ELA
Grade 7
Covers week of May 4th –
week of June 16th
ELA
Grade 7
Pencil-Paper Packet
Please follow the table below to ensure that you complete all of the assignments on time.

<table>
<thead>
<tr>
<th>Session Dates</th>
<th>Paper/ Pencil</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sessions 1 - 3</td>
<td>Read <em>The Triangle Factory Fire</em> and <em>Song of the Shirt</em></td>
<td>Complete <em>Comparing Texts Reading Guide</em></td>
</tr>
<tr>
<td>May 6 - 13</td>
<td></td>
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</tr>
<tr>
<td>Sessions 4 &amp; 5</td>
<td>Read <em>What's the Author's Purpose</em></td>
<td>Complete <em>Author's Purpose-Practice</em></td>
</tr>
<tr>
<td>May 14 - 19</td>
<td></td>
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<tr>
<td>Session 6</td>
<td>Complete <em>Comparing Text</em> Writing Assignment</td>
<td></td>
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<tr>
<td>May 20 - 21</td>
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<tr>
<td>Session 7</td>
<td>Complete <em>Letter to the Editor</em> Writing Assignment</td>
<td></td>
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<tr>
<td>May 22 - 26</td>
<td></td>
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<tr>
<td>Session 8</td>
<td>Review <em>Mood Words</em> paper and add two of your own words to each box</td>
<td>Complete the <em>Mood Story</em> Writing Assignment</td>
</tr>
<tr>
<td>May 27 - 28</td>
<td></td>
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<tr>
<td>Session 9</td>
<td>Read <em>Theme</em> document</td>
<td>Complete Theme assignment</td>
</tr>
<tr>
<td>May 29 - June 1</td>
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<tr>
<td>Session 10</td>
<td>Read <em>Text Evidence</em> document</td>
<td>Complete Text Evidence assignment</td>
</tr>
<tr>
<td>June 3 - 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Session 11</td>
<td>Read <em>Determining Point of View</em></td>
<td>Complete assignments in packet</td>
</tr>
<tr>
<td>June 5 &amp; 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Session 12</td>
<td>Read <em>Analyzing Point of View</em></td>
<td>Complete assignments in packet</td>
</tr>
<tr>
<td>June 9 &amp; 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Session 13</td>
<td>Read <em>Comparing and Contrasting Text</em></td>
<td>Complete assignments in packet</td>
</tr>
<tr>
<td>June 11 &amp; 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Session 14</td>
<td>Read <em>Comparing and Contrasting Genres</em></td>
<td>Complete assignments in packet</td>
</tr>
<tr>
<td>June 15 &amp; 16</td>
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</tbody>
</table>
COMPARE ANCHOR TEXTS

Background An event can be so dramatic and so haunting that it compels the generations that follow it to dissect its details and to trace its impact. A deadly disaster occurred in New York City in 1911 at a company in the ten-story Asch Building. Known today as the Brown Building, it is now a National Historic Landmark. These early writings are detailed accounts of what happened and the long-term effects.

The Triangle Factory Fire

from Flesh & Blood So Cheap: The Triangle Fire and Its Legacy
History Writing by Albert Marrin

Albert Marrin in the 1930s taught social studies in a junior high school and then became a college teacher. But he realized that he missed telling stories as he had as a teacher. That's when Marrin decided to write history for young adults. He has now produced more than thirty nonfiction books, for which he has won numerous awards.

from The Story of the Triangle Factory Fire
History Writing by Zachary Kent

Zachary Kent is the author of over fifty books for young readers. He writes primarily about history and has written biographies of various noted figures, including Abraham Lincoln and Charles Lindbergh.

SETTING A PURPOSE. As you read, think about how each writer presents information on the same event. How are the pieces similar? How are they different? Write down any questions you have while reading.
get their coats and hats. They looked forward to Sunday and family visits, boyfriends, dances, and nickelodeons. Although they had no inkling of what was about to happen, many had only minutes to live.

We will never know for sure what started the Triangle Fire. Most likely, a cutter flicked a hot ash or tossed a live cigarette butt into a scrap bin. Whatever the cause, survivors said the first sign of trouble was smoke pouring from beneath a cutting table.

Cutters flung buckets of water at the smoking spot, without effect. Flames shot up, igniting the line of hanging paper patterns. "They began to fall on the layers of thin goods underneath them," recalled cutter Max Rothen. "Every time another piece dropped, light scraps of burning fabric began to fly around the room. They came down on the other tables and they fell on the machines. Then the line broke and the whole string of burning patterns fell down." A foreman ran for the hose on the stairway wall. Nothing! No water came. The hose had not been connected to the standpipe. Seconds later, the fire leaped out of control.

Yet help was already on the way. At exactly 4:45 p.m., someone pulled the eighth-floor fire alarm. In less than two minutes, the horse-drawn vehicles of Engine Company 72 arrived from a firehouse six blocks away. The moment they arrived, the firefighters unloaded their equipment and prepared to swing into action. As they did, the area pumping station raised water pressure in the hydrants near the Asch Building. Other units soon arrived from across the Lower East Side with more equipment.

Meanwhile, workers on the eighth floor rang furiously for the two passenger elevators. Safety experts have always advised against using elevators in a fire. Heat can easily damage their machinery, leaving trapped passengers dangling in space, to burn or suffocate. Despite the danger, the operators made several trips, saving scores of workers before heat bent the elevators' tracks and put them out of action.

Those who could not board elevators rushed the stairway door. They caused a pileup, so that those in front could not open the door. Whenever someone tried to get it open, the crowd pinned her against it. "All the girls were falling on me
the firemen cutting their way into the elevator shaft, and they came and let me out."

Those who reached the ninth-floor stairway door found it locked. This was not unusual, as employers often locked doors to discourage latecomers and keep out union organizers. "My God. I am lost!" cried Margaret Schwartz as her hair caught fire. Nobody who went to that door survived, nor any who reached the windows.

With a wave of fire rolling across the room, workers rushed to the windows, only to meet more fire. Hot air expands. Unless it escapes, pressure will keep building, eventually blowing a hole even in a heavy iron container like a boiler. Heat and pressure blew out the eighth-floor windows. Firefighters call the result "lapping in"—that is, sucking flames into open windows above. That is why you see black scorch marks on the wall above the window of a burnt-out room.

With fire advancing from behind and flames rising before them, people knew they were doomed. Whatever they did meant certain death. By remaining in the room, they chose death by fire or suffocation. Jumping ninety-five feet to the ground meant death on the sidewalk. We cannot know what passed through the minds of those who decided to jump. Yet
I saw every feature of the tragedy visible from outside the building. I learned a new sound—a more horrible sound than any description can picture. It was the sound of a speeding, living body on a stone sidewalk.

Thud—dead, thud—dead, thud—dead, thud—dead.

Sixty-two thud—dead. I call them that, because the sound and the thought of death came to me each time, at the same instant. . . . Down came the bodies in a shower, burning, smoking—flaming bodies, with the disheveled hair trailing upward. . . .

On the sidewalk lay heaps of broken bodies.

A policeman later went about with tags, which he fastened with wires to the wrists of the dead girls. . . . The floods of water from the firemen’s hose that ran into the gutter was actually stained red with blood.

Onlookers saw many dreadful sights, none more so than the end of a love affair. A young man appeared at a window. Gently, he helped a young woman step onto the windowsill, held her away from the building—and let go. He helped another young woman onto the windowsill. “Those of us who were looking saw her put her arms around him and kiss him,” Shepherd wrote. “Then he held her out into space and dropped her. But quick as a flash he was on the windowsill himself. . . . He was brave enough to help the girl he loved to a quicker death, after she had given him a goodbye kiss.”

Meanwhile, others managed to reach the fire escape. It had not been designed for a quick exit. FDNY smoke experts later declared that those on the third top floors of the Asch Building could not have made it to the ground in under three hours. In reality, they had only minutes.

People crowded onto the fire escape. As they walked single file, flames lapped at them through broken windows. Worse, the human load became too heavy for the device to bear. Bolts that fastened it to the building became loose. It began to sway, then collapsed at the eighth floor, tumbling dozens into the courtyard. “As the fire-crazed victims were thrown by the collapse of the fire escape, several struck the sharp-tipped palings,” the New York Herald reported. “The body of one woman was found with several iron spikes driven
"The Song of the Shirt"

Thomas Hood (1799-1845)

With fingers weary and worn,
With eyelids heavy and red,
A woman sat, in unwomanly rags,
Plying her needle and thread —
Stitch! stitch! stitch!
In poverty, hunger, and dirt,
And still with a voice of dolorous pitch
She sang the "Song of the Shirt."

"Work! work! work!"
While the cock is crowing aloof! 10
And work — work — work,
Till the stars shine through the roof!
It's Oh! to be a slave
Along with the barbarous Turk,
Where woman has never a soul to save,* 20 * [A reflection of Hood's conception of Islam.]
If this is Christian work!

"Work — work — work,
Till the brain begins to swim;
Work — work — work,
Till the eyes are heavy and dim!
Seam, and gusset, * and band, 20 * [cloth inserted to strengthen or widen a
garment.]
Band, and gusset, and seam,
Till over the buttons I fall asleep,
And sew them on in a dream!

"Oh, Men, with Sisters dear!
Oh, men, with Mothers and Wives!
It is not linen you're wearing out,
But human creatures' lives!
Stitch — stitch — stitch,
In poverty, hunger and dirt,
Sewing at once, with a double thread,
A Shroud as well as a Shirt.

"But why do I talk of Death?
That Phantom of grisly bone,
I hardly fear its terrible shape,
It seems so like my own —
But only time for Grief!
A little weeping would ease my heart,
But in their briny bed
My tears must stop, for every drop
Hinders needle and thread!"  

With fingers weary and worn,
With eyelids heavy and red,
A woman sat in unwomanly rags,
Plying her needle and thread —

Stitch! stitch! stitch!
In poverty, hunger, and dirt,
And still with a voice of dolorous pitch, —
Would that its tone could reach the Rich! —
She sang this "Song of the Shirt!"
Compare Texts - Reading Guide

Vocabulary

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
<th>Answers to Page 281 - Critical Vocab</th>
</tr>
</thead>
<tbody>
<tr>
<td>flammable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>reign</td>
<td></td>
<td></td>
</tr>
<tr>
<td>portable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>inspection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>corridor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>enact</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Page 266-267

1. What were the dangers on each floor? Use your words and their words.

<table>
<thead>
<tr>
<th>Floor</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>8th</td>
<td></td>
</tr>
<tr>
<td>9th</td>
<td></td>
</tr>
<tr>
<td>10th</td>
<td></td>
</tr>
</tbody>
</table>

2. A history author’s point of view may be subjective at times, revealing the author’s opinions and beliefs. This may be done through the author’s word choice and through the details the author emphasizes.

3. Reread lines 89–96. Cite especially vivid descriptive details and explain why the author includes those details.

<table>
<thead>
<tr>
<th>Details from the story</th>
<th>Why the author included them:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Notice that the author is using quotations from survivors to support his main ideas. What do Mary Bucelli’s words in lines 100-104 reveal about the situation?

5. Note: An author’s perspective is the combination of ideas, feelings, values, and beliefs that influence the way the author presents information.
Hmmmm... Using the two texts, answer the essential question: How can we analyze how two or more authors writing about the same topic shape their presentations of key information by emphasizing different evidence or advancing different interpretations of facts?
What is The Author's Purpose?

By Kelly Roell
Updated May 24, 2018

Here's your heads up for the day: most standardized tests have a reading comprehension section. I'm fairly certain you knew that, but in case you didn't, you're welcome. What you may not have known is that in most reading comprehension sections, you will be called upon to answer questions about the author's purpose, along with other concepts like main idea, vocabulary in context, inferences and more. If you have no idea what author's purpose means you're going to have a hard time finding it, huh? I thought so. Take a peek below to read a little more about this reading skill and how you can find it in those long reading passages on standardized tests.

Author's Purpose Practice

Author's Purpose Basics

The author's purpose is basically the reason he or she chose to act in a particular way, whether that's writing the passage, selecting a phrase, using a word, etc. It differs from the main idea in that author's purpose not the point you're supposed to get or understand; rather, it's the why behind why the author picked up a pen or selected those words in the first place. It can be difficult to determine because, after all, you may not be inside the mind if the writer. You may not actually know why she or he chose to include a particular phrase or idea. The good news? The majority of author's purpose questions will come in multiple choice format. So you won't have to come up with the reason for an author's behavior. You'll just need to select the best choice.

If you're trying to determine the author's purpose on a standardized test, your question may look a little something like this:

1. The author most likely mentions the Depression in lines 33 - 34 to:
   A. identify the primary purpose for Social Security.
   B. criticize FDR's adoption of a program that would run out of money.
   C. contrast the effectiveness of the Social Security Program with that of family care.
   D. list another factor that contributed to the need for the Social Security Program.

Author's Purpose Key Words
Author’s Purpose: practice

Part 1: Read each of the passages below and select the best answer

In 1872, Elijah McCoy, an engineer from Canada, invented a way to keep the moving parts of train cars constantly oiled. As a result, trains did not have to stop every few miles for oiling. Soon, no machine was considered any good unless it had one of McCoy’s oil cups. To be sure they got a good train, engineers began saying they wanted “the real McCoy.” In time, the phrase came to mean “the real thing.”

The Author’s main purpose for writing this passage is to
a) Entertain the reader with a story about Elijah McCoy.
b) Inform the reader about how Elijah McCoy grew up in Canada.
c) Inform the reader about how Elijah McCoy made trains better by creating oil cups.
d) Persuade the reader that Elijah McCoy’s oil cups were the best cups to use.

George Washington, the first President of the United States, took office in 1789. The first president to live in the White House, however, was John Adams. He and his wife Abigail moved there in 1800. Since then, technology has changed the lives of presidents. In 1833, Andrew Jackson was the first president to ride on a train. James Polk was the first president to be photographed in 1849. Benjamin Harrison was the first president to have electricity in the White House in 1891. Presidential firsts also relate to advances in communications. In 1993, William Clinton was the first president to have e-mail in the White House. In 1955, Dwight Eisenhower was the first president to appear on color TV. The first president to make a radio broadcast from the White House was Calvin Coolidge in 1925.

What is the author’s purpose for writing this passage?
 a) Persuade the reader that U.S. Presidents were special people.
b) Inform the reader about different presidential firsts.
c) Persuade the reader that Presidents get to do a lot of fun things.
d) Inform the reader about Dwight D. Eisenhower and how he was the first president to appear on TV.

As the spaceship raced toward Earth, my heart pounded. Never before had I seen the planet of our forefathers. This was the place that they had left when they started the colony on Pluto. That was long before they came to Star System XPA. The mother
**Part 2:** Now compose an original example of each

<table>
<thead>
<tr>
<th>Persuade the reader:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entertain the reader:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inform the reader:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
You will compose an answer to the prompt below. Refer to the rubric.

You've now read two accounts of a disaster that occurred a century ago. What did you think as you were reading? Consider addressing: Why is it important to read about disasters from the past? If a similar fire were to start in a garment factory of today, how might the events be the same and/or different? How did you feel as you were reading?

Include details from the text to support your ideas.

