

# JCPS NTI Grade 8 Mathematics Packet #2



## Grade 8 Mathematics

### Student At-Home Activity Packet

This At-Home Activity Packet is intended for a two-week period, and it includes lessons that your student may complete across more than one day.

The practice problems align to important math concepts your student has worked with so far this year.

Specific instructions to guide your student are found at the top of each page.

Encourage your student to do the best they can with this content—the most important thing is that they continue developing their mathematical fluency and skills.

See the Grade 8 Math  
concepts covered in  
this packet!



# Understanding Linear Equations

## Finding the Slope of a Line

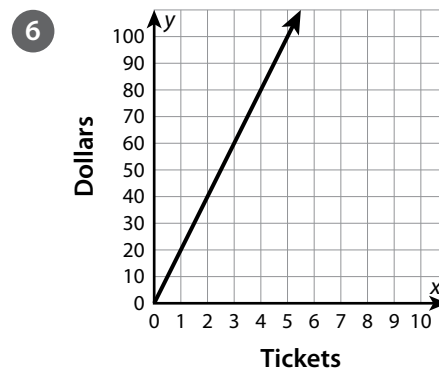
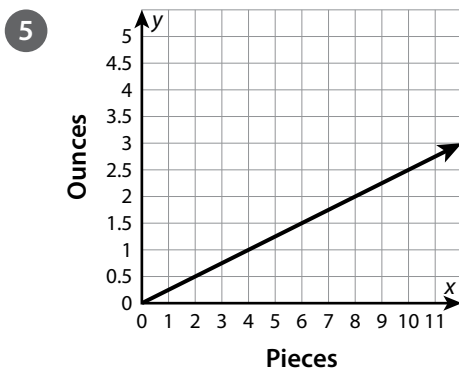
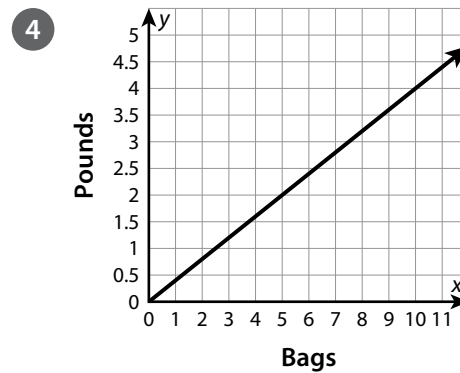
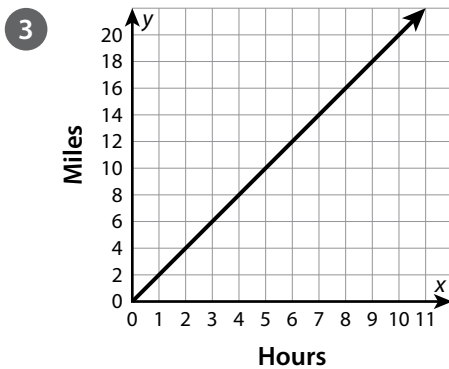
► Use the information provided to find the slope of each line. State what the slope represents.

1

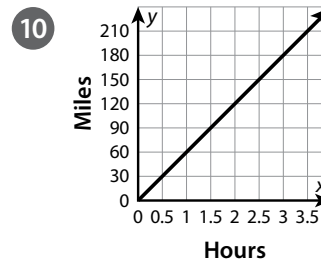
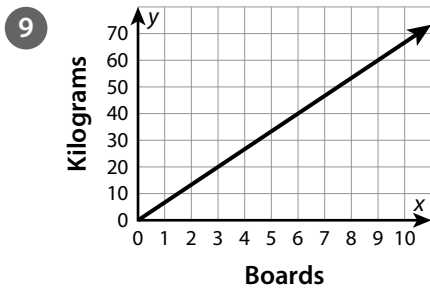
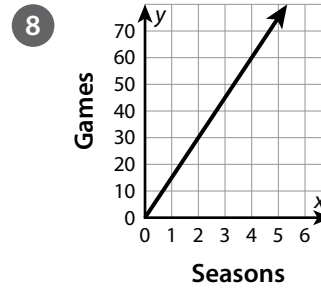
<b>Seconds</b>	0	5	10
<b>Feet</b>	0	30	60

2

<b>Hours</b>	0	2	5
<b>Dollars</b>	0	18	45



## Finding the Slope of a Line *continued*

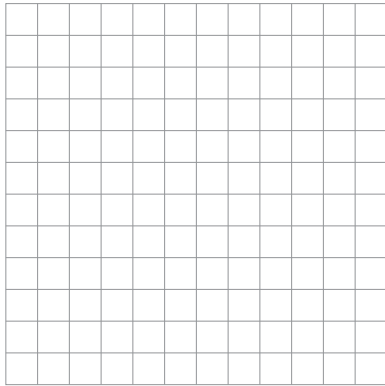


- 11 Compare finding the slope using a table and using a graph.

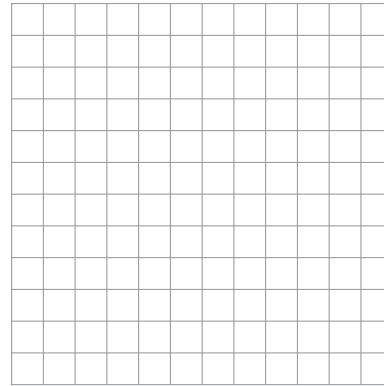
# Graphing a Linear Equation Given in Any Form

► Graph each linear equation on the grid provided. Be sure to label the units on the  $x$ - and  $y$ -axes.

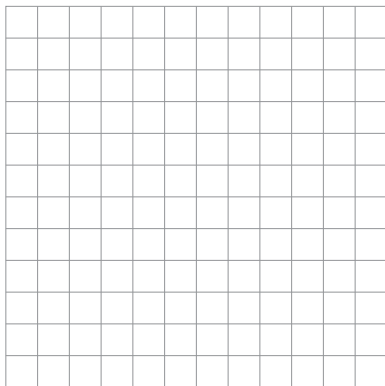
1  $5x + 2y = 10$



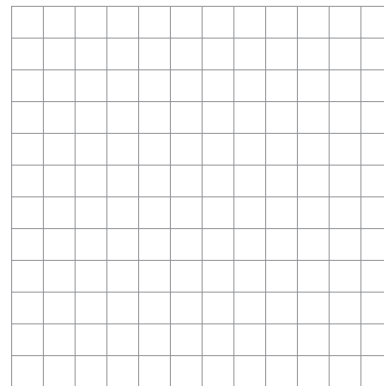
2  $200x - 300y = 600$



3  $-\frac{1}{2}x - 2y = 4$

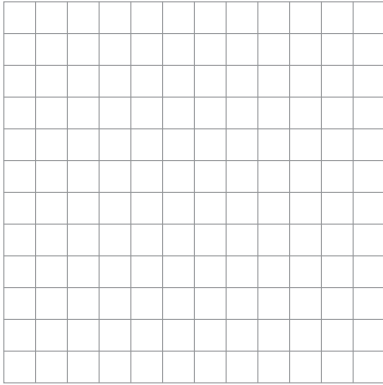


4  $6x - 12y + 24 = 0$

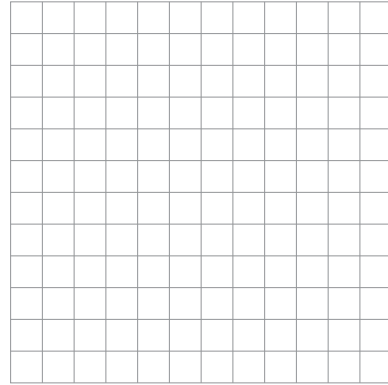


# Graphing a Linear Equation Given in Any Form *continued*

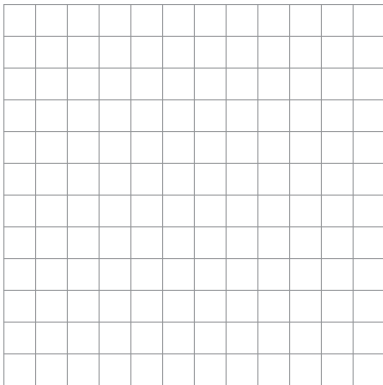
5  $-150x + 5y = 300$



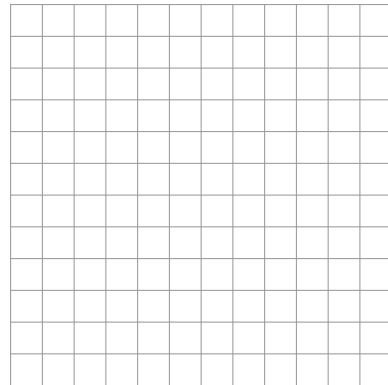
6  $-4x - 40y - 80 = 0$



7  $-6x + 7y = 42$



8  $10x + \frac{1}{3}y = 30$

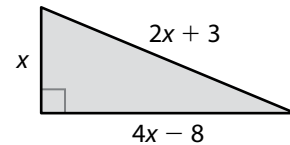


9 Which method do you prefer for graphing linear equations that are not in the form  $y = mx + b$ ?

# Representing and Solving Problems with One-Variable Equations

► Write and solve an equation to answer each question.

- 1 The perimeter of the triangle shown is 30 inches. What is the length of the longest side of the triangle?

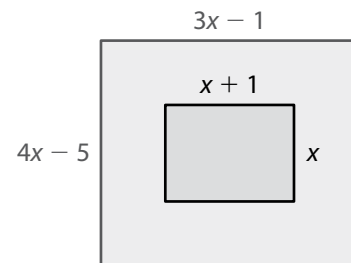


- 2 Two times the quantity of seven less than one-fourth of a number is equal to four more than one-third of the number. What is the number?
- 3 Amanda uses a rectangular canvas for a painting. The length is  $6x - 3$  centimeters. The width is  $2x + 6$  centimeters, and is  $\frac{4}{5}$  of the length. What are the dimensions of the canvas?
- 4 Three friends fill bags with trash at a neighborhood cleanup. Randall's bag weighs  $3x - 7$  pounds, Seth's bag weighs  $2x - 10$  pounds, and Joanna's bag weighs  $2x + 2$  pounds. Together, Randall's and Joanna's bags weigh 3 times as much as Seth's bag. How many pounds of trash does each friend pick up?

## Representing and Solving Problems with One-Variable Equations *continued*

- 5 Eli and Angela are saving money to buy their grandparents an anniversary gift. Eli has saved \$8 more than  $\frac{1}{3}$  of Angela's savings. If they each save \$10 more, Eli will have saved \$4 more than Angela's savings. How much has Eli saved?

- 6 The perimeter of the larger rectangle is 2 meters greater than twice the perimeter of the smaller rectangle. What is the perimeter of the larger rectangle?



# Understanding Systems of Linear Equations

## Solving Systems of Linear Equations by Substitution

► Find the solution of each system of equations.

1  $y = 2x - 1$

$y = 3x + 2$

---

2  $x = y + 4$

$2x + 2y = 16$

---

3  $x + y = 5$

$6x + 3y = 27$

---

4  $5x + 2y = 10$

$2x + y = 2$

---

5  $4x - 8y = -26$

$9x + 4y = 13$

---

6  $2x - 3y = 24$

$2x + y = 4$

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7 How do you decide which variable to substitute when solving a system of equations by substitution? Explain.



# Solving Systems of Linear Equations by Elimination

► Find the solution to each system of equations.

1  $4x - 12y = -8$   
 $-3x + 12y = 12$

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2  $6x - 9y = 18$   
 $-6x + 2y = -4$

---

3  $6x + 3y = 3$   
 $3x - y = 4$

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4  $-3x + 2y = -17$   
 $-6x + 3y = -30$

---

5  $7x + 6y = 16$   
 $4x - 2y = 1$

---

6  $16x + 5y = -2$   
 $4x - y = -2$

---

7 When using the elimination method to solve a system of equations, how do you choose which variable to eliminate?

# Solving Real-World Problems with Systems of Linear Equations

► Solve the problems by solving a system of equations.

- 1 Otis paints the interior of a home for \$45 per hour plus \$75 for supplies. Shireen paints the interior of a home for \$55 per hour plus \$30 for supplies. The equations give the total cost for  $x$  hours of work for each painter. For how many hours of work are Otis's and Shireen's costs equal? What is the cost for this number of hours?

$$y = 45x + 75$$

$$y = 55x + 30$$

---

- 3 There are 47 people attending a play at an outdoor theater. There are 11 groups of people sitting in groups of 3 or 5. How many groups of each size are there?
- 
- 

- 2 Calvin has 13 coins, all of which are quarters or nickels. The coins are worth \$2.45. How many of each coin does Calvin have?
- 

- 4 Agnes has 23 collectible stones, all of which are labradorite crystals or galena crystals. Labradorite crystals are worth \$20 each, while galena crystals are worth \$13 each. Agnes earns \$439 by selling her entire collection. How many stones of each type did she sell?
- 
-

## Solving Real-World Problems with Systems of Linear Equations *continued*

- 5 A dog groomer buys 7 packages of treats. Gourmet treats are sold in packs of 2. Treats that help clean a dog's teeth are sold in packs of 5. The dog groomer buys 26 treats in all. How many packages of each did she buy?
- 6 Copland competes in 27 swimming events this season. He wins either first place or second place in each event. Copland has 3 more first-place wins than second-place wins. In how many events did he win first place, and in how many did he win second place?

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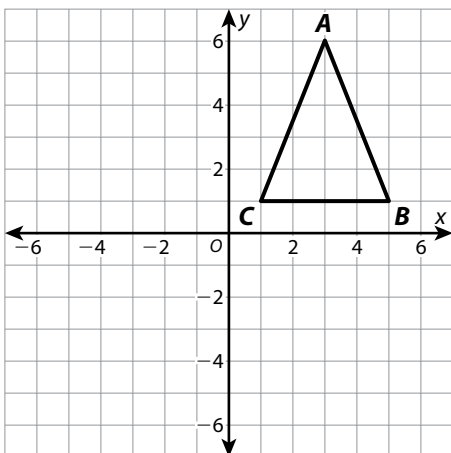
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- 7 Choose one problem from problems 1–6. Check your answer by solving the system of equations in a different way.

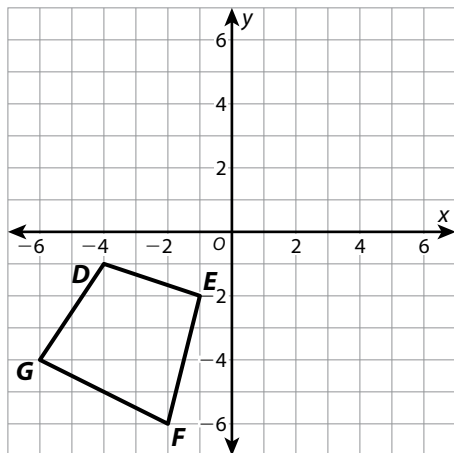
## Performing Sequences of Rigid Transformations

- Perform the given sequence of transformations on each figure. Write the coordinates of the vertices of the final image. Then tell whether the final image is congruent to the original figure.

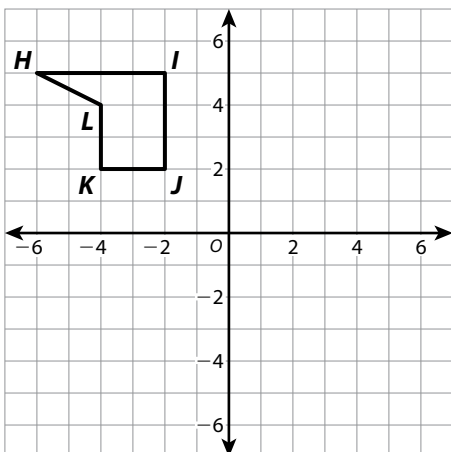
- 1 Reflect across the  $x$ -axis.  
Translate 5 units left.



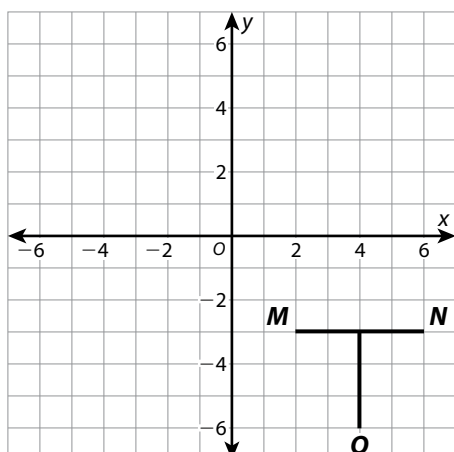
- 2 Rotate  $90^\circ$  clockwise around the origin.  
Reflect across the  $x$ -axis.



- 3 Translate 2 units right and 4 units down.  
Rotate  $180^\circ$  around the origin.

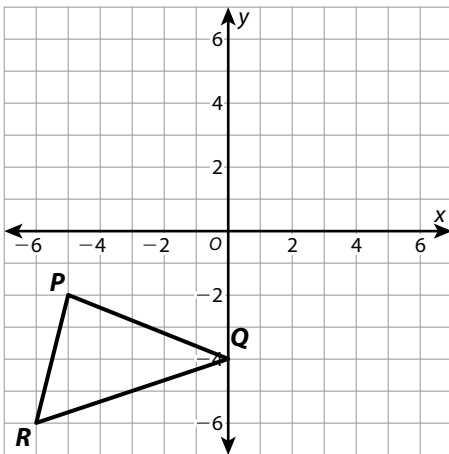


- 4 Reflect across the  $x$ -axis. Rotate  $90^\circ$  counterclockwise around the origin.

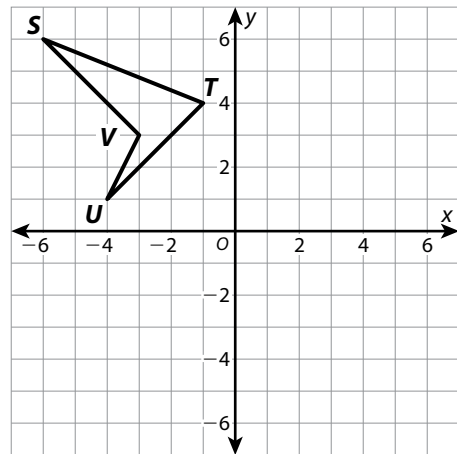


# Performing Sequences of Rigid Transformations *continued*

- 5 Reflect across the  $y$ -axis.  
Translate 5 units up.  
Rotate  $90^\circ$  clockwise around the origin.



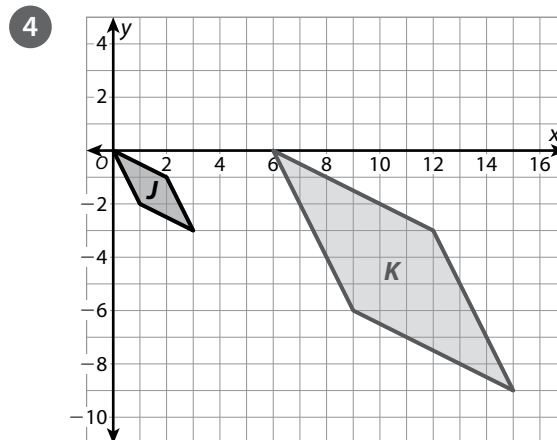
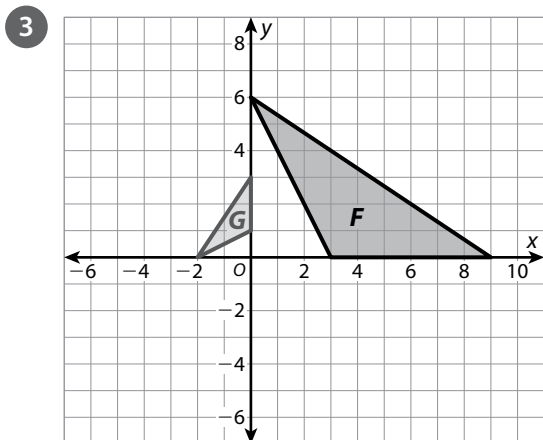
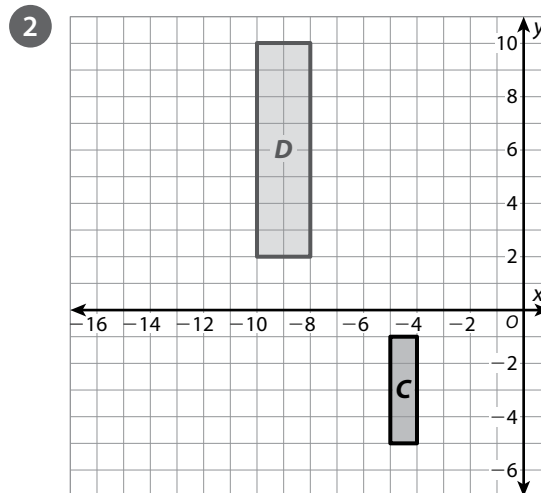
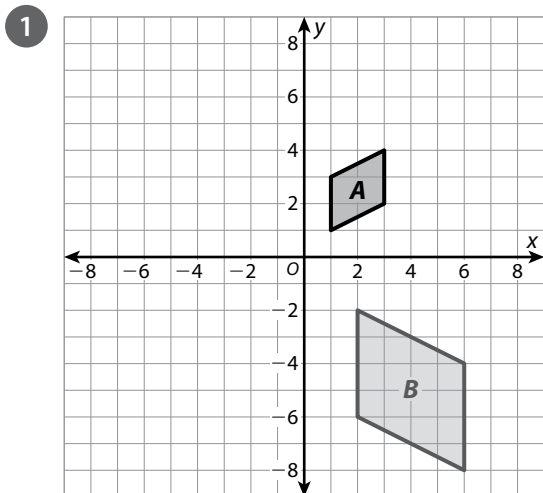
- 6 Translate 6 units right.  
Rotate  $180^\circ$  around the origin.  
Reflect across the  $y$ -axis.



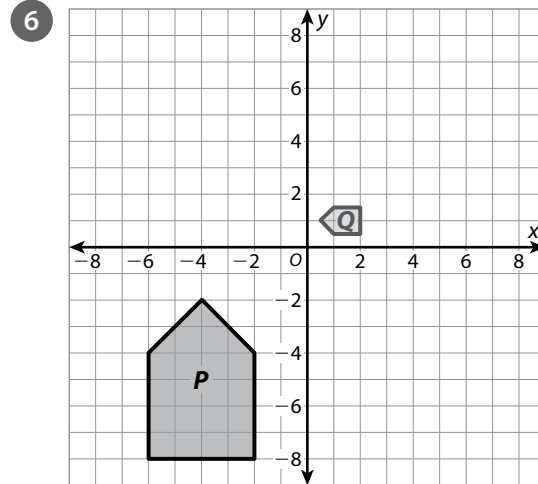
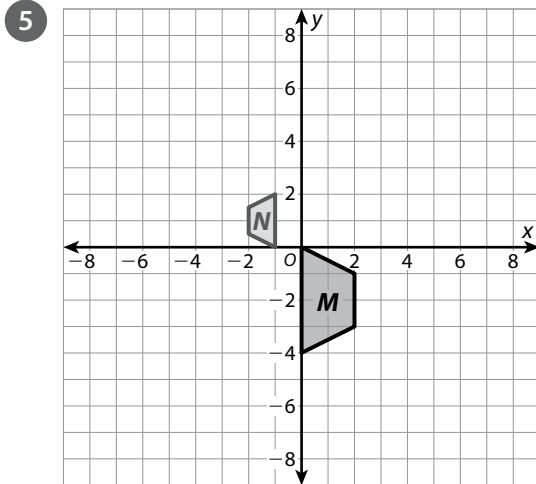
- 7 How did you determine the label for each vertex when you transformed the triangles in problem 5?

# Describing Sequences of Transformations Involving Dilations

- For each pair of figures, describe a sequence of three or fewer transformations that can be used to map one figure onto the other.



## Describing Sequences of Transformations Involving Dilations *continued*



- 7 Give an example of a sequence of transformations that can be performed in any order and will result in the same image.
  
- 8 Give an example of a sequence of transformations for which changing the order results in a different final image.



# Grade 8 Reading

## Student At-Home Activity Packet

This At-Home Activity Packet is intended for a two-week period, and it includes lessons that your student may complete across more than one day.

Most lessons can be completed independently. However, there are some lessons that may benefit from the support of an adult. If there is not an adult available to help, don't worry! Just skip those lessons. A teacher will be in touch soon and your student can ask for help.

Encourage your student to do the best they can with this content. The most important thing is that they continue to work on their reading!


Flip to see the Grade 8  
Reading activities  
included in this packet!





## Lesson 1

# Punctuation to Indicate a Pause or Break

 **Introduction** Sometimes in your writing, you will want to signal a pause. The pause may be in the middle of a sentence or at the end of it. You can use commas, dashes, or ellipses to cue different types of pauses.

Punctuation	When to Use	Examples
Commas	to set off nonessential information	Professional sports, <b>such as football and basketball</b> , can be more fun to watch live than on TV. Yesterday's game was thrilling, <b>especially at the end.</b>
Dashes	to indicate a change in thought or an abrupt break, or to emphasize set-off text	Some people think baseball is boring— <b>nine innings of players standing around.</b> The batter swung and— <b>with the crack of his bat</b> —knocked the ball out of the park.
Ellipses	to indicate an unfinished action or the process of thinking	With two seconds left on the clock, the player dribbled down the court . . . slam dunk!

 **Guided Practice** Add the type of punctuation shown in parentheses to correctly signal the pause in each sentence. Use a caret (^) to add dashes and ellipses.

### Hint

When you use commas or dashes to signal a pause in the middle of a sentence, be sure to use the same punctuation before and after the pause.

### Example:

Camella—that girl over there—plays hockey.

NOT

Camella, that girl over there—plays hockey.

- 1 Did you see the game between the Hornets and the Grizzlies the one that went into overtime? (comma)
- 2 Suddenly the referee blew his whistle stopping the game for a penalty. (ellipsis)
- 3 A professional athlete runs the risk of serious injury a disaster that could even end a career. (dash)
- 4 Our softball team has a game next Thursday not Friday. (comma)
- 5 Curtis a newcomer to our team usually scores the most runs. (dashes)
- 6 At 6:00 A.M. a time when most people are asleep Curtis and his brother are out practicing. (commas)
- 7 My mom says I can go to the game if I accomplish one thing an A on my algebra test. (dash)
- 8 Stepping up to the plate he keenly focused his eyes on the pitcher. (ellipsis)



## Independent Practice

For numbers 1–5, choose the best way to punctuate the pause in each sentence.

- 1**
- A** The ball slowly rolled around the rim and finally, dropped through the hoop.
  - B** The ball slowly rolled, around the rim, and finally dropped through the hoop.
  - C** The ball slowly rolled . . . around the rim and finally dropped through the hoop.
  - D** The ball slowly rolled around the rim . . . and finally dropped through the hoop.

- 2**
- A** That tennis ball is flying toward you—watch out!
  - B** That tennis ball is—flying toward you watch out!
  - C** That tennis ball is flying toward you, watch out!
  - D** That tennis ball is—flying toward you—watch out!

- 3**
- A** The score after six innings—if she remembered correctly was 4 to 1.
  - B** The score after six innings if she remembered correctly, was 4 to 1.
  - C** The score after six innings . . . if she remembered correctly was 4 to 1.
  - D** The score after six innings, if she remembered correctly, was 4 to 1.

### Answer Form

1 (A) (B) (C) (D)

2 (A) (B) (C) (D)

3 (A) (B) (C) (D)

4 (A) (B) (C) (D)

5 (A) (B) (C) (D)

Number  
Correct

5

- 4**
- A** Let's get something to eat, maybe popcorn or nachos—at halftime.
  - B** Let's get something to eat—maybe popcorn or nachos—at halftime.
  - C** Let's get something to eat maybe popcorn or nachos, at halftime.
  - D** Let's get something to eat—maybe popcorn or nachos, at halftime.

- 5**
- A** Competing in the Olympics, what an amazing experience, that would be.
  - B** Competing in the Olympics . . . what an amazing experience, that would be.
  - C** Competing in the Olympics . . . what an amazing experience that would be.
  - D** Competing in the Olympics—what an amazing experience—that would be.

## Lesson 2

# Greek and Latin Word Parts



### Introduction

Many words in English have Greek and Latin roots and affixes.

- A **root** is a word part that contains the main meaning of the word. In the word *secede*, the root *cede* means “move” or “go.” *Secede* means “to move apart, or to separate.”

Root	Meaning	Root	Meaning
<i>cede, cede</i>	“go, move”	<i>pon, pos</i>	“put, place”
<i>cur</i>	“run”	<i>ven, vent</i>	“come”
<i>mit, miss</i>	“send”	<i>ject</i>	“throw”

- An **affix** is a word part added to a root. **Prefixes** are affixes that come before the root, and **suffixes** are affixes that come after it.

Prefix	Meaning	Suffix	Meaning
<i>inter-</i>	“between”	<i>-ion</i>	“act or process of”
<i>pro-</i>	“forward; in favor of”	<i>-or</i>	“state, quality, or action”
<i>pre-</i>	“before”	<i>-ent</i>	“someone who does an action; occurring in a certain way”

- You can use the meanings of roots and affixes to figure out the meaning of many English words.



### Guided Practice

Read the passage. Circle the root in each underlined word.

On a separate piece of paper, write the meanings of the word parts and define the word.

#### Hint

The meaning of the root does not usually fit exactly with the definition of the word. Think of affixes and roots as clues that you can use along with the context to figure out the meaning of an unknown word.

Our car was proceeding along the highway when we heard the forecast. The weather had been mixed all day, and now we knew that the intermittent rains were the precursor to a big storm. The station resumed its programming, but soon the announcer interjected another warning. My brother, who was driving, was a proponent of going home, but my sister Lexy wanted to continue. We needed an intervention, so I used my cell phone to call my mom.



## Independent Practice

For numbers 1–4, read each sentence. Then answer the question.

- 1** My mom told us that the trajectory of the storm had changed and the river might overflow.

The prefix *tra-* means “across,” the root *ject* means “throw,” and the suffix *-ory* means “a place where.” What is the meaning of trajectory as used in the sentence?

- A** the time when something important begins
- B** the type
- C** the path something takes as it moves over
- D** the size and shape

- 2** Lexy could be tenacious, but my mother’s news put an end to all discussion.

The root *ten* means “hold,” and the suffix *-ious* means “characterized by.” What is the meaning of tenacious as used in the sentence?

- A** stubborn
- B** talkative
- C** cranky
- D** bossy

### Answer Form

1 (A) (B) (C) (D)

2 (A) (B) (C) (D)

3 (A) (B) (C) (D)

4 (A) (B) (C) (D)

Number Correct

4

- 3** We subsequently turned the car around and returned home.

The prefix *sub-* means “under or after,” and the root *sequ* means “follow.” What is the meaning of subsequently as used in the sentence?

- A** slowly but surely
- B** immediately after
- C** completely
- D** eventually


- 4** After the huge storm, everyone wondered how long it would take the floodwaters to recede.

The prefix *re-* means “back,” and the root *cede* means “go.” What is the meaning of recede as used in the sentence?

- A** flow over
- B** rise higher
- C** remain stable
- D** withdraw from

## Lesson 3


# Denotation and Connotation

 **Introduction** Words can have two kinds of meanings that convey very different ideas or images. A word's **denotation** is its basic meaning, or dictionary definition. A word's **connotation** is the feeling or impression that people associate with the word.

- A word can have a **positive**, **negative**, or **neutral** connotation. When you write, think about the connotations of the words you choose and the effect they will have on your readers.

Positive Connotation	Neutral Connotation	Negative Connotation
Several people <b>lingered</b> in the theater after auditions.	Several people <b>stayed</b> in the theater after auditions.	Several people <b>loitered</b> in the theater after auditions.
My aunt picked me up in her <b>compact</b> two-door car.	My aunt picked me up in her <b>small</b> two-door car.	My aunt picked me up in her <b>cramped</b> two-door car.

- To say that a car is **small** is a neutral statement about the car. A car that is **compact**, however, can fit everything you need into just a small space. This word has a positive connotation. A **cramped** car, on the other hand, conjures images of tightly squeezed passengers and belongings. The connotation is negative.

 **Guided Practice** Read each sentence. Each underlined word has a neutral or a positive connotation. Write a word that has a negative connotation to replace each underlined word.

### Hint

Words that have the same, or a similar, denotation are synonyms. You can use a thesaurus to find the synonyms for each underlined word. Then choose and write the synonym that has a negative connotation.

- 1 It was adventurous of me to try out for the role of villain.  
\_\_\_\_\_
- 2 I'm quiet and shy, and the character is powerful. \_\_\_\_\_
- 3 My best friend was surprised that I was so firm in my decision.  
\_\_\_\_\_
- 4 I nervously held the script as I read my first lines. \_\_\_\_\_
- 5 My right leg shook as I faced the hero. \_\_\_\_\_
- 6 When offered the part, I deliberated for a while. \_\_\_\_\_
- 7 But then I decided that I had spent too much time being shy.  
\_\_\_\_\_
- 8 Sometimes, I wonder what kind of silliness I'll try next.  
\_\_\_\_\_



## Independent Practice

For numbers 1–3, which word has the same denotation as the underlined word but has a more negative connotation?

**1** The director was unpredictable in his reactions to the actors and scenes.

- A** changeable
- B** volatile
- C** whimsical
- D** variable

**2** The actors felt that the director's comments were sometimes clever.

- A** perceptive
- B** insightful
- C** keen
- D** shrewd

**3** The director's feedback excited the actors.

- A** agitated
- B** inspired
- C** invigorated
- D** energized

### Answer Form

1 (A) (B) (C) (D)

2 (A) (B) (C) (D)

3 (A) (B) (C) (D)

4 (A) (B) (C) (D)

5 (A) (B) (C) (D)

Number  
Correct

5

For numbers 4 and 5, which word has the same denotation as the underlined word but has a more positive connotation?

**4** The director's great arrogance made it difficult for him to compromise in his way of doing things.

- A** conceit
- B** smugness
- C** confidence
- D** haughtiness

**5** At the end of the rehearsals, the actors admitted that this director brought out the best in them.

- A** declared
- B** confessed
- C** gossiped
- D** vented

# Analyzing Word Meanings

Theme: *Animal Survival*

What’s the difference between saying “He doesn’t eat very much” and saying “He eats like a bird”? The two phrases mean the same thing, but the first sentence is literal, and the second is figurative. **Literal meaning** refers to the dictionary definition of a word or phrase. Words or phrases with a **figurative meaning** express ideas in unusual or creative ways.

Words may also have positive, neutral, or negative **connotations**, which are the feelings or ideas associated with a word. And, some words have **technical meanings** specific to a certain subject area. When you read, be aware of these different types of meaning. It will improve your understanding of an author’s message.

**Read the magazine article below. Circle an example of figurative language, underline words with strong connotations, and put a box around any technical words or phrases.**



**Read the chart to analyze some of the words you may have marked in the article.**

Type of Language	Example	Effect on Meaning
Connotative	“majestic”	<i>Majestic</i> encourages readers to think that the birds are more than ordinarily beautiful.
Technical	“wingspan”	<i>Wingspan</i> is a specific term used to explain one of the eagle’s characteristics.
Figurative	“They sail and dive through the air like trained acrobats.”	The simile <i>They sail and dive through the air like trained acrobats</i> compares an eagle’s movement to an acrobat’s.

Authors choose words and phrases carefully to convey meaning and feeling. Determining word meanings can help you understand how an author’s specific word choice affects the text.



Read the beginning of the scientific account about mollusks.

Genre: Scientific Account

# The Mollusk Family *By Deshawn Miller*

Did you ever imagine that a tiny snail and a giant octopus might be part of the same family tree? Most people don't realize that snails, mussels, squid, and even octopods belong to the same category of creatures known as mollusks. These amazing creatures are invertebrates, which means they do not have spines.

Mollusks share three basic body parts: a foot, a body, and a mantle. The foot is a fleshy part of the mollusk's body, made up mostly of muscle tissue. In a snail, the foot is the part of the mollusk that meets the ground and gently rolls the body forward. From this slow, measured motion comes the phrase "a snail's pace." A mollusk's soft body is like a fragile bag that holds the heart, the guts, and various internal organs. The mantle, which is often a shell or a tough, sturdy covering, functions like a suit of armor to protect the body.

*(continued)*

**Explore how to answer this question:** "How do the word choices in the scientific account help you understand the author's intended meaning?"

Reread the account. Circle an example of figurative language, underline words with strong connotations, and put a box around any technical words or phrases.

**In the account, find an example of each type of language named in the first column. Add it to the chart. Then, in the last column, explain the effect the word or phrase has on meaning.**

Type of Language	Example	Effect on Meaning
Figurative		
Connotative		
Technical		

**With a partner, discuss your completed charts. Then identify one more example for each type of language.**





### Close Reading

**Circle** two phrases in the first paragraph that help you understand the technical term *defense mechanisms*.

**Continue reading the account. Use the Close Reading and the Hint to help you answer the question.**

*(continued from page 96)*

Because many mollusks creep along slowly, they need defense mechanisms. Mollusks with shells simply retreat into their body armor to protect themselves from predators. But the Blue-Ringed Octopus, a mollusk found in the South Pacific, defends itself with a bite so fierce it is almost always fatal to humans.

Overall, mollusks are peaceful inhabitants of our planet. Whether they live on land or in the sea, they are not aggressive. Our taste for cooked mussels, clams, and oysters, in fact, makes us far more dangerous to mollusks than they are to us.

### Hint

Think about the connotations, or feelings, that the words suggest. How do those feelings differ?

**Circle the correct answer.**

Which statement best explains why the author has used the words *retreat*, *fierce*, and *fatal* in the first paragraph above?

- A** to warn readers that mollusks are often aggressive and dangerous
- B** to emphasize the contrast between different mollusk defenses
- C** to explain the mystery behind a mollusks' defense system
- D** to call attention to the unusual shells grown by the mollusk family



### Show Your Thinking

Look at the answer you chose above. Explain how the connotations of the words helped you to understand the ideas about mollusk defense mechanisms that the author wants to convey.

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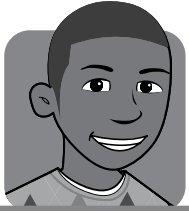
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With a partner, discuss how the use of figurative, connotative, and technical language in the account gives you a clearer picture of the characteristics of the mollusk family.



Read the scientific account. Use the Study Buddy and Close Reading to guide your reading.



As I read, I'm going to look for any connotative, figurative, or technical language the author uses to describe the attributes of armadillos.

### Close Reading

**Underline** examples of figurative language in the first and fourth paragraphs.

**Circle** words with strong connotations used to describe the armadillo.

Genre: Scientific Account

## Armadillo Attributes *By Karen Olson*

- 1 The word *armadillo* comes from a Spanish word meaning “little armored one.” The armadillo earned its name from the bony carapace that shields the armadillo’s body like hinged plates of armor. This protective covering has helped this homely mammal survive for about 55 million years.
- 2 Armadillos are related to sloths and anteaters. They may also be descendants of ancient dinosaurs. Some scientists believe modern armadillos are related to an extinct mammal called the glyptodont (GLIP-toh-dont). Like armadillos, glyptodonts originated in South America.
- 3 Today, more than 20 species of armadillos live in Central and South America. The nine-banded armadillo is the only species in the United States. It is now found in Texas, Oklahoma, Arkansas, Missouri, Louisiana, and parts of Florida.
- 4 Armadillos have many strange yet fascinating traits. In order to swim, they can swallow air to inflate their stomachs, becoming as buoyant as a balloon floating on the water. When threatened, armadillos may react defensively by jumping three to four feet into the air. Some are able to curl up into tight balls.
- 5 Armadillos have terrible eyesight, so they use their foolproof sense of smell to find food. They probe grasses, decaying logs, or sandy soil with their pointy snouts. Once they locate beetles, ants, or other insects they like to eat, they eagerly dig them out with sharp claws and trap them with narrow, sticky tongues.
- 6 Armadillos are the only mammals with protective shells. You might assume that these shells and other traits make armadillos immune from danger; however, predators such as dogs, wolves, and coyotes hunt these peaceful animals. Sadly, speeding cars and trucks can also injure or kill them. Despite these ever-present threats, armadillos continue to survive in a variety of habitats and climates.



### Hints

Find this word in paragraph 6.

Look for context clues in paragraph 6 that might help you understand the meaning of "immune."

Look back at the descriptive words you circled. Which words have a positive connotation? Which words have a negative connotation?

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

- 1 What does the word "immune" mean as it is used in the passage?
  - A defensive
  - B unaffected
  - C threatened
  - D unaware
  
- 2 Which of the phrases from the passage best helps the reader understand the meaning of "immune"?
  - A "may react defensively"
  - B "these peaceful animals"
  - C "can also injure or kill them"
  - D "in a variety of habitats and climates"
  
- 3 Explain why the author uses words like *homely*, *strange*, *fascinating*, *terrible*, *foolproof*, and *peaceful* to describe armadillos. Write a paragraph about what these word choices reveal about how the author would like readers to feel about armadillos. Use at least three specific details from the text in your response.

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Read the scientific account. Then answer the questions that follow.

## Animal Regeneration

*by Aleya Brown*

1       Regeneration is the ability of an organism to regrow a lost body part. All creatures have the power to regenerate lost body parts to some degree. If a human scrapes a knee or breaks a bone, for example, tissue is regenerated to heal the wound. Even a lost fingernail will regenerate over time. If the finger is severed, however, the limits of regeneration have been reached; humans cannot regrow limbs or organs. In contrast, if an earthworm is cut in half, the end of the worm with a head can grow a new tail. If the end of the worm with the tail survives, it too may grow a new tail. Unfortunately, it starