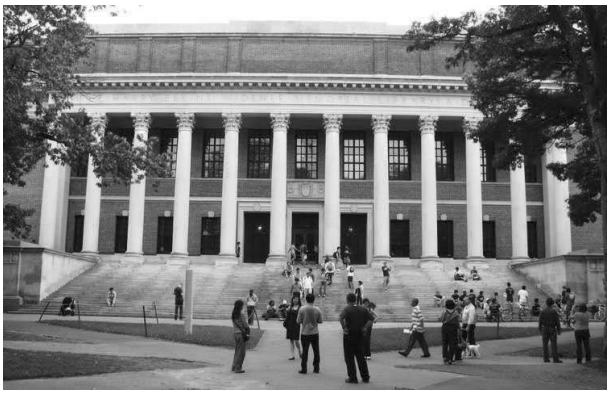
There are many different types of colleges and universities. The options after high school can seem overwhelming. To help you figure out which colleges or career schools might be best for you, here is a list of the main types of schools and the average time it takes students to graduate.

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