Criteria | Grading Scale
---|---
**LA.7.CCSS.ELA-Literacy.W.7.2b** | 4 Excellent use of "My words/Their words" strategy! Many examples included. 3 Good use of "My words/Their words" strategy! 2 Satisfactory use of "My words/Their words" strategy. 1 Needs Improvement in the use of "My words/Their words" strategy.

**L.7.2 Grammar**
Students use proper grammar, punctuation, and capitalization. Proofread for spelling.

4 Excellent! There are no errors! 3 Good There are 1-2 errors. 2 Satisfactory There are 3-4 errors. 1 Needs Improvement There are 5 or more errors. Please proofread!

Jot down your answer here. Use your words and use words from the text to justify your answer. Next, proofread it.
Prompt:

Imagine that you were a resident of New York City at the time of the Triangle Shirtwaist Factory fire. You have thought about the tragedy and have come to the conclusion that the tragedy was preventable and was rooted in injustice.

Write an editorial calling for improvements regarding the treatment of workers in the garment industry in the early 1900’s. Use the articles we read. Think: Will your letter be objective or subjective? Which will garner the most support from the readers?

In the space below, please write your response. Remember to include the following: Your

- First person Point of View (resident of New York)
- Provide details from the two articles
- Use proper grammar and mechanics

Dear Editor,
Mood Words

**Mood** is the feeling the reader gets from a work of literature. There are many different words you can use to describe the mood of a piece of writing. Here are some to get you started. They are organized into groups of words with similar meanings. Turn on your brain and add two of your own words to each box. Think!

<table>
<thead>
<tr>
<th>ANGRY</th>
<th>HAPPY</th>
<th>BORING</th>
</tr>
</thead>
<tbody>
<tr>
<td>aggravated, enraged,</td>
<td>content, joyful,</td>
<td>dreary, dull, uneventful,</td>
</tr>
<tr>
<td>hostile, irate, violent</td>
<td>delighted, ecstatic,</td>
<td>tiring, tired, dull</td>
</tr>
<tr>
<td>mad, temper</td>
<td>elated, excited, joyous</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CALM</th>
<th>SCARY</th>
<th>SAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>quiet, serene, tranquil</td>
<td>creepy, nightmarish,</td>
<td>depressed, melancholy,</td>
</tr>
<tr>
<td>mellow, harmonious,</td>
<td>spooky, haunting,</td>
<td>mournful, tragic, gloomy,</td>
</tr>
<tr>
<td>cool, lowkey</td>
<td>threatening, blood</td>
<td>bitter, heartbroken</td>
</tr>
<tr>
<td></td>
<td>boiling, horrifying</td>
<td></td>
</tr>
</tbody>
</table>
Mood Story

Take a look at the man and the woman at the table to the right. What are they thinking about, and how do they feel? Write a story in which one of these two people is your main character.

Photo credit: AP/Bebeto Matthews

https://portal.achieve3000.com/article/?id=8717
Theme

Definition of Theme
Theme is defined as a main idea or an underlying meaning of a literary work, which may be stated directly or indirectly.

Major and Minor Themes
Major and minor themes are two types of themes that appear in literary works. A major theme is an idea that a writer repeats in his literary work, making it the most significant idea in the work. A minor theme, on the other hand, refers to an idea that appears in a work briefly, giving way to another minor theme. Examples of theme in Jane Austen’s “Pride and Prejudice” are matrimony, love, friendship, and affection. The whole narrative revolves around the major theme of matrimony. Its minor themes are love, friendship, affectation etc.

Difference Between a Theme and a Subject
It is important not to confuse a theme of a literary work with its subject. Subject is a topic that acts as a foundation for a literary work, while a theme is an opinion expressed on the subject. For example, a writer may choose a subject of war for his story, and the theme may be his personal opinion that war is a curse for humanity. Usually, it is up to the readers to explore the theme of a literary work by analyzing characters, plot, and other literary devices.

Presentation of Themes
A writer presents themes in a literary work through several means. A writer may express a theme through the feelings of his main character about the subject he has chosen to write about. Similarly, themes are presented through thoughts and conversations of different characters. Moreover, the experiences of the main character in the course of a literary work give us an idea about its theme. Finally, the actions and events taking place in a narrative are consequential in determining its theme.

Short Examples of Theme
1. When the astronaut landed on the moon, he felt loneliness. Thinking there was no one else; he became a little forlorned, though the view of Earth was stunningly beautiful.  
   (Theme of lonesomeness)
2. The space travelers were travelling to the moon, when their spaceship suddenly ran out of fuel. They were all frightened to learn that they wouldn't be able to return to Earth, and could only land on the moon.  
   (Theme of fear)
3. The bus was travelling at a great speed when it was stopped by a gang of robbers. The passengers were ordered to get out, leaving their precious belongings in the bus.  
   (Theme of fear)
4. Their marriage ceremony was taking place in a grand hotel. All the eminent people of the city were invited, the reason that the celebration was excellent.  
   (Theme of happiness)
5. As soon as the clock struck 12 at noon, the jubilations started. It travelled from East to West on the first day of the year.  
   (Theme of felicitation)
6. The religious leader was leading a huge congregation of followers, praying with utmost humility.  
   (Theme of religiosity)

https://literarydevices.net/theme/
• Crime and Mystery Themes
  - Crime and mystery are utilized in detective novels. Such narratives also include sub-themes, such as "crimes cannot be hidden," "evil is always punished," and others. Some well-known crime and mystery theme examples include:
    - The Murders in the Rue Morgue by Edgar Allan Poe
    - Sherlock Holmes by Arthur Conan Doyle
    - Bleak House by Charles Dickens
    - Murder on the Orient Express by Agatha Christie
    - Da Vinci Code by Dan Brown

• Revenge Theme
  - Revenge is another recurrent theme found in many popular literary works. A character comes across certain circumstances that make him aware of his need for revenge. The outcome of his action is often bitter, but sometimes they may end up being satisfied. Examples are:
    - Hamlet and Macbeth by William Shakespeare
    - The Count of Monte Cristo by Alexandre Dumas
    - The Girl Who Kicked the Hornet's Nest by Stieg Larsson
    - A Time to Kill by John Grisham

Function of Theme
Theme is an element of a story that binds together various essential elements of a narrative. It is often a truth that exhibits universality, and stands true for people of all cultures. Theme gives readers better understanding of the main character's conflicts, experiences, discoveries, and emotions as they are derived from them. Through themes, a writer tries to give his readers an insight into how the world works, or how he or she views human life.

Your Turn:
In the boxes below, please list books, movies, or songs and identify the theme in each.

<table>
<thead>
<tr>
<th>Title</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</tbody>
</table>

https://literarydevices.net/theme/
Read the following short passages. Using Text Evidence, respond to the following prompts.

Angela swept her hair back and shrugged. "Nope," she squealed to her brother. Tommy, Angela's brother, pouted and ran back into his room. When he returned he had added another dollar to his offer and pushed the money toward Angela. "No, Tommy," Angela screamed, "I don't care how much you offer me!" Tommy frowned and trudged back to his room. He looked at the huge diagonal piece of glass missing in the window. He dropped the money back into his wallet and plopped on his bed.

1. Based on the passage, what do you think Tommy is trying to accomplish?

Claim? Write down your response to question 1.

Text Evidence? What textual support backs up your claim?

Put it together. Write a short response to the question. Cite the text.
Lesson 11 Part 1: Introduction
Determining Point of View

Look at a photo or a picture of an event, and you can usually figure out the feelings and attitudes of the people involved. Actions, body language, and other clues give away each person’s point of view about what’s happening.

Can you figure out the feelings of the people watching the parade in the picture below? Circle clues that help you figure out their points of view.

Read the chart below, which provides details that suggest different points of view about the parade scene.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Evidence</th>
<th>Positive (+) or Negative (−) Attitude</th>
<th>Point of View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parade</td>
<td>The woman is smiling. The man in the baseball cap is waving a flag.</td>
<td>+</td>
<td>The man and woman are excited and happy to be watching the parade.</td>
</tr>
<tr>
<td></td>
<td>The child is frowning and holding his ears.</td>
<td>−</td>
<td>The child dislikes the noise from the parade.</td>
</tr>
</tbody>
</table>

When you’re reading a book or magazine, you must use different clues to help you determine the author’s point of view. Notice the content and language choices; they’ll help you infer an author’s position on a topic. Also look for clues that reflect an author’s purpose, or main reason for writing, and the tone being adopted. Analyze facts an author includes and leaves out, the opinions expressed, and word choices. All of these details help reveal the author’s point of view—where he or she stands—on a particular topic.
Continue reading the account about Mount St. Helens. Then answer the question that follows.

Close Reading
Think about the author's point of view on page 104. Then circle the phrase that signals a shift in attitude in this part of the account. Think about why the author may have made this kind of shift.

(continued from page 104)

From a scientific perspective, however, the eruption was an exciting event. Ecologist Charlie Crisafulli points out that the volcanic devastation at Mount St. Helens provides insight into the reawakening of ecosystems. "It's the most thoroughly studied large-forest disturbance in the world," claims Crisafulli.

The blast zone, once barren and uninhabitable, is gradually becoming fertile ground for growing numbers of plant and animal life. Like the mythical phoenix, the blast zone is rising from the ashes, reborn and very much alive. The spectacular event shocked and amazed many. Nature's ability to heal herself, however, is even more awe-inspiring.

Hint
The different attitudes expressed in the account support the author's purpose for writing. Which answer choice best explains why the author presents different points of view?

Circle the correct answer.
Which sentence most accurately describes the author's purpose for writing this account?

A The author's purpose is to persuade readers to agree that the Mount St. Helens eruption was a horrible disaster.
B The author's purpose is to tell the frightening yet exciting story of the Mount St. Helens eruption.
C The author's purpose is to show readers that even this terrifying natural disaster has had some benefits.
D The author's purpose is to convince readers to research the Mount St. Helens eruption.

Show Your Thinking
Using text evidence, explain the author's point of view about the Mount St. Helens eruption.

With a partner, discuss the different viewpoints in the account and explain which view is strongest.
Hints

How does the author describe BP? Look for words that describe the company’s actions.

Look for quotes in the text that describe the BP executives’ position on deep-water drilling. How well do their statements reflect what actually happened?

Look back at the words and phrases you circled in the editorial that show the author’s strong feelings and beliefs.

Use the Hints on this page to help you answer the questions.

1. Which sentence most accurately summarizes the author’s point of view in the editorial?
   A. The explosion leaked millions of barrels of oil into the Gulf Coast, but BP responded quickly and responsibly.
   B. The oil spill disaster was a result of BP’s thoughtless actions and its refusal to listen to experts.
   C. The rig explosion is a tragedy, but events like this are a problem that the oil industry can learn how to control.
   D. BP has been drilling safely in the Gulf of Mexico for over fifty years, and one accident should not be held against the company.

2. Why does the author of the editorial include statements made by the BP oil executives?
   A. to show the contrast between the evidence and the company’s official position
   B. to emphasize that the oil company executives are truthful but unimaginative
   C. to explain why BP’s actions were understandable
   D. to defend the company’s actions both before and after the deep water oil spill

3. Think about the author’s attitude toward the oil spill. Then explain the author’s purpose, or reason for writing this editorial. Use at least two details from the text to support your answer.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
**People Problems**

12 Oceans can't take all of the blame for the impact of today's drought, Dohrenwend says.

13 Although ocean temperatures may be an important factor in starting a drought, people are making the problem of water shortages much worse. Dohrenwend notes that cities are growing faster in the southwest than anywhere else in the country. And people keep pouring in.

14 "Many of these people are retired persons who lived in the northeast or northwest and want to get out of the cold," Dohrenwend says. It's hard for them to adjust to using less water than they're used to, he adds, and they don't want to let go of their golf courses, green lawns, or long showers.

15 "Over time, more and more water has to be allocated to people moving in and less goes to everything else," Dohrenwend says.

16 Ironically, as the drought continues, the cycle feeds on itself. Ranchers go out of business because they don't have enough water to grow alfalfa for their cattle. Then developers arrive and build more homes. As more people move in, the demand for water continues to grow—even as the supply of water rapidly dwindles.

**How Long?**

17 It's impossible to know how long this drought will last, and some scientists are beginning to fear the worst.

---

**Answer Form**

1 A B C D

2 A B C D

3 A B C D

**Number Correct** / 3

---

1. Read these two sentences.

Some people believe that droughts are the fault of nature, which we can't control. These people say that Earth has always experienced water shortages and that we do not need to worry about the issue.

How does the author of "A Dire Shortage of Water" reveal a point of view that differs from the statement above?

A She mentions recent scientific discoveries about ocean temperatures, global climate, and drought.

B She refers to historical records of droughts in the western part of the United States.

C She explains that ocean temperatures cause drought, but human settlements make the problem worse.

D She reports that the rate of water flow in the Colorado River Basin has decreased to about one-third of its original rate.
Roiler coasters aren't for everyone. You might love the thrills, but your friend keeps her eyes closed the whole time! Each of you has your own perspective, or point of view, about the experience.

Stories contain different points of view, too. Sometimes you'll get the point of view of the narrator, or the voice telling the story. At other times you'll get the point of view of one or more characters. By revealing their words, thoughts, feelings, and actions, the author gives you insight into the characters' attitudes about the events and people around them.

**Who are the main characters in the scene below? How would the description of the same event differ if it were told from each character's point of view?**

![Image of a performer on a trapeze with captions]

OK, this next trick is going to be tough.

Wow, he makes it look so easy.

---

Read the chart below. Note how the evidence shows why a contrast exists between the acrobat's point of view about the situation and the audience member's perspective.

<table>
<thead>
<tr>
<th>Character</th>
<th>Evidence</th>
<th>Point of View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acrobat</td>
<td>says next trick will be tough; walking a high tightrope</td>
<td>The routine is very dangerous, and he could fall at any minute.</td>
</tr>
<tr>
<td>Audience Member</td>
<td>smiling, eyes wide, says acrobat makes it look easy</td>
<td>The acrobat seems very talented, and he's in no danger.</td>
</tr>
</tbody>
</table>

The characters in the scene are having two different experiences and would tell different versions of the same story. In other words, how an event is described is directly affected by who is describing it. So by carefully choosing or describing points of view, the author is able to advance the plot and help readers understand the characters' actions and motivations.
Continue reading about the visit to the art museum. Use the Close Reading and the Hint to help you answer the question.

(continued from page 154)

After a few moments, Ramon tried again. “Those still-life pieces were so remarkable. Did you notice how the artists captured the interplay of light and shadow across even such ordinary objects?”

Blanca checked her text messages for the billionth time and muttered angrily, “Sure, I always pay attention to boring stuff like light and shadow when I’m looking at a bowl of fruit.”

“Well, was there anything at the museum that you enjoyed?”

Blanca thought carefully for a moment before flashing her wrist—“I did enjoy the gift shop, because I got this cool watch.”

**Hint**

How does Ramon react to Blanca’s complaints?

**Circle the correct answer.**

Based on evidence from the story, which statement best describes Ramon’s point of view about his sister?

A  He thinks Blanca could be a painter if she paid attention to details.

B  He believes she should admit to knowing that the art is valuable.

C  He hopes to convince her that she can appreciate fine art.

D  He’s not sure that Blanca will ever appreciate expressionism.

**Show Your Thinking**

Citing evidence from the text, describe how the author contrasts Blanca’s point of view from that of her brother.

With a partner, discuss how the contrasting points of view help readers understand the characters’ relationships with one another.
Look at your marked-up text. Then use the Hints on this page to help you complete the graphic organizer and answer the questions.

1. For each character, identify two or more details from the text that support your analysis of each character's point of view.

<table>
<thead>
<tr>
<th>Character</th>
<th>Evidence</th>
<th>Point of View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gessen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sakura</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Which statement best describes Gessen's attitude toward money?
   A. Gessen thinks people should spend money any way they wish.
   B. Gessen believes art is more important than money.
   C. Gessen thinks that money is more important than beauty.
   D. Gessen feels money should be used to help others, not wasted.

3. Citing at least two specific details from the text and the chart above, contrast the points of view of Gessen and Sakura from *The Stingy Artist*.

As you write, think about how Sakura's ignorance of Gessen's motives colors her point of view.
"What is your price?" Wang Lung whispered at last. Well, there were these three children to be fed—the children and the old man. He and his wife could dig themselves graves in the land and lie down in them and sleep. Well, but here were these.

And then one of the men from the city spoke, a man with one eye blind and sunken in his face, and unctuously he said, "My poor man, we will give you a better price than could be got in these times anywhere for the sake of the boy who is starving. We will give you . . ." he paused and then he said harshly, "we will give you a string of a hundred pence for an acre!"

Wang Lung laughed bitterly. "Why, that," he cried, "that is taking my land for a gift. Why, I pay twenty times that when I buy land!"

"Ah, but not when you buy it from men who are starving," said the other man from the city. He was a small, slight fellow with a high thin nose, but his voice came out of him unexpectedly large and coarse and hard.

Wang Lung looked at the three of them. They were sure of him, these men! What will not a man give for his starving children and his old father! The weakness of surrender in him melted into an anger such as he had never known in his life before. He sprang up and at the men as a dog springs at an enemy.

"I shall never sell the land!" he shrieked at them. . . . "I will dig up the fields and feed the earth itself to the children and when they die I will bury them in the land, and I and my wife and my old father, even he, we will die on the land that has given us birth!"

---

**Answer Form**

1. A  B  C  D
2. A  B  C  D
3. A  B  C  D

**Number Correct / 3**

---

1. Look at the chart below.

<table>
<thead>
<tr>
<th>CHARACTER</th>
<th>POINT OF VIEW</th>
<th>EVIDENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wang Lung</td>
<td>upset that he is forced to choose between feeding his family and selling his land</td>
<td></td>
</tr>
</tbody>
</table>

Which sentence from the text best completes the chart?

A. "He did not rise nor in any way recognize the men who had come."
B. "They looked as though they had eaten and blood still ran in their veins."
C. "Well, there were these three children to be fed—the children and the old man."
D. ". . . here they were, come to squeeze his land from him in his extremity."
Imagine that two artists use the same paints to paint a mountain scene. One creates a dark, scary landscape, and the other paints a bright, peaceful place. Even though the artists use the same materials and paint the same subject, their results depend on the effects they want to achieve and the colors they choose to create those effects. In the same way, authors may write about the same topic, but, depending on their purpose, they may choose to focus on different details and evidence. As a result, they produce very different products.

Look at the cartoon below and think about how the characters are reacting to the poster. What if they both decided to write reports about global warming? How might each of them approach the topic?

Read the information in this chart. Which facts do you think each of the two characters would emphasize when writing about global warming?

<table>
<thead>
<tr>
<th>General Facts</th>
<th>Causes of the Problem</th>
<th>Effects on Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Earth’s average temperatures are increasing.</td>
<td>- Fossil-fuel emissions release heat trapping gases into the atmosphere.</td>
<td>- Loss of habitat due to ice melt results in decreasing animal populations.</td>
</tr>
<tr>
<td>- Rising temperatures result in melting of the polar ice caps.</td>
<td>- The additional heat raises local temperatures and, in turn, impacts Earth’s climates.</td>
<td>- Changes in feeding and migration patterns put animals at risk.</td>
</tr>
<tr>
<td>- Polar ice melt causes sea levels to rise.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

While both students would probably use the information in the first column, the girl probably would also use the evidence in the second column, while the boy would focus on facts from the third one. Always keep in mind that an author’s purpose for writing shapes the way he or she presents key information as well as which facts and evidence are emphasized.
Part 3: Guided Instruction

Lesson 18

Read another account about global warming. Use the Close Reading and the Hint to help you complete the chart and then answer the question.

**Close Reading**

The accounts here and on page 180 both tell about global warming, but they use key information differently. **Underline** any facts in this account that are similar to those in the first one. **Star (*)** any unique details. Use this information to complete the chart on the previous page.

**The Side Effects of Warming**  
by Di Garza

Global warming widely impacts both Earth’s climate and the environment as a whole. The Arctic regions, in particular, are suffering due to climate change. Glacial ice is melting at an alarming rate. The amount of ice lost in recent years equals the combined area of Alaska, Texas, and Washington. This change to the Arctic landscape endangers many of the creatures living there. Polar bears, for example, depend on glacial ice. It allows them to travel far from land to open water to find their favorite prey, seals. A decrease in this ice limits the bears’ ability to reach their prey, thus reducing their chance of survival. Only by changing human habits that contribute to climate change, such as the use of fossil fuels, can we stop the harmful effects of global warming on wildlife.

**Hint**

What is the main point that the author of this account wants you to know? How is it different from the first account?

**Circle the correct answer.**

How does the focus of this account differ from the account on page 180?  
A  Instead of telling the cause of global warming, it explains an effect.  
B  Instead of describing one solution, it tells about many possibilities.  
C  Instead of talking about glacial ice, it describes polar bear habits.  
D  Instead of naming climate changes, it warns of future problems.

**Show Your Thinking**

Compare and contrast the key information presented in the two passages. What evidence, if any, do both include? Why has it been presented differently?

______________________________

______________________________

______________________________

______________________________

With a partner, summarize how the author’s purpose in each passage shapes the presentation.
Water for the World  by Lee Epstein

1 The essential ingredients for life are food, water, and shelter. Water, of course, is especially important. Not only do we need to drink it to survive, but we also need it to water our crops and take care of livestock, both of which are primary food sources. Without a ready supply of clean, fresh water, however, these needs cannot be met. As the number of people in our world continues to grow, meeting everyone's water requirements becomes more and more challenging. How can this be, though, if most of Earth's surface is water?

2 Although 70 percent of Earth is covered in water, only a small fraction of that total is fresh water safe for human use. This amount appears even smaller when considering that the population has tripled over the last hundred years or so and our water use has increased six-fold. Not only are there more people, but they are using more water than in the past. In some areas, the supply is dwindling while the demand continues to grow.

3 Given our limited fresh water resources and increased water needs, we must turn to other means of providing adequate water supplies to the 1.1 billion people who currently do not have access to clean, safe water. One popular solution for some areas experiencing water stress or an imbalance between water use and resources is desalination. The process "manufactures" fresh water from seawater.

4 Desalination, or the removal of salt from salt water through reverse osmosis, is not a new idea. The Greeks and Romans were doing it thousands of years ago, one potful of water at a time. Luckily, technology has made the task easier: As of 2009, there were more than 1,400 desalination plants around the world, producing more than 15 billion gallons of usable water per day.

5 Despite our progress in making desalination a viable solution to the water crisis, we still have a long road ahead. Countries must continue to work toward building more desalination plants to keep up with the growing need for fresh water. Only then will our water resources become as limitless as the sea.
Read both scientific articles about endangered fish. Then answer the questions that follow.

from “Big Fish in Troubled Waters”

by Stephen Ornes, Science News for Kids

1. You may have heard the popular saying “there are always more fish in the sea.” But as a number of new studies show, the truth of that statement depends on the kind of fish. Fish populations are changing, and not necessarily for the better.

2. Consider the case of big, predatory fish. These giants, like sharks and cod, devour other, smaller fish. Big fish are an important part of the marine ecosystem—which includes the ocean and all the things living in it—because they keep down the numbers of smaller fish. Without fish that eat other fish, populations of smaller swimmers could swell. More of these smaller fish would devour more plants, leaving less vegetation for other organisms—or for future fish.

3. As fierce and ferocious as predators can be, they’re no match for fishing technology. Many people love to eat predatory fish like sharks, cod and tuna. According to two new, large studies, these giant predators are becoming scarce. One study shows how the populations are decreasing; the other shows how fishing hauls, or the amount of fish caught, have changed. Together, the studies suggest that overfishing threatens the creatures near the top of the marine food chain.

4. In one study, Villy Christensen and his colleagues looked at 200 past studies of marine life to learn how fish populations have changed over time. Christensen is a fisheries expert at the University of British Columbia in Vancouver. The oldest studies his team looked at dated to 1880; the most recent were published in 2007. In these 200 studies, researchers counted and described all the different types of life in small oceanic ecosystems.

5. Christensen presented the team’s findings in February at the 2011 meeting of the American Association for the Advancement of Science in Washington, D.C. He reported that between 1910 and 1970, the numbers of big predators decreased slowly. In 1970, their populations really started to drop. Around that time, fishing ships began using new tools that led to catching more fish. The numbers have been falling quickly ever since.

6. Now, the number of these big fish in the ocean is very low. Christensen reported that today there is only about one-third as many of the large, fish-eating fish as there was in 1910. That means for every three you might have found in 1910, now you would only find one. Christensen said the future looks increasingly dismal for these giants.

7. “We see no indication that things are improving,” Christensen told the audience. “It’s a pretty bleak situation.”

8. While Christensen looked at the problem from the perspective of the fish, Reg Watson approached it from the perspective of the fishermen. Watson, a biologist also at the University of British Columbia, studied the increase in fishing in recent decades. Like Christensen, Watson reported his findings at the AAAS meeting.
5 For those who like eating lobster, paying attention to where it comes from can protect some lobster populations. Spiny lobsters from the Caribbean and South American are threatened, but spiny lobster populations in Florida, California, and Mexico’s Baja California are still in good shape. Your local seafood market should be able to tell you where its seafood comes from. If they cannot, consider a surer option, such as an American lobster from Maine.

6 If this all sounds a bit complicated, don’t worry. There is information available on which to base your seafood-eating decisions. The Monterey Bay Aquarium, one of the top aquariums in the country, maintains a complete, easily printable “Buyer’s Guide.” This list tells you which seafood species from which sources are the best choices, which alternatives to consider, and which species you, the consumer, should avoid. By paying a little attention to the seafood you’re eating, you can avoid contributing to the problems faced by endangered fish species. Change won’t happen overnight, but every choice you make can help protect an ocean ecosystem near you.

1 Which of the following best sums up how the focus of “Big Fish in Troubled Waters” differs from “Protecting the Oceans, One Choice at a Time”?  

A The first article explains why people love to catch large predatory fish like cod and tuna, while the second explains the life-cycle of large fish such as the Atlantic halibut.

B The first article explains why predatory fish are important to the ocean ecosystem, while the second explains where to find information about fish that are rich in omega-3s.

C The first article explains the causes of declining fish populations, while the second explains the connections between the creatures in the ocean food chain.

D The first article explains that overfishing is threatening some fish populations, while the second explains how to save some fish species by making careful decisions about meals.

2 Which of the following pieces of key information is used in both articles?

A Spiny lobsters from the Caribbean and South America are endangered.

B Fish populations are changing or decreasing, leaving some species at risk.

C An increase in smaller fish means a decrease in the food supply for predatory fish.

D The health benefits of eating fish and shellfish is creating a high demand for them.
Lesson 19  Part 1: Introduction

Comparing and Contrasting Genres

Have you ever seen a movie about an important part of history, such as the Civil Rights Movement, that included fictional characters? This kind of movie is a work of **historical fiction**, or a story set in the past that combines made-up characters and events with historical figures and real events from a specific time and place. A **historical account**, on the other hand, is a factual explanation, description, or narrative from or about the past. All the people actually lived, the places existed, and the events in a historical account really occurred.

**Study the illustration below. Which details are based on reality and which are fictional?**

The image above shows a real person, Martin Luther King Jr., standing next to a fictional character, a young woman who admires him. In a similar way, historical fiction includes real people and events and then alters some historical details to tell a made-up story.

**Study the chart to consider how the author of historical fiction draws upon real facts to create a work of fiction.**

<table>
<thead>
<tr>
<th>How Historical Fiction Uses History</th>
<th>How Historical Fiction Alters History</th>
</tr>
</thead>
<tbody>
<tr>
<td>• set in a real time period and place</td>
<td>• plot combines real and made-up events</td>
</tr>
<tr>
<td>• provides factual information</td>
<td>• made-up yet realistic characters interact with real people who once lived</td>
</tr>
<tr>
<td>• includes events that actually occurred</td>
<td>• most dialogue is invented</td>
</tr>
<tr>
<td>• uses historical figures, language, and details, such as famous people or typical customs of the times</td>
<td>• may interpret or change historical details to create a better story</td>
</tr>
</tbody>
</table>

Good readers understand that historical accounts use facts and information to inform readers about history, while historical fiction is meant to entertain readers with an engaging story that combines real and imagined characters and events from the past. As they read, good readers are aware of these differences and are careful to separate fact from fiction.
Read the historical fiction story, and complete the chart by adding fictional details. Then read and answer the question that follows.

**Close Reading**
Which facts from the account on the previous page are also present in the historical fiction story? **Underline** facts that are the same or similar. **Star (*)** any story elements that are clearly fictional, and add them to the chart on page 202.

**Sighting the Pacific** by Jaycee Wright

As the weary explorers reached the top of the hill, Mr. Lewis let out a cry of delight. "We've made it!" he exclaimed. "The Pacific!"

The men exchanged doubtful glances—just last week, Mr. Clark had rejoiced along with the entire team, confident that the large body of water before them was the ocean. Later, they discovered that the water was just the estuary of the Columbia River. Yet they smelled ocean air! Peter had tried to stay positive as they continued their search, but it was extremely difficult. Would today, November 15th, actually be the day they reached the Pacific Ocean?

"That certainly is a sight for sore eyes!" one of the men exclaimed, and Peter looked up and grinned. After a year and a half of traveling, they had, in fact, come upon the salt waters of the Pacific.

**Hint**
Compare the answer choices with the facts you underlined in "Journey to the Pacific."

**Circle the best answer.**
Which fact presented in "Journey to the Pacific" is also included in the fictional story above?
- A Peter played a key role as a member of Lewis and Clark's team.
- B Some of the explorers felt that the ocean was a "sight for sore eyes."
- C Peter tried to keep up his spirits during the expedition.
- D The explorers had mistaken an estuary for the Pacific Ocean.

**Show Your Thinking**
Describe how the author of "Sighting the Pacific" used and altered historical details about the Lewis and Clark expedition to tell a story.

---

With a partner, discuss the advantages of reading each type of account about an historical event.
The Train to Somewhere by Lydia Wren

My heart was in my throat as Robbie and I boarded the train in New York City that April day. A member of the Children's Aid Society led us to our seats and advised us, “Be sure to smile and make a good impression on the people you meet!”

At age five, I thought myself lucky—at least I had my older brother at my side. I still could remember Mama humming as she cooked dinner and my father's smiling face, but they had both died. For months we had lived on the streets until the Children's Aid Society sheltered us. Now they were shipping us on an orphan train to a new home and a new life.

As the train gathered speed, I caught one last glimpse of the city, the only home I had ever known. The next few days blurred together as our train powered over rivers, lush farmlands, and empty prairies. Where were we going, and what would happen to us? Our destination and future were unclear and unknown.

Then one morning we pulled into a small station as our Society escorts did their best to smooth our hair and straighten our clothes. Weary and confused, we were led to a large hall and seated on a stage in front of a crowd of strangers. Many stared, but some walked up to inspect us. Suddenly I was staggered by a terrible thought. What if Robbie and I went to different homes in different towns and were separated permanently?

“What do you know about farming?” a man asked Robbie gruffly. Wide-eyed, Robbie stammered a response, and my heart thumped wildly in my chest as I clutched his sweaty hand.

“Now Jacob,” said a plain woman behind the man. “Don't start off by scaring 'em.” She looked at us and smiled. “Are you brother and sister? Would you both like to come live with us?”

Some 70 years later, I still remark at how well my luck held. It wasn’t just that Robbie and I were raised together or that our lives were all pleasure and no pain. No, it was that the Larsens came to take us home that day, two caring people who became our new family and who made us who we are today.
Read the following speech and historical fiction story. Then answer the questions that follow.

from "The Progress of 50 Years"

by Mrs. Lucy Stone

Lucy Stone was a well-known suffragist in the Women's Rights Movement. Forced to pay for her own education, she was the first woman from Massachusetts to earn a college degree and gained fame for not changing her name after marrying Henry B. Blackwell in 1855. Stone continued to fight for equality for women throughout her career. The following is an excerpt from her last public speech, presented to the Congress of Women at the World's Fair in 1893.

1 Fifty years ago the legal injustice imposed upon women was appalling. Wives, widows and mothers seemed to have been hunted out by the law on purpose to see in how many ways they could be wronged and made helpless. A wife by her marriage lost all right to any personal property she might have. The income of her land went to her husband, so that she was made absolutely penniless. If a woman earned a dollar by scrubbing, her husband had a right to take the dollar.... It was his dollar. If a woman wrote a book the copyright of the same belonged to her husband and not to her. The law counted out in many states how many cups and saucers, spoons and knives and chairs a widow might have when her husband died. I have seen many a widow who took the cups she had bought before she was married and bought them again after her husband died, so as to have them legally. The law gave no right to a married woman to any legal existence at all. Her legal existence was suspended during marriage. She could neither sue nor be sued. If she had a child born alive the law gave her husband the use of all her real estate as long as he should live, and called it by the pleasant name of "the estate by courtesy." When the husband died the law gave the widow the use of one-third of the real estate belonging to him, and it was called the "widow's encumbrance." While the law dealt thus with her in regard to her property, it dealt still more hardly with her in regard to her children. No married mother could have any right to her child, and in most of the states of the Union that is the law to-day. But the laws in regard to the personal and property rights of women have been greatly changed and improved, and we are very grateful to the men who have done it.

2 We have not only gained in the fact that the laws are modified. Women have acquired a certain amount of political power. We have now in twenty states school suffrage for women. Forty years ago there was but one. Kentucky allowed widows with children of school age to vote on school questions. We have also municipal suffrage for women in Kansas, and full suffrage in Wyoming, a state larger than all New England.

3 The last half century has gained for women the right to the highest education and entrance to all professions and occupations, or nearly all. As a result we have women's clubs, the Woman's Congress, women's educational and industrial unions, the moral education societies, the Woman's Relief Corps, police matrons... colleges for women, and co-educational colleges and the Harvard Annex, medical schools and medical societies open to women, women's hospitals... women as a power in the press, authors, women artists, women's beneficent societies and Helping Hand societies, women school supervisors, and factory inspectors and prison inspectors, women on state boards of charity, the International Council of Women, the Woman's National Council, and last, but not least, the Board of Lady Managers. And not one of these things was allowed women fifty years ago, except the opening at Oberlin. By what toil and fatigue and patience and strife
Sarah explained that Brad’s court order allowed him to sell most of the land. As a woman, she wasn’t legally entitled to keep it.

“What a pity!” her father said thoughtfully.

“Nonsense,” cried Sarah’s mother. “This is just the problem I’ve been describing these many years, Jebediah!” Sarah’s father cleared his throat, but her mother continued. “And you know how much I admire Lucy Stone’s efforts to provide fair treatment for women!”

“Who is Lucy Stone?” Sarah asked, ignoring her father’s frown.

Her mother explained that Mrs. Stone had been speaking about women’s rights for many years and was pushing to modify state laws. She also called for women to be allowed to pursue all professions and occupations. Her mother continued, “Mrs. Stone even refused to take her husband’s last name when she married him because she did not want to be considered anyone’s property. And this woman is not alone in her fight. Women all over the country are working together so that they will no longer be mistreated as you have been, Sarah. The Women’s Rights Movement is gaining support from many!

“For once your mother may have a point,” observed her father, taking Sarah’s hand to reassure her. “You should have a right to what you and Elijah owned together, Sarah. We will help you get back on your feet, and then we’ll fight to get your farm back.”

Her mother nodded in agreement. Then she added one last thought, “Perhaps when more men and women add their voices to this movement, we will be able to improve the lives of all the women throughout the nation.”

Later, with stories of women like Lucy Stone in her head and her parents’ reassurances, Sarah washed the dinner dishes with a smile on her face. For the first time in months, she could imagine a life for herself where she didn’t have to live like a second-class citizen. As for her girls, what new doors of opportunity would this movement open for them?

---

1 Which statement best describes how the author has drawn an important fact from the speech to create a fictional story?

A. Lucy Stone speaks about the lack of equality for women, and Sarah experiences the problems it creates.

B. Lucy Stone delivers a speech, and after they hear it, Sarah and her mother decide to join the women’s movement.

C. The speech is about social change, and the story is about accepting things as they are.

D. The speech is meant to persuade women, and the story problem encourages a woman to fight for her rights.
Science
Grade 7
Covers week of May 4th – week of June 16th
# 7th Grade Science-New Learning Schedule

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Genes to Proteins to Traits

She has her mother’s hair. He has his father’s eyes. Why do children resemble their parents? Living things resemble their parents because they inherit, or receive, traits from them. Hair color and eye color are both examples of inherited traits. Remember that inherited traits are crucial to evolution because natural selection only acts on inherited traits. But exactly how are inherited traits passed from parents to offspring?

Children resemble their parents because they inherit their parents' genes. These children inherited their hair color and eye color from their parents, among other traits.

Traits are passed from parents to offspring through genes in DNA. DNA is a type of molecule that carries the inherited information passed from parents to offspring. A gene is a segment of DNA that contains the instructions for building a product, usually a protein. But what exactly is a protein, and how do proteins determine an organism’s traits?

Figure 1  Genes are found in structures called chromosomes in the cell nucleus. Genes contain the instructions for building molecules, most often proteins. Many proteins help determine the traits of living things. In this example, the finch ALX1 gene makes a protein that causes the finch to develop a thin beak.

A protein is a type of molecule that makes up much of an organism's structure and helps it function. Living organisms have tens or even hundreds of thousands of different kinds of proteins in their bodies. One protein found in humans is keratin, which makes up much of human skin, hair, and nails. Another is amylase, a protein that helps humans digest, or break down, the carbohydrates they eat.

Different proteins have different shapes and structures, and they function in different ways. The traits of an organism are determined by the kinds of proteins
The Location of Genes

You scratch an itch on your arm. You may have just scratched off hundreds or thousands of cells from the surface of your skin. Cells are tiny, and yet inside every one of your living cells are the instructions for how to make you. How can something that fits in a tiny part of a tiny cell be responsible for making all of you?

To answer that question, you first need to know where genes are located and how they are organized in the cell. Remember that genes are small sections of a strand of DNA. Humans have 46 strands of DNA in the nucleus of most of their cells. These long strands of DNA are wrapped around proteins, similar to the way that thread is wrapped around spools to keep it from tangling. Each of these long strands of DNA wrapped around proteins is called a **chromosome**.

![Location of Genes and Chromosomes in Cells of the Human Body](image)

**Figure 5** Humans have 46 chromosomes in the nucleus of most of their cells. Genes are found on chromosomes. Together, all the chromosomes in a cell carry all the genes that are the instructions for making all the proteins of the body.

Chromosomes help to organize the DNA. Numbering chromosomes is a convenient way for scientists to "map," or label, which genes are found on which chromosomes. For example, one of the genes that instructs a
Alleles

Take a look at everyone around you. You have a lot in common with them. You all eat and digest food. You all have senses that help you to interact with the environment. But you also have some differences. If humans all have the same genes in the same places on chromosomes, why do people have different traits?

Every chromosome has hundreds or even thousands of genes, and in general, all humans have the same genes in the same places of the same chromosomes. However, not everyone has the same version of these genes. As an analogy, your family and your friend's family both have recipes for how to make spaghetti sauce, but they have an alternate recipe that calls for slightly different amounts of salt. An alternate version of a gene for a trait is called an allele.

Scientists refer to genes by a combination of letters and numbers. As an example, OCA2 is one of the many genes that help determine eye color. It instructs a cell to make P protein, the protein that helps regulate the amount of melanin. This gene is found on chromosome 15. There are many different alleles of OCA2 that can occur in populations. To keep track of different alleles of a gene, scientists label alleles with either a capital letter or a lower case letter. Allele B might represent one variation of a gene and allele b another variation. The same letter is used in both cases because the alleles are both versions of the same gene, but the capital and lower case are used to indicate that they are different variations of the same gene. Allele B of OCA2 could result in a lot of P protein being formed. A person with this allele might have a lot of melanin in the iris and have brown eyes. Allele b could result in less P protein, which would make less melanin and blue eyes.

These two people both have the gene OCA2 on chromosome 15, but they have different alleles of that gene. In combination with other gene alleles, the different alleles of OCA2 result in two different colors of eyes.

OCA2 is only one example of a gene that is important in the determination of eye color. It is the combination of all of the alleles of all the genes for eye color that results in the overall eye color. All these combinations help to explain why we are all different.
Asexual Reproduction

Imagine a scientist studying a rotting potato. When she cuts it open, she sees that the potato is starting to turn black. She looks at the potato under a microscope and finds that there are many small white spots on the surface of the potato. What are these spots?

What the scientist saw were colonies of bacteria. Colonies are groups of bacterial cells that are all related. There can be millions of bacterial cells in a single colony. In a way, a colony is a bacterial family with many offspring cells. Bacterial offspring come from a parent cell that has divided in half through cell division. Like humans, even bacteria get many of their traits from their parent cell. In fact, all the cells in a bacterial colony are nearly identical in their traits. Why?

![Chromosome Inheritance in Asexual Reproduction](image)

**Figure 1** This model of bacteria dividing is an example of asexual reproduction of a unicellular organism. When this occurs, the parent divides to form two genetically identical offspring. Each offspring has a copy of the same chromosome as the parent.

As you have learned, all organisms have genes that are located on the organism's chromosomes. Even bacteria have chromosomes that carry genes important for the organism's survival. Sometimes a bacterium has only one circular chromosome. Genes, and the traits they control, are inherited when chromosomes are passed on during reproduction. A bacterium passes its chromosomes to its offspring by asexual reproduction, the process by which one organism produces offspring that are genetically identical to it and to each other. For bacteria and most other unicellular organisms, reproduction is the same process as cell division.

In Figure 1, you can see a model of a bacterium reproducing where a parent cell divides into two offspring. In asexual reproduction, the one parent makes an exact duplicate of all of its chromosomes. Then the parent cell divides in half, distributing each full set of chromosomes into each of two new cells. Thus, asexual reproduction
The inheritance of different alleles from each parent brings about some genetic variation. Genetic variation is the different combinations of alleles of genes found in a species. For example, the corgi-husky puppy looks different from either of its parents and has a different combination of alleles than either of its two parents.

Most multicellular and some unicellular organisms reproduce sexually. More specifically most animals, plants, and many fungi reproduce sexually. Even some unicellular organisms, like amoebae are thought to reproduce sexually, at least some of the time.

Check for Understanding:
1. What is sexual reproduction? How is it different from asexual reproduction?
Which of the chromosomes in the pair goes into the sex cell is completely random, or an event that happens in which the outcome cannot be predicted before it occurs. So, some eggs might have the first copy of chromosome 1, but the second copy of chromosome 2, while another egg has the opposite.

How, then, does almost every cell of the human body get 46 chromosomes? When egg and sperm unite to form the single cell that develops into an offspring, each contributes its one copy of each chromosome to the resulting merged cell. This gives the new offspring 46 chromosomes, 23 from the mother’s egg and 23 from the father’s sperm. As a result, there are two copies, or one pair, of every kind of chromosome in a person’s cells.

Like the offspring of the corgi and husky dogs have traits from both of its parents, human offspring have the traits from both of their biological parents. Figure 3B is a model of how chromosomes are passed from parents to offspring in humans. Like the corgi-husky puppy, the offspring inherited one copy of every chromosome from his mother’s egg and the other copy from his father’s sperm.

**Figure 3B** Human offspring inherit one set of chromosomes from their biological mother and another set from their biological father. Offspring share some traits of each parent because the genes that control the expression of these traits are passed from both parents to the offspring on their chromosomes.

Together, the merged egg and sperm cell divided and developed into the boy. As a result, he has two copies of every chromosome, one from his mother and the other from his father, in all of his body cells. On those chromosomes are versions, or alleles, of genes. This boy will have traits that were coded for in the alleles that he got from his mother and the alleles that he got from his father. So, he will have a unique combination of traits that will be different from either parent.
Probability and the Inheritance of Alleles

If you have a sibling born from the same biological parents, do you both have the same traits? No, you probably look and behave very differently. But, if you both inherit one copy of every chromosome from each parent, why are you not identical?

You are not identical to your siblings because you inherited a different combination of alleles from each of your parents than they did. How did this happen? Since following the inheritance of 46 different chromosomes is a lot to keep track of, the example in Figure 4A follows only the inheritance of chromosome 1. All pairs of chromosomes follow the same pattern. Each of the mother’s eggs and the father’s sperm carries one copy of chromosome 1. Half of the mom’s eggs randomly got the first copy of chromosome 1 (shown as dark purple) and the other half got the second copy of chromosome 1 (shown as light purple). The same was true for the dad’s sperm (shown as dark and light red).

There are four possible combinations of chromosome pairs that the offspring could inherit. He is equally likely to inherit any one of these four possible chromosomes. In other words, he has an equal chance of inheriting the dark purple chromosome from his mom and the dark red chromosome from his dad as inheriting the light purple and the light red. This means that you might have gotten combination one while your sibling got combination two, so you inherited different alleles.
and a father with straight brown hair and no dimples might have one child with curly red hair and no dimples and another child with curly brown hair and dimples.

**Check for Understanding:**
1. Why don't siblings (other than identical twins) that share two parents have all the same traits?

2. What percent probability is a 50-in-100 chance of something happening? What percent probability is a 1-in-4 chance of something happening?

3. If the inheritance of each of these combinations of chromosomes is equally likely, what is the percent probability that each combination would be passed on to an offspring?
square and the other parent's alleles on the side. Each of the four boxes shows one of the four possible ways the parents' alleles can combine. For example, one possible combination is for the offspring to inherit one dominant allele (D) from each parent. There is a ¼ chance, that the offspring will inherit this combination and end up with DD alleles. Inheriting DD means this offspring will express the dominant trait.

There are three other possible combinations of inherited alleles. This does not mean that the parents will have four offspring or that each offspring will have a different combination. Each offspring has an equal chance of inheriting one of these combinations. You cannot know for sure what an offspring will inherit, but by using a Punnett square you can predict the chance.

**Check for Understanding:**
1. Draw an arrow showing where each allele in the possible offspring combinations comes from in this Punnett Square.

If Parent 1 and Parent 2 from this Punnett Square have 4 children, what is the chance that the first child will inherit the allele combination DD? What about the final child?
More Punnett Square Practice - Session 5

READ

A punnett square helps scientists predict the possible genotypes and phenotypes of offspring when they know the genotypes of the parents. The *phenotype* is the physical appearance of an organism and the *genotype* is the inherited combination of alleles. This skill sheet will give you additional practice in using punnett squares to solve genetics problems.

EXAMPLE

In rabbits, black fur is dominant to white fur. If you cross a BB male with a Bb female, what are the possible genotypes and phenotypes of the offspring? What is the percent chance for each type?

Solution:

\[
\begin{array}{c|c|c}
 & B & B \\
B & BB & BB \\
b & Bb & Bb \\
\end{array}
\]

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<tr>
<td>BB</td>
<td>Black fur</td>
<td>50%</td>
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<tr>
<td>Bb</td>
<td>Black fur</td>
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PRACTICE

1. In cabbage butterflies, White wings are dominant to yellow wings. If a Ww butterfly is crossed with a ww butterfly, what are the possible genotypes and phenotypes of the offspring and the percent chance for each?

\[
\begin{array}{c|c|c}
 & W & w \\
w & w & w \\
w & w & w \\
\end{array}
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4. Can you curl your tongue up on the sides? Tongue-curling in humans is a dominant genetic trait. Suppose a man who is Tt for tongue-curling marries a woman who is also Tt for this trait. What are the possible genotypes and phenotypes of their children and the percent chance for each?

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5. In guinea pigs, rough coats (with lots of swirly cowlicks) are dominant over smooth coats. If an RR guinea pig is crossed with a Rr guinea pig, what are the possible genotypes and phenotypes of the offspring? What are the chances of each?

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Effects of Genes and the Environment on Traits

Have you ever heard the phrase "nature versus nurture"? Nature refers to the genes that influence traits. When people tell you that you have your mother's eyes, they are referring to the alleles of your parent's genes you inherited.

Nurture refers to the environmental factors that affect traits. The kind and amount of food you eat can affect the way your body looks. This question is meant to ask whether a trait is determined by someone's genes or by the environment, but this question is flawed. Why?

Perfect pitch is the ability to identify or produce a note without having to hear any other notes. Studies suggest that this trait has both genetic and environmental causes. Both causes are important for the trait to be expressed in a person.

Some traits are highly influenced by genes or the environment, but most are not determined by one or the other factor. Most traits are strongly influenced by both genes and the environment.

For example, many people have the ability to recognize if a sound is higher or lower pitched than another sound. However, fewer people have a trait known as perfect pitch. Perfect pitch is the ability to identify or produce a musical note without comparing it to another note. If someone played a note on the piano, these people would be able to name or recreate the note without hearing any other note. This trait can run in families and seems to be controlled by at least one allele of a gene.

However, having this allele or alleles is not enough to develop the ability. Studies suggest that some musical training or exposure to certain languages where the tone of a word helps to express its meaning during early childhood is also necessary for this inherited trait to be expressed.
with very similar genes, but one has eaten a diet of more shrimp and the other has eaten a diet with less shrimp.

What, and how much, an organism eats is an example of an environmental factor. Shrimp contain pink pigments. When a flamingo eats shrimp, the pigments accumulate in the bird's feathers and make them pink. In this example, the environmental factor of what the flamingo eats is a very strong influencing factor on its pink color trait.

The genetic link to some traits is very clear. Belgian Blue cattle have an allele of a gene that causes them to make a lot of muscle tissue compared to other cattle breeds. They are even born muscular, without ever having exercised.

**Check for Understanding:**

1. Which of these statements is most accurate?
   a. Each trait is determined by either genes or the environment.
   b. Only a few traits are influenced by both genes and the environment.
   c. Most traits are strongly influenced by both genes and the environment.

2. How is having perfect pitch dependent on both genes and the environment?
Mutations in Genes

Tiny fruit flies are buzzing all around. To you they are a bother, but to many scientists, they are a treasure of information about genes. These scientists use fruit flies as model organisms to better understand human genetics. From fly research, people now know about different alleles of genes and the traits they instruct for. Flies have been especially helpful in learning how different alleles first arise.

All populations of individuals have variations in their genes. These variations in genes are called alleles. The original sources of these variations are mutations. A *mutation* is any change in DNA, the genetic material of a cell. You can model the way a mutation changes a gene using a sentence. For example, read the following sentence: *The cat ate the rat*. Now, change the letter *r* in *rat* to the letter *h*. One small change in the sentence and it can have a completely new meaning. Similarly, a mutation in a gene can change the function of the gene.

![Fruit flies](image)

Geneticists study fruit flies to learn about mutations. Mutations are changes in DNA. Some mutations can change the expression of proteins and lead to different traits. The red-eyed fruit fly has a normal eye color. The white-eyed fly has a mutation for eye color.

Remember that many genes are the instructions for making a protein. A mutation might cause the organism to make a protein with a different structure, which could change the way the protein functions and, thus, change a trait. For example, fruit flies normally have red eyes, but with one mutation in one gene, they can have white eyes. The mutation results in the change of a membrane protein structure. With a different structure, the membrane protein no longer allows the substances that make the red pigment to enter the cells of the eye.

However, permanent mutations that affect traits are rare. This is true for a few reasons. First of all, many mutations are repaired by the cell. The cell has machinery that can help find ‘mistakes’ in the DNA. Secondly, not all mutations happen in a gene. Some parts of DNA are not genes, so a mutation might not affect any traits. Finally, the change to a protein that results from a gene mutation might be too small to affect the way the protein functions.
exposure to UV radiation, which can cause mutations. Certain mutations in skin cells can lead to skin cancers.

Check for Understanding:

1. What is the difference between a mutation and a mutagen?

2. How can a mutation in a gene change an organism's traits?

Neutral, Harmful, and Beneficial Mutations

You may be familiar with the idea of mutations through movies or books. Often, superheroes gain powers from their mutations or a horrible disease occurs because of a mutation. How do mutations affect real-life organisms?

Most mutations are neutral, but some can be harmful or beneficial. This girl from Tibet most likely has a beneficial mutation that allows her to survive at high altitudes in the Himalayan Mountains. The mutation makes her red blood cells more efficient at carrying oxygen.

Most mutations have no effect on an organism's survival. They are considered neutral. Sometimes the mutation does not change the organism's traits. Other times the new trait caused by the mutation has no effect on the organism's survival. For example, if a redflowering rose bush developed a mutation that caused one of its flowers to be slightly pinker, this would be a neutral mutation. As long as the insects that pollinate the plant are still attracted to the pink flower, the mutation has not affected the survival of the plant. Neutral mutations occur in animals, too. If a mutation causes a small change in the structure of a protein that breaks down sugar, that protein may function just as well as the unchanged protein.
2. Mutations resulted in this woodpecker having a very sharp beak that can pierce through the wood on a tree trunk.

3. Mutations resulted in this cat having one blue eye and one green eye.
acting over long time periods, changes in living things could result from the accumulation of many small changes over a long period of time.

But how do even small changes in living things happen? Darwin’s big breakthrough came when he read the work of Thomas Malthus, an economist. Malthus argued that there was never enough food to keep up with human population growth. As a result, humans would always suffer from famine and misery. Darwin realized that Malthus’s argument applied to all life. All living things were engaged in a constant “struggle for existence” because there was not enough food or resources for all of them to survive and reproduce.

But which individuals survive and reproduce? Do these individuals have specific traits that make them more successful? This led Darwin to his idea of natural selection.

Charles Darwin combined evidence from his own observations with ideas from other thinkers to work out his theory of evolution. This photo shows his study at Down House in Downe, England, where Darwin worked for over 40 years. Darwin’s microscope can be seen on the bench in the window, and his many books line the shelves.

Check for Understanding:
1. Pick one other scientist (either Lamarck, Lydell, or Malthus) and describe how their ideas influenced Darwin’s thoughts on living things and how they changed over time.

Darwin’s Idea of Natural Selection

What was Darwin’s idea of natural selection? What if your class went on a trip to the grocery store, and everyone selects an apple for lunch? You avoid the brown, mushy apples and select a crunchy, red apple. So do most of your classmates. When you compare your class’s apples to the original apples at the store, you
This cactus finch is peeking out from its nest. If a longer beak makes this finch better able to obtain food, it might be more likely to survive and reproduce than finches with shorter beaks. If so, then longer beaks would become more common in the population through natural selection.

Darwin reasoned that, over time, natural selection causes the inherited traits that make living things more likely to survive and reproduce to become more common in the population. If long-beaked cactus finches have a greater chance of surviving and reproducing, they will produce more offspring than short-beaked finches. Since the offspring of long-beaked finches will also inherit long beaks, long beaks will become more common in the population over time. Short beaks will become less common. The distribution of traits in the population—that is, how common each trait is—changes.

Natural selection is the key to Darwin’s theory of evolution. Evolution describes the inherited changes that occur in a population over time. Over many generations, natural selection causes populations of living things to evolve adaptations to their environment. An adaptation is an inherited trait evolved through natural selection that makes a population well suited to living and reproducing in its environment.

In the cactus finch population, a long beak is an example of an adaptation. This trait makes cactus finches better able to survive and reproduce in their environment. Of course, more than one cause may be responsible for the evolution of a trait. A long beak, for example, could be useful to cactus finches for many different reasons. Scientists may only be able to conclude that getting food is one likely cause for the origin of the trait. They may then conduct experiments in order to better understand the possible causes.

Check for Understanding:

1. What is the variation in these birds’ traits?
Natural Selection for Survival

Looking like a leaf helps ghost mantises hide from predators. Sharp claws and teeth help lions catch prey. Spines protect cactuses from hungry animals. These traits help living things survive long enough to reproduce. But where can scientists actually see evidence of natural selection for survival traits happening in populations?

Scientists have seen evidence of natural selection for traits that improve survival. One example of such a trait is the horns of flat-tailed horned lizards. These lizards use the sharp horns on their heads to defend themselves from predators. When threatened, they tuck their heads so that the horns stick up. They can also stab predators by jerking their heads back.

But horns cannot always protect flat-tailed horned lizards from loggerhead shrikes. These birds are only the size of robins, but they hunt lizards, mice, and small birds. Shrikes do not have deadly claws like hawks or eagles; instead, they impale their prey, piercing their bodies on sharp objects such as barbed wire or cactus spines. After shrikes eat their prey, they leave the skeletons hanging. Since the size of a lizard’s horns is an inherited trait that shows genetic variation, it can be affected by natural selection. Scientists wondered, do longer horns better protect lizards from shrikes?

To find out, scientists compared the horns of living lizards with those of dead lizards left hanging by shrikes. As shown in Figure 1, living horned lizards had longer horns than dead ones. In other words, lizards with longer horns have a lower probability of being eaten by shrikes than lizards with shorter horns. This evidence shows that natural selection favors longer horns in flat-tailed horned lizards.

However, long horns could be disadvantageous for other reasons. Long horns might take more energy to grow, or they might be heavier to carry around. Whether horned lizards will evolve even longer horns depends on their overall effect on survival and reproduction.

![Figure 1](image-url) Natural selection favors traits that help organisms survive. This bar graph shows that longer horns better protect flat-tailed horned lizards from shrikes than shorter horns.
Natural Selection for Reproduction

Ghost mantises have incredible adaptations for staying hidden from predators, as you have learned. However, they would not want to go unnoticed by their mates. To attract the attention of male mantises, female mantises release special chemicals that the males can detect. How does natural selection favor traits that aid in reproduction?

The big, heavy horns of male bighorn sheep help organisms find mates and reproduce. The horns are used in battles that determine which males will mate with females.

Organisms have to reproduce in order for their traits to be passed to the next generation. Just as natural selection favors traits that help organisms survive long enough to reproduce, it favors traits that help organisms find and attract mates and reproduce successfully.

Natural selection favors traits that help organisms find mates and reproduce successfully. The peacock’s gorgeous tail is an adaptation that helps males attract females.

A wide variety of adaptations help organisms find and attract mates. Male fireflies produce light signals to attract nearby females. Male peacocks spread their beautiful tail feathers to court peahens. Another adaptation for reproduction is shown in the photo—the large horns of male bighorn sheep. Their horns are really big—they measure up to 1 meter in total length and weigh as much as all the other bones in the male’s body combined! Males use these horns to fight each other to determine who will get to mate with females. They evolved such big horns because individuals with larger, heavier horns won more fights and reproduced more successfully than other males.
Check for Understanding:
1. What are three examples of adaptations organisms have for finding or attracting mates?

2. Besides traits for finding or attracting mates, what other traits for reproduction are important to some organisms?
proportion of light moths had decreased. Why had the population evolved this way, with a trend towards more dark moths?

One thing that scientists immediately realized was that dark moths were well camouflaged against soot-covered tree trunks, but light moths were not. Could this explain the trend towards an increased proportion of dark moths in the population?

In fact, scientists came up with several possible explanations for the evolution of the peppered moth population. Peppered moth color is an inherited trait that shows genetic variation, and it can be affected by natural selection. One idea was that, as the environment became polluted, birds (the main predators of peppered moths) had started eating more light moths, which were no longer well camouflaged. A second idea was that dark color somehow protected the moths from pollution. A third idea was that soot pollution caused moths to make more pigment, darkening their color. How could scientists determine if any of these causes was responsible for the evolution of color in the population?

In the 1950s, English scientist Bernard Kettlewell decided to test the predatory bird explanation for the evolution of peppered moth color. This is how he did it: Kettlewell marked many dark and light moths and then released them. In the next few days, he tried to recapture the marked moths. During that time, birds were expected to eat some of the moths. If birds ate more of one type of moth, there would be a difference in the proportions of moths recaptured.

Kettlewell performed this experiment in both polluted and unpolluted habitats. In an unpolluted habitat, Kettlewell recaptured more light moths, as shown in Figure 3. In a polluted habitat, Kettlewell recaptured more dark moths. In both habitats, the data showed that camouflaged moths had about twice the probability, or chance, of surviving as non-camouflaged moths. Kettlewell concluded that birds ate more non-camouflaged moths than camouflaged ones.
Selective Breeding

What does an ear of sweet corn have in common with your loyal dog? Just like the carrots you saw in the introduction, both corn and dogs have been genetically changed by humans. Before human interference, the "corn" that existed was tiny, hardly nutritious, and not very sweet, and "dogs" were wild wolves. How did humans change the traits of these other organisms?

Teosinte, found in Mexico, is the wild ancestor of corn. It has tiny ears and is not very sweet. Humans started selectively breeding Teosinte with larger ears. As a result of this breeding, we now have modern corn with large, sweet ears.

Humans have been changing the traits of certain plant and animal species through selective breeding for thousands of years. Selective breeding is a technique in which organisms with desired traits are chosen to be bred with each other so that they will pass on those traits to their offspring. For example, the ancestor of corn, called Teosinte, had very tiny ears that were not very sweet. However, by random gene mutations, a few Teosinte plants had slightly larger or sweeter ears. Humans chose to plant more of the fertilized seeds from the Teosinte parent plants that had slightly larger, sweeter ears so that the offspring would have the trait of larger, sweeter ears. They did this again and again, breeding many generations of Teosinte plants with the mutations that led to slightly larger and sweeter ears. Eventually, over many generations of breeding Teosinte plants with those traits, the sweet corn plant as we know it was developed. Selective breeding is also called artificial selection because humans, not natural environmental factors, are selecting which organisms will produce offspring.
Hundreds of different breeds of dog have been selectively bred. Many breeds were selectively bred for performing a specific job or for a particular appearance.

Check for Understanding:
1. A rancher raises cows to sell for meat. Explain how he could selectively breed bulls and cows to get his whole herd to be more muscular?

Artificial Selection and Human Society

When you greet your friend's dog, it wags its tail happily. When you hike through a forest, on the other hand, the animals run away. How did some living things become so well suited to the needs and desires of humans? The answer is that humans caused them to evolve these desirable traits. But how exactly did humans do this?
Today, the crops that humans eat, the pets that humans keep, and the livestock that humans raise are all products of evolution through artificial selection. Artificial selection is the process through which humans select the organisms that reproduce so that they can obtain offspring with similar desirable traits. For example, humans might breed together sweet cabbages to produce even sweeter cabbages, or breed together cows with high milk yield to obtain cows with even higher milk yield. All the traits that humans select for are inherited traits that are determined at least partly by an organism’s genes.

Figure 1 shows the evolution of strawberries through artificial selection. The first photo shows wild strawberries. Wild strawberries are edible and flavorful, but they are very small in size. However, strawberry size is an inherited trait, and wild strawberry plants showed genetic variation in the size of the fruit they produced. In other words, the genes of different wild strawberry plants caused them to vary in the size of their fruit.

During artificial selection, humans chose to breed the strawberry plants with the most desirable traits. They bred strawberry plants with larger fruit. Choosing specific individuals to breed is called selective breeding. Artificial selection is sometimes called selective breeding.

Through artificial selection, the domesticated strawberry population evolved. A domesticated animal or plant is one that has become adapted, through generations of breeding, to live in close association with humans. Because of the choices made by strawberry farmers, strawberry plants with larger fruit reproduced more than other strawberry plants. These plants produced offspring that had similar traits. After many generations, the result was strawberries with large fruit—just like the ones you find in grocery stores today.

This ancient Egyptian wall painting shows an early example of the important role that artificially selected animals and crops played in human civilizations. The oxen are threshing wheat (removing the wheat kernels from the plant) by trampling over it.

Artificial selection has played a major role in human civilization. The domesticated animals and plants that humans produced through artificial selection—including dogs, cows, wheat, and rice—provided humans with companionship, protection, hunting assistance, and, perhaps most importantly, food. Artificial selection remains important to this day. People continue to breed new varieties of pets and livestock, and artificial selection continues to be the basis of agriculture.
Introduction

It might not look like it, but this could be a photo from a family reunion! That is because alligators and crocodiles are birds’ closest living relatives! But how do scientists know this? How exactly are birds and alligators related? After all, they do not exactly look alike.

You already learned Darwin’s big idea that natural selection can lead to evolution, or inherited changes in populations over time. Darwin’s other big idea is that all species are related to one another. However, some living things are clearly more closely related than others. For example, an oak tree and an apple tree are more closely related to each other than either is to a dog. But how do scientists figure out how species are related to one another? What kinds of evidence do they look at?

Species Are Related

Have you ever wanted to learn about your ancestors? You may have put together a family tree in school. Just as you and your siblings or cousins share a common family tree, Darwin realized that all living things share a common family tree. How are living things related?

Darwin’s Tree of Life Earth is inhabited by millions of different kinds of living things, called species. A species is a group of organisms that share traits and can breed successfully with one another but not with other groups. Humans, tulips, and cheetahs are all different species. How did Earth end up with so many species?
Evolutionary Trees Related species share a common ancestor. A common ancestor is an ancestor from which two or more different species evolved, or descended. Species that are more closely related share a more recent common ancestor than species that are more distantly related. The more closely related species are, the more evolutionary history they have shared.

Related species share traits that they inherited from their common ancestors. This is a pattern that is seen consistently across many groups of living things. For example, all mammals have hair and feed their young milk. Mammals share these traits because the common ancestor of mammals had hair and fed its young milk. The descendants of this ancestor—all mammals—_inherited these traits. In the same way, the common ancestor of all birds had wings, and all living bird species inherited wings from this ancestor. In each case, common ancestry is the cause, and having shared traits is the effect.

Birds and mammals also share certain traits. Both groups have a backbone, four limbs, and lungs. On the other hand, bony fishes have a backbone, but they do not have limbs or lungs. How are bony fishes, birds, and mammals related?

The evolutionary relationships among mammals, birds, and bony fishes can be shown using an evolutionary tree. An evolutionary tree is a diagram with "branches" that shows how different groups of organisms are related. Time can be represented by the vertical axis of the tree, as in Figure 1B. In this figure, you can see that the branch containing bony fishes splits off from the rest of the tree first, whereas mammals and birds only split from each other later in time. This means that mammals and birds share a more recent common ancestor with each other than either does with bony fishes. So, mammals and birds are more closely related to each other, while bony fishes are more distantly related.

Figure 1B also shows patterns of traits found in bony fishes, mammals, and birds, and when these traits evolved. A backbone is found in all three groups, so it evolved before the groups separated. Four limbs and lungs are found in mammals and birds, but not bony fishes. These traits evolved after the bony fishes branch separated but before the mammal and bird branches split. Hair and milk evolved in the mammal branch while wings evolved in the bird branch.
**Arthropod Anatomy** A crayfish, a spider, and a dragonfly are shown in Figure 2A. Notice that all three species have a hard external skeleton, a body divided into segments, and legs with joints. These shared traits support the idea that the three species are related.

![Similarities in Arthropod Anatomy](image)

**Figure 2A** Related species share anatomical traits. This diagram shows three anatomical traits that are found in all arthropod species, including crayfish, spiders, and dragonflies.

In fact, dragonflies, beetles, and crayfish all belong to a group of animals known as arthropods. This group includes spiders, insects, lobsters, crabs, scorpions, and many other species. All arthropods inherited an external skeleton, a segmented body, and legs with joints from their common ancestor, which is why they share these traits.

Within the arthropods, the insects include species such as dragonflies, beetles, butterflies, mosquitoes, and ants. All insects have wings and exactly six legs. These anatomical similarities provide evidence that all insects are closely related to one another.

**Vertebrate Anatomy** The skeletons of vertebrates also show shared anatomical traits. The front limbs of five species are shown in Figure 2B. Each species uses its limbs in a different way—whales swim with their flippers, frogs jump or walk with their legs, humans manipulate objects with their hands, lions run with their legs, and birds fly with their wings. Given these different functions, you might expect the limbs to look completely different. And in a way, they do—the five limbs have very different shapes.
Plants that have different traits are more distantly related. Roses and cherry trees, for example, have flat leaves and use flowers for reproduction. Roses and cherries are more distant relatives of bristlecone pines and larches than redwoods, firs, and cedars.

Check for Understanding:

1. Based on its anatomy, is this beetle an arthropod? Why or why not?

![Beetle Image]

2. Why might these five different species of vertebrates have the same bone arrangement in their limbs despite being so different?

![Vertebrate Bones Image]
tell that the fossil belongs to a specific kind of conifer—a redwood. The cones of a currently living redwood species are also shown, for comparison.

Another example can be seen in Fossil B. Fossil B has flowers, so it must have been left by a flowering plant. By comparing the traits of Fossil B to the traits of other flowering plants, scientists were able to determine that the fossil is a relative of flowering plants called heathers. A currently living heather species is shown for comparison. What similarities can you see?

Fossils show that birds are reptiles and that birds are in fact dinosaurs. The discovery of many feathered dinosaur fossils provides strong evidence of this relationship. The dinosaur fossil here is about 125 million years old and shows visible feather imprints around the animal’s head and body.

**Fossil Birds and Dinosaurs** Fossils were very important in figuring out the evolutionary relationships of one important group—birds. The relationships of birds were unclear at first, partly because no other living species share birds’ most striking anatomical features, such as feathers and feathered wings.

Fossils show that birds are a group of reptiles and, specifically, a group of dinosaurs. As you have already learned, the fossil bird *Archaeopteryx* greatly resembles a group of dinosaurs known as dromaeosaurs. At the same time, *Archaeopteryx* has many features unique to birds, such as feathers, feathered wings, and a wishbone. This combination of dinosaur and bird traits shows that *Archaeopteryx* represents an intermediate stage between dinosaurs and modern birds. In recent decades, many more feathered dinosaur fossils have been found, strengthening the evidence that birds are descended from dinosaurs.

Birds are the only dinosaurs that survived the mass extinction at the end of the Cretaceous Period. But how does this help scientists determine which species birds are most closely related to among Earth’s living species? Scientists know that dinosaurs are closely related to alligators and crocodiles because all three share many anatomical traits. What does this mean about the closest living relatives of birds? They are also crocodiles and alligators.
**Figure 4A** Traits in plant embryos can help scientists determine the evolutionary relationships among plants. One example comes from the number of embryonic leaves, or cotyledons, in flowering plant embryos. The embryos of most flowering plants have two cotyledons, but in certain species, such as corn, there is only one cotyledon. All flowering plants with only one cotyledon are closely related.

**Figure 4B** Early embryos of vertebrate species look similar because all vertebrates inherited the same early pattern of development from their common ancestor. Vertebrate embryos have gill slits and tails, even though not all species have gills and tails as adults. For example, humans have neither gills nor tails as adults.

**Vertebrate Embryos** Figure 4B shows the early, middle, and late embryos of several species of vertebrates. Although the adult animals are very different, their early embryos look similar. For example, the early embryos all have structures called gill slits. In fish, the gill slits
**Penny Boat Challenge**

**Problem:** Can the shape of a boat affect the amount of buoyancy it has?

**Research:** Buoyancy is the upward force that keeps things afloat. When placed in water, an object will float if its buoyancy is greater than its weight. And it will sink if its weight is greater than its buoyancy.

"People have been aware of objects floating on water (or sinking) since before recorded history. But it was not until Archimedes of Syracuse came along, that the theory of flotation and the buoyancy principle were defined." Archimedes was a mathematician born in 287 BCE, in the city of Syracuse on the island of Sicily. Archimedes is best remembered for a discovery involving the crown of King Hiero II.

**Procedure:**
- Cut three pieces of 15 cm by 15 cm (square) aluminum foil.
- Think up a boat design and construct your boat using **only** one piece of the heavy duty aluminum foil.
- Pennies are the only item you may add to your boat. Your boat cannot be attached to anything.
- Slowly add pennies to your boat. Once water enters the boat, or any part of the boat touches the bottom of the container, your boat is considered sunk! (The boat must remain floating for 5 seconds before it is considered a successfully added penny... after 5 seconds you may then add another penny)
- The last penny added (that sunk the boat) will not count in the total amount held.
- Use the chart below to make sketches of your boat and to keep track of your trials, errors, and successes.

<table>
<thead>
<tr>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prediction:</td>
<td>Prediction:</td>
<td>Prediction:</td>
</tr>
<tr>
<td>Number of pennies: _________</td>
<td>Number of pennies: _________</td>
<td>Number of pennies: _________</td>
</tr>
<tr>
<td>Sketch 1</td>
<td>Sketch 2</td>
<td>Sketch 3</td>
</tr>
<tr>
<td>Outcome: Successful? (Y/N)</td>
<td>Outcome: Successful? (Y/N)</td>
<td>Outcome: Successful? (Y/N)</td>
</tr>
<tr>
<td>Actual # of pennies: _________</td>
<td>Actual # of pennies: _________</td>
<td>Actual # of pennies: _________</td>
</tr>
</tbody>
</table>
Session 15

Science A to Z Puzzle

Can you find 26 science terms in the puzzle?

* Indicates two words!

Challenge: Research 3 terms from the puzzle and create a trivia question for each to share with your classmates!
Math
Grade 7
Covers week of May 4th –
week of June 16th
Grade 7 Mathematics

Pencil-Paper Packet
| 12-13 | Angle Relationships  
|       | Drawing Polygons with Given Conditions  
|       | Solid Geometry | Unit 7 Family Support Materials  
|       |               | (Expose students to vocab and concepts, use examples from family materials) |
| 14-14 | Comparing Populations | Unit 8 Family Support Materials  
|       |               | (Expose students to vocab and concepts, use examples from family materials) |
| June 8 (B) |          |               |                          |
| June 9 (G)   |          |               |                          |
| June 10 (B)  |          |               |                          |
| June 11 (G)  |          |               |                          |
| June 12 (B)  |          |               |                          |
| June 15 (G)  |          |               |                          |
| June 16 (B)  |          |               |                          |
3. Decide which story goes with which equation-diagram pair:

- Three friends went cherry picking and each picked the same amount of cherries, in pounds. Before they left the cherry farm, someone gave them an additional 6 pounds of cherries. Altogether, they had 39 pounds of cherries.

- One of the friends made three cherry tarts. She put the same number of cherries in each tart, and then added 6 more cherries to each tart. Altogether, the three tarts contained 39 cherries.

Solution:

Diagram A represents \(3x + 6 = 39\) and the story about cherry picking. Diagram B represents \(3(y + 6) = 39\) and the story about making cherry tarts.
\[ 29 = \frac{1}{2}(x + 45) \]
\[ 2 \cdot 29 = 2 \cdot \frac{1}{2}(x + 45) \quad \text{multiply each side by 2} \]
\[ 58 = x + 45 \]
\[ 58 - 45 = x + 45 - 45 \quad \text{subtract 45 from each side} \]
\[ 13 = x \]
2. The equation is true when $e = 6.5$. We can rewrite the equation as $3e = 30 - 10.50$, or $3e = 19.50$. Then we can rewrite this as $e = 19.50 \div 3$, or $e = 6.5$.

3. This means that when $e \geq 6.5$ then Noah's inequality is true.

4. Noah can't really run 6.5 errands, but he could run 7 or more errands, and then he would have more than $30$. 
• $24x - 18$

Solution

1. $3x + 9$ is equivalent to $5x + 8 - 2x + 1$, because $5x + 2x = 3x$ and $8 + 1 = 9$.
2. $24x - 18$ is equivalent to $6(4x - 3)$, because $6 \cdot 4x = 24x$ and $6 \cdot -3 = -18$.
3. $3x + 7$ is equivalent to $(5x + 8) - (2x + 1)$, because $5x - 2x = 3x$ and $8 - 1 = 7$.
4. $-3(4x - 3)$ is equivalent to $-12x + 9$, because $-3 \cdot 4x = -12x$ and $-3 \cdot -3 = 9$. 
3. Write an equation corresponding to each story. If you get stuck, use the diagram.

4. Find the value of the variable in the story.

**Are you ready for more?**

A tutor is starting a business. In the first year, they start with 5 clients and charge $10 per week for an hour of tutoring with each client. For each year following, they double the number of clients and the number of hours each week. Each new client will be charged 150% of the charges of the clients from the previous year.

1. Organize the weekly earnings for each year in a table.

2. Assuming a full-time week is 40 hours per week, how many years will it take to reach full time and how many new clients will be taken on that year?

3. After reaching full time, what is the tutor's annual salary if they take 2 weeks of vacation?

4. Is there another business model you'd recommend for the tutor? Explain your reasoning.
Unit 6 Lesson 6 Cumulative Practice Problems

1. A school ordered 3 large boxes of board markers. After giving 15 markers to each of 3 teachers, there were 90 markers left. The diagram represents the situation. How many markers were originally in each box?

   ![Diagram](image)

   (From Unit 6, Lesson 2.)

2. The diagram can be represented by the equation $25 = 2 + 6x$. Explain where you can see the 6 in the diagram.

   ![Diagram](image)

   (From Unit 6, Lesson 3.)
Lesson 7: Reasoning about Solving Equations (Part 1)

7.1: Hanger Diagrams

In the two diagrams, all the triangles weigh the same and all the squares weigh the same.

For each diagram, come up with . . .

1. One thing that must be true

2. One thing that could be true

3. One thing that cannot possibly be true
7.3: Use Hangers to Understand Equation Solving

Here are some balanced hangers where each piece is labeled with its weight. For each diagram:

1. Write an equation.

2. Explain how to figure out the weight of a piece labeled with a letter by reasoning about the diagram.

3. Explain how to figure out the weight of a piece labeled with a letter by reasoning about the equation.
So the hanger will balance with $\frac{1}{3}$ of the weight on each side: $\frac{1}{3} \cdot 6 = \frac{1}{3} \cdot 3x$.

The two sides of the hanger balance with these weights: 6 1-unit weights on one side and 3 weights of unknown size on the other side.

Here is a concise way to write the steps above:

- $7 = 3x + 1$
- $6 = 3x$ after subtracting 1 from each side
- $2 = x$ after multiplying each side by $\frac{1}{3}$
2. Explain how the parts of the balanced hanger compare to the parts of the equation.

\[ 7 = 2x + 3 \]

3. For the hanger below:

   a. Write an equation to represent the hanger.

   b. Draw more hangers to show each step you would take to find \( x \). Explain your reasoning.

   c. Write an equation to describe each hanger you drew. Describe how each equation matches its hanger.
8.3: Use Hangers to Understand Equation Solving, Again

Here are some balanced hangers. Each piece is labeled with its weight.

For each diagram:

1. Assign one of these equations to each hanger:
   
   \begin{align*}
   2(x + 5) &= 16 \\
   3(y + 200) &= 3000 \\
   20.8 &= 4(z + 1.1) \\
   \frac{20}{3} &= 2 \left( w + \frac{2}{3} \right)
   \end{align*}

2. Explain how to figure out the weight of a piece labeled with a letter by reasoning about the diagram.

3. Explain how to figure out the weight of a piece labeled with a letter by reasoning about the equation.
The two sides of the hanger balance with these weights: 3 groups of \(x + 2\) on one side, and 18, or 3 groups of 6, on the other side.

\[3(x + 2) = 18\]

The two sides of the hanger will balance with \(\frac{1}{3}\) of the weight on each side:

\[\frac{1}{3} \cdot 3(x + 2) = \frac{1}{3} \cdot 18.\]

We can remove 2 units of weight from each side, and the hanger will stay balanced. This is the same as subtracting 2 from each side of the equation.

\[x + 2 = 6\]

An equation for the new balanced hanger is \(x = 4\). This gives the solution to the original equation.

Here is a concise way to write the steps above:

\[3(x + 2) = 18\]
\[x + 2 = 6\quad \text{after multiplying each side by } \frac{1}{3}\]
\[x = 4\quad \text{after subtracting 2 from each side}\]
2. Explain how each part of the equation $9 = 3(x + 2)$ is represented in the hanger.

- $x$
- $9$
- $3$
- $x + 2$
- $3(x + 2)$

- the equal sign

3. Select the word from the following list that best describes each situation.
4. Clare drew this diagram to match the equation \(2x + 16 = 50\), but she got the wrong solution as a result of using this diagram.

![Diagram](image)

a. What value for \(x\) can be found using the diagram?

b. Show how to fix Clare's diagram to correctly match the equation.

c. Use the new diagram to find a correct value for \(x\).

d. Explain the mistake Clare made when she drew her diagram.

(From Unit 6, Lesson 3.)
Lesson 8: Reasoning about Solving Equations (Part 2)

Cool Down: Solve Another Equation

Solve the equation $3(x + 4.5) = 36$. If you get stuck, use the diagram.
\[ x = -6 \]
\[ x - 3 = -9 \]
\[ -9 = x - 3 \]
\[ 900 = -100(x - 3) \]
\[ 900 = (x - 3) \cdot (-100) \]
\[ 900 = -100x + 300 \]

1. Explain how you know that each equation has the same solution as the previous equation. Pause for discussion before moving to the next question.

2. Keep your work secret from your partner. Start with the equation \(-5 = x\). Do the same thing to each side at least three times to create an equation that has the same solution as the starting equation. Write the equation you ended up with on a slip of paper, and trade equations with your partner.

3. See if you can figure out what steps they used to transform \(-5 = x\) into their equation. When you think you know, check with them to see if you are right.
Unit 6 Lesson 9 Cumulative Practice Problems

1. Solve each equation.
   a. $4x = -28$

   b. $x - 6 = -2$

   c. $-x + 4 = -9$

   d. $-3x + 7 = 1$

   e. $25x - 11 = -86$

2. Here is an equation $2x + 9 = -15$. Write three different equations that have the same solution as $2x + 9 = -15$. Show or explain how you found them.
5. Match each story to an equation.

A. A stack of nested paper cups is 8 inches tall. The first cup is 4 inches tall and each of the rest of the cups in the stack adds \( \frac{1}{4} \) inch to the height of the stack.

1. \( \frac{1}{4} + 4x = 8 \)

2. \( 4 + \frac{1}{4}x = 8 \)

3. \( 8x + \frac{1}{4} = 4 \)

B. A baker uses 4 cups of flour. She uses \( \frac{1}{4} \) cup to flour the counters and the rest to make 8 identical muffins.

C. Elena has an 8-foot piece of ribbon. She cuts off a piece that is \( \frac{1}{4} \) of a foot long and cuts the remainder into four pieces of equal length.

(From Unit 6, Lesson 4.)
b. How many invitations should Tyler make each day to finish his goal within a week? Explain or show your reasoning.


c. Use Tyler's diagram to write an equation that represents the situation. Explain how each part of the situation is represented in your equation.

d. Show how to solve your equation.

2. Noah and his sister are making prize bags for a game at the fair. Noah is putting 7 pencil erasers in each bag. His sister is putting in some number of stickers. After filling 3 of the bags, they have used a total of 57 items.

\[
\begin{array}{cccc}
\times & 7 & \times & 7 & \times & 7 \\
\end{array}
\]

a. Explain how the diagram represents the situation.

b. Noah writes the equation \(3(x + 7) = 57\) to represent the situation. Do you agree with him? Explain your reasoning.

c. How many stickers is Noah's sister putting in each prize bag? Explain or show your reasoning.
3. Priya and Han plan a fundraiser for the running club. They begin with a balance of -80 because of expenses. In the first hour of the fundraiser they collect equal donations from 9 family members, which brings their balance to -44. How much did each parent give?

4. The running club uses the money they raised to pay for a trip to a canyon. At one point during a run in the canyon, the students are at an elevation of 128 feet. After descending at a rate of 50 feet per minute, they reach an elevation of -472 feet. How long did the descent take?

Are you ready for more?
A musician performed at three local fairs. At the first he doubled his money and spent $30. At the second he tripled his money and spent $54. At the third, he quadrupled his money and spent $72. In the end he had $48 left. How much did he have before performing at the fairs?

Lesson 11 Summary
Many problems can be solved by writing and solving an equation. Here is an example:

Clare ran 4 miles on Monday. Then for the next six days, she ran the same distance each day. She ran a total of 22 miles during the week. How many miles did she run on each of the 6 days?

One way to solve the problem is to represent the situation with an equation, $4 + 6x = 22$, where $x$ represents the distance, in miles, she ran on each of the 6 days. Solving the equation gives the solution to this problem.

\[
4 + 6x = 22 \\
6x = 18 \\
x = 3
\]
3. The baby giraffe weighed 132 pounds at birth. He gained weight at a steady rate for the first 7 months until his weight reached 538 pounds. How much did he gain each month?

4. Six teams are out on the field playing soccer. The teams all have the same number of players. The head coach asks for 2 players from each team to come help him move some equipment. Now there are 78 players on the field. Write and solve an equation whose solution is the number of players on each team.

5. A small town had a population of 960 people last year. The population grew to 1200 people this year. By what percentage did the population grow?

6. The gas tank of a truck holds 30 gallons. The gas tank of a passenger car holds 50% less. How many gallons does it hold?
2. Noah said the equation $1.20(d + 5) = 42$ also represents the situation. Do you agree with Noah? Explain your reasoning.

3. Find the number of minutes Mai walked on the first day. Did you use the diagram, the equation, or another strategy? Explain or show your reasoning.

4. Mai has been walking indoors because of cold temperatures. On Day 4 at noon, Mai hears a report that the temperature is only 9 degrees Fahrenheit. She remembers the morning news reporting that the temperature had doubled since midnight and was expected to rise 15 degrees by noon. Mai is pretty sure she can draw a diagram to represent this situation but isn't sure if the equation is $9 = 15 + 2t$ or $2(t + 15) = 9$. What would you tell Mai about the diagram and the equation and how they might be useful to find the temperature, $t$, at midnight?
Are you ready for more?
A coffee shop offers a special: 33% extra free or 33% off the regular price. Which offer is a better deal? Explain your reasoning.

Lesson 12 Summary
We can solve problems where there is a percent increase or decrease by using what we know about equations. For example, a camping store increases the price of a tent by 25%. A customer then uses a $10 coupon for the tent and pays $152.50. We can draw a diagram that shows first the 25% increase and then the $10 coupon.

```
<table>
<thead>
<tr>
<th>Original price</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>25% increase</td>
<td>.25p</td>
</tr>
<tr>
<td>$10 coupon</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>152.50</td>
</tr>
</tbody>
</table>
```

The price after the 25% increase is \(p + .25p\) or \(1.25p\). An equation that represents the situation could be \(1.25p - 10 = 152.50\). To find the original price before the increase and discount, we can add 10 to each side and divide each side by 1.25, resulting in \(p = 130\). The original price of the tent was $130.
4. Complete each sentence with the word discount, deposit, or withdrawal.
   
a. Clare took $20 out of her bank account. She made a ____.

b. Kiran used a coupon when he bought a pair of shoes. He got a ____.

c. Priya put $20 into her bank account. She made a ____.

d. Lin paid less than usual for a pack of gum because it was on sale. She got a ____.

(From Unit 4, Lesson 11.)

5. Here are two stories:

   o The initial freshman class at a college is 10% smaller than last year's class. But then during the first week of classes, 20 more students enroll. There are then 830 students in the freshman class.

   o A store reduces the price of a computer by $20. Then during a 10% off sale, a customer pays $830.

Here are two equations:

   o $0.9x + 20 = 830$

   o $0.9(x - 20) = 830$

a. Decide which equation represents each story.

b. Explain why one equation has parentheses and the other doesn't.

c. Solve each equation, and explain what the solution means in the situation.
Expressions, Equations, and Inequalities: Mid-Unit Assessment (A)

You may use a four-function or scientific calculator, but not a graphing calculator.

1. This hanger is in balance. There are two labeled weights of 4 grams and 12 grams. The three circles each have the same weight. What is the weight of each circle, in grams?

   \[ \begin{array}{c}
   \times \\
   \times \\
   \times \\
   4 \\
   \end{array} \]

   \[ 12 \]

   A. $\frac{3}{8}$
   B. 1
   C. $\frac{8}{3}$
   D. 8

3. At practice, Diego does twice as many push-ups as Noah, and also 40 jumping jacks. He does 62 exercises in total. The equation $2x + 40 = 62$ describes this situation. What does the variable $x$ represent?

   A. The number of jumping jacks Diego does
   B. The number of push-ups Diego does
   C. The number of jumping jacks Noah does
   D. The number of push-ups Noah does
Lesson 15: Efficiently Solving Inequalities

15.1: Lots of Negatives

Here is an inequality: \(-x \geq -4\).

1. Predict what you think the solutions on the number line will look like.

2. Select all the values that are solutions to \(-x \geq -4\):
   a. 3
   b. -3
   c. 4
   d. -4
   e. 4.001
   f. -4.001

3. Graph the solutions to the inequality on the number line:

   ____________________________________

15.2: Inequalities with Tables

1. Let’s investigate the inequality \(x - 3 > -2\).

\[
\begin{array}{cccccccc}
  x & -4 & -3 & -2 & -1 & 0 & 1 & 2 & 3 & 4 \\
  x - 3 & -7 & -5 & -1 & 1 & & & & & \\
\end{array}
\]

   a. Complete the table.
   b. For which values of \(x\) is it true that \(x - 3 = -2\)?
   c. For which values of \(x\) is it true that \(x - 3 > -2\)?
   d. Graph the solutions to \(x - 3 > -2\) on the number line:

   ____________________________________

2. Here is an inequality: \(2x < 6\).
15.3: Which Side are the Solutions?

1. Let's investigate \(-4x + 5 \geq 25\).
   a. Solve \(-4x + 5 = 25\).

   b. Is \(-4x + 5 \geq 25\) true when \(x\) is 0? What about when \(x\) is 7? What about when \(x\) is -7?

   c. Graph the solutions to \(-4x + 5 \geq 25\) on the number line.

2. Let's investigate \(\frac{4}{3}x + 3 < \frac{23}{3}\).
   a. Solve \(\frac{4}{3}x + 3 = \frac{23}{3}\).

   b. Is \(\frac{4}{3}x + 3 < \frac{23}{3}\) true when \(x\) is 0?

   c. Graph the solutions to \(\frac{4}{3}x + 3 < \frac{23}{3}\) on the number line.

3. Solve the inequality \(3(x + 4) > 17.4\) and graph the solutions on the number line.
Unit 6 Lesson 15 Cumulative Practice Problems

1. a. Consider the inequality \(-1 \leq \frac{x}{2}\).
   i. Predict which values of \(x\) will make the inequality true.

   ii. Complete the table to check your prediction.

<table>
<thead>
<tr>
<th>(x)</th>
<th>-4</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\frac{x}{2})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   b. Consider the inequality \(1 \leq \frac{-x}{2}\).
   i. Predict which values of \(x\) will make it true.

   ii. Complete the table to check your prediction.

<table>
<thead>
<tr>
<th>(x)</th>
<th>-4</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\frac{-x}{2})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Diego is solving the inequality \(100 - 3x \geq -50\). He solves the equation \(100 - 3x = -50\) and gets \(x = 50\). What is the solution to the inequality?
   A. \(x < 50\)
   B. \(x \leq 50\)
   C. \(x > 50\)
   D. \(x \geq 50\)

3. Solve the inequality \(-5(x - 1) > -40\), and graph the solution on a number line.

4. Select all values of \(x\) that make the inequality \(-x + 6 \geq 10\) true.
Lesson 17: Modeling with Inequalities

17.1: Possible Values

The stage manager of the school musical is trying to figure out how many sandwiches he can order with the $83 he collected from the cast and crew. Sandwiches cost $5.99 each, so he lets $x$ represent the number of sandwiches he will order and writes $5.99x \leq 83$. He solves this to 2 decimal places, getting $x \leq 13.86$.

Which of these are valid statements about this situation? (Select all that apply.)

1. He can call the sandwich shop and order exactly 13.86 sandwiches.
2. He can round up and order 14 sandwiches.
3. He can order 12 sandwiches.
4. He can order 9.5 sandwiches.
5. He can order 2 sandwiches.
6. He can order -4 sandwiches.

17.2: Elevator

A mover is loading an elevator with many identical 48-pound boxes. The mover weighs 185 pounds. The elevator can carry at most 2000 pounds.

1. Write an inequality that says that the mover will not overload the elevator on a particular ride. Check your inequality with your partner.

2. Solve your inequality and explain what the solution means.

3. Graph the solution to your inequality on a number line.
Unit 6 Lesson 17 Cumulative Practice Problems

1. 28 students travel on a field trip. They bring a van that can seat 12 students. Elena and Kiran's teacher asks other adults to drive cars that seat 3 children each to transport the rest of the students.

   Elena wonders if she should use the inequality $12 + 3n > 28$ or $12 + 3n \geq 28$ to figure out how many cars are needed. Kiran doesn't think it matters in this case. Do you agree with Kiran? Explain your reasoning.

2. a. In the cafeteria, there is one large 10-seat table and many smaller 4-seat tables. There are enough tables to fit 200 students. Write an inequality whose solution is the possible number of 4-seat tables in the cafeteria.

b. 5 barrels catch rainwater in the schoolyard. Four barrels are the same size, and the fifth barrel holds 10 liters of water. Combined, the 5 barrels can hold at least 200 liters of water. Write an inequality whose solution is the possible size of each of the 4 barrels.

c. How are these two problems similar? How are they different?
Lesson 20: Combining Like Terms (Part 1)

20.1: Why is it True?

Explain why each statement is true.

1. \(5 + 2 + 3 = 5 + (2 + 3)\)

2. \(9a\) is equivalent to \(11a - 2a\).

3. \(7a + 4 - 2a\) is equivalent to \(7a - 2a + 4\).

4. \(8a - (8a - 8)\) is equivalent to \(8\).

20.2: A’s and B’s

Diego and Jada are both trying to write an expression with fewer terms that is equivalent to

\[7a + 5b - 3a + 4b\]

- Jada thinks \(10a + 1b\) is equivalent to the original expression.
- Diego thinks \(4a + 9b\) is equivalent to the original expression.

1. We can show expressions are equivalent by writing out all the variables. Explain why the expression on each row (after the first row) is equivalent to the expression on the row before it.

\[
\begin{align*}
7a + 5b - 3a + 4b & \\
(a + a + a + a + a + a + a) + (b + b + b + b + b) - (a + a + a) + (b + b + b + b) & \\
(a + a + a + a) + (a + a + a) + (b + b + b + b) - (a + a + a) + (b + b + b + b) & \\
(a + a + a + a) + (b + b + b + b + b) + (a + a + a) - (a + a + a) + (b + b + b + b) & \\
(a + a + a + a) + (b + b + b + b + b) + (b + b + b + b) & \\
(a + a + a + a) + (b + b + b + b + b) + (b + b + b + b) & \\
4a + 9b & 
\end{align*}
\]
3. $6x + ? = -10x$

4. $6x + ? = 0$

5. $6x + ? = 10$

Check your results with your partner and resolve any disagreements. Next move on to Set B.

Set B

1. $6x - ? = 2x$

2. $6x - ? = 10x$
Unit 6 Lesson 20 Cumulative Practice Problems

1. Andre says that $10x + 6$ and $5x + 11$ are equivalent because they both equal 16 when $x$ is 1. Do you agree with Andre? Explain your reasoning.

2. Select all expressions that can be subtracted from $9x$ to result in the expression $3x + 5$.
   
   A. $-5 + 6x$
   B. $5 - 6x$
   C. $6x + 5$
   D. $6x - 5$
   E. $-6x + 5$

3. Select all the statements that are true for any value of $x$.
   
   A. $7x + (2x + 7) = 9x + 7$
   B. $7x + (2x - 1) = 9x + 1$
   C. $\frac{1}{2}x + (3 - \frac{1}{2}x) = 3$
   D. $5x - (8 - 6x) = -x - 8$
   E. $0.4x - (0.2x + 8) = 0.2x - 8$
   F. $6x - (2x - 4) = 4x + 4$
Lesson 21: Combining Like Terms (Part 2)

21.1: True or False?
Select all the statements that are true. Be prepared to explain your reasoning.

1. $4 - 2(3 + 7) = 4 - 2 \cdot 3 - 2 \cdot 7$
2. $4 - 2(3 + 7) = 4 + -2 \cdot 3 + -2 \cdot 7$
3. $4 - 2(3 + 7) = 4 - 2 \cdot 3 + 2 \cdot 7$
4. $4 - 2(3 + 7) = 4 - (2 \cdot 3 + 2 \cdot 7)$

21.2: Seeing it Differently
Some students are trying to write an expression with fewer terms that is equivalent to $8 - 3(4 - 9x)$.

Noah says, "I worked the problem from left to right and ended up with $20 - 45x."$

Lin says, "I started inside the parentheses and ended up with $23x."$

\[
\begin{align*}
8 - 3(4 - 9x) & \quad 8 - 3(4 - 9x) \\
5(4 - 9x) & \quad 8 - 3(-5x) \\
20 - 45x & \quad 8 + 15x \\
\end{align*}
\]

Jada says, "I used the distributive property and ended up with $27x - 4."$

Andre says, "I also used the distributive property, but I ended up with $-4 - 27x."$

\[
\begin{align*}
8 - 3(4 - 9x) & \quad 8 - 3(4 - 9x) \\
8 - (12 - 27x) & \quad 8 - 12 - 27x \\
8 - 12 - (-27x) & \quad -4 - 27x \\
27x - 4 & \\
\end{align*}
\]
Unit 6 Lesson 21 Cumulative Practice
Problems

1. ◦ Noah says that $9x - 2x + 4x$ is equivalent to $3x$, because the subtraction sign tells us to subtract everything that comes after $9x$.

◦ Elena says that $9x - 2x + 4x$ is equivalent to $11x$, because the subtraction only applies to $2x$.

Do you agree with either of them? Explain your reasoning.

2. Identify the error in generating an expression equivalent to $4 + 2x - \frac{1}{2}(10 - 4x)$.
   Then correct the error.

   $4 + 2x + \frac{1}{2}(10 - 4x)$
   $4 + 2x - 5 + 2x$
   $4 + 2x - 5 + 2x$
   $=-1$

3. Select all expressions that are equivalent to $5x - 15 - 20x + 10$.

   A. $5x - (15 + 20x) + 10$
   B. $5x + -15 + -20x + 10$
   C. $5(x - 3 - 4x + 2)$
   D. $-5(-x + 3 + 4x + -2)$
   E. $-15x - 5$
   F. $-5(3x + 1)$
   G. $-15(x - \frac{1}{3})$
Lesson 22: Combining Like Terms (Part 3)

22.1: Are They Equal?
Select all expressions that are equal to $8 - 12 - (6 + 4)$.

1. $8 - 6 - 12 + 4$
2. $8 - 12 - 6 - 4$
3. $8 - 12 + (6 + 4)$
4. $8 - 12 - 6 + 4$
5. $8 - 4 - 12 - 6$

22.2: X’s and Y’s
Match each expression in column A with an equivalent expression from column B. Be prepared to explain your reasoning.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. $(9x + 5y) + (3x + 7y)$</td>
<td>1. $12(x + y)$</td>
</tr>
<tr>
<td>2. $(9x + 5y) - (3x + 7y)$</td>
<td>2. $12(x - y)$</td>
</tr>
<tr>
<td>3. $(9x + 5y) - (3x - 7y)$</td>
<td>3. $6(x - 2y)$</td>
</tr>
<tr>
<td>4. $9x - 7y + 3x + 5y$</td>
<td>4. $9x + 5y + 3x - 7y$</td>
</tr>
<tr>
<td>5. $9x - 7y + 3x - 5y$</td>
<td>5. $9x + 5y - 3x + 7y$</td>
</tr>
<tr>
<td>6. $9x - 7y - 3x - 5y$</td>
<td>6. $9x - 3x + 5y - 7y$</td>
</tr>
</tbody>
</table>
Lesson 22 Summary

Combining like terms is a useful strategy that we will see again and again in our future work with mathematical expressions. It is helpful to review the things we have learned about this important concept.

• Combining like terms is an application of the distributive property. For example:

\[
2x + 9x \\
(2 + 9) \cdot x \\
11x
\]

• It often also involves the commutative and associative properties to change the order or grouping of addition. For example:

\[
2a + 3b + 4a + 5b \\
2a + 4a + 3b + 5b \\
(2a + 4a) + (3b + 5b) \\
6a + 8b
\]

• We can't change order or grouping when subtracting; so in order to apply the commutative or associative properties to expressions with subtraction, we need to rewrite subtraction as addition. For example:

\[
2a - 3b - 4a - 5b \\
2a - 3b - 4a + -5b \\
2a + -4a + -3b + -5b \\
-2a + -8b \\
-2a - 8b
\]

• Since combining like terms uses properties of operations, it results in expressions that are equivalent.

• The like terms that are combined do not have to be a single number or variable; they may be longer expressions as well. Terms can be combined in any sum where there is a common factor in all the terms. For example, each term in the expression 5(x + 3) - 0.5(x + 3) + 2(x + 3) has a factor of (x + 3). We can rewrite the expression with fewer terms by using the distributive property:

\[
5(x + 3) - 0.5(x + 3) + 2(x + 3) \\
(5 - 0.5 + 2)(x + 3) \\
6.5(x + 3)
\]
3. For each situation, write an expression for the new balance using as few terms as possible.
   
a. A checking account has a balance of -$126.89. A customer makes two deposits, one 3 ½ times the other, and then withdraws $25.

   b. A checking account has a balance of $350. A customer makes two withdrawals, one $50 more than the other. Then he makes a deposit of $75.

   (From Unit 6, Lesson 20.)

4. Tyler is using the distributive property on the expression \(9 - 4(5x - 6)\). Here is his work:
   
   \[9 - 4(5x - 6)\]
   \[9 + (-4)(5x + -6)\]
   \[9 + -20x + -6\]
   \[3 - 20x\]

   Mai thinks Tyler's answer is incorrect. She says, "If expressions are equivalent then they are equal for any value of the variable. Why don't you try to substitute the same value for \(x\) in all the equations and see where they are not equal?"

   a. Find the step where Tyler made an error.

   b. Explain what he did wrong.

   c. Correct Tyler's work.

   (From Unit 6, Lesson 21.)
Expressions, Equations, and Inequalities: End-of-Unit Assessment (A)

2. Which number line shows all the values of $x$ that make the inequality $-3x + 1 < 7$ true?

A. A

B. B

C. C

D. D
Family Support Materials

Angles, Triangles, and Prisms

Angle Relationships

Family Support Materials 1

This week your student will be working with some relationships between pairs of angles.

- If two angles add to 90°, then we say they are complementary angles. If two angles add to 180°, then we say they are supplementary angles. For example, angles $JGF$ and $JGH$ below are supplementary angles, because $30 + 150 = 180$.

- When two lines cross, they form two pairs of vertical angles across from one another. In the previous figure, angles $JGF$ and $HGI$ are vertical angles. So are angles $JGH$ and $FGJ$. Vertical angles always have equal measures.

Here is a task to try with your student: Rectangle $PQRS$ has points $T$ and $V$ on two of its sides.

1. Angles $SVT$ and $TVR$ are supplementary. If angle $SVT$ measures 117°, what is the measure of angle $TVR$?

2. Angles $QTP$ and $QPT$ are complementary. If angle $QTP$ measures 53°, what is the measure of angle $QPT$?
Drawing Polygons with Given Conditions

Family Support Materials 2

This week your student will be drawing shapes based on a description. What options do we have if we need to draw a triangle, but we only know some of its side lengths and angle measures?

- Sometimes we can draw more than one kind of triangle with the given information. For example, “sides measuring 5 units and 6 units, and an angle measuring 32°” could describe two triangles that are not identical copies of each other.

- Sometimes there is only one unique triangle based on the description. For example, here are two identical copies of a triangle with two sides of length 3 units and an angle measuring 60°. There is no way to draw a different triangle (a triangle that is not an identical copy) with this description.

- Sometimes it is not possible to draw a triangle with the given information. For example, there is no triangle with sides measuring 4 inches, 5 inches, and 12 inches. (Try to draw it and see for yourself!)

Here is a task to try with your student: Using each set of conditions, can you draw a triangle that is not an identical copy of the one shown?

1. A triangle with sides that measure 4, 6, and 9 units.
Solid Geometry

Family Support Materials 3

This week your student will be thinking about the surface area and volume of three-dimensional figures. Here is a triangular prism. Its base is a right triangle with sides that measure 12, 12, and 17 inches.

![Triangular prism diagram]

In general, we can find the volume of any prism by multiplying the area of its base times its height. For this prism, the area of the triangular base is 72 in$^2$, so the volume is 72 \cdot 14, or 1,008 in$^3$.

To find the surface area of a prism, we can find the area of each of the faces and add them up. The example prism has two faces that are triangles and three faces that are rectangles. When we add all these areas together, we see that the prism has a total surface area of 72 + 72 + 168 + 168 + 238, or 718 in$^2$.

Here is a task to try with your student: The base of this prism is a hexagon where all the sides measure 5 cm. The area of the base is about 65 cm$^2$. 
Family Support Materials

Probability and Sampling
Probabilities of Single Step Events

Family Support Materials 1

This week your student will be working with probability. A probability is a number that represents how likely something is to happen. For example, think about flipping a coin.

- The probability that the coin lands somewhere is 1. That is certain.
- The probability that the coin lands heads up is $\frac{1}{2}$, or 0.5.
- The probability that the coin turns into a bottle of ketchup is 0. That is impossible.

Sometimes we can figure out an exact probability. For example, if we pick a random date, the chance that it is on a weekend is $\frac{2}{7}$, because 2 out of every 7 days fall on the weekend. Other times, we can estimate a probability based on what we have observed in the past.

Here is a task to try with your student:

People at a fishing contest are writing down the type of each fish they catch. Here are their results:

- Person 1: bass, catfish, catfish, bass, bass, bass
- Person 2: catfish, catfish, bass, bass, bass, catfish, catfish, bass, catfish
- Person 3: bass, bass, bass, catfish, bass, bass, catfish, bass, catfish

1. Estimate the probability that the next fish that gets caught will be a bass.

2. Another person in the competition caught 5 fish. Predict how many of these fish were bass.

3. Before the competition, the lake was stocked with equal numbers of catfish and bass. Describe some possible reasons for why the results do not show a probability of $\frac{1}{2}$ for catching a bass.

Solution:
<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
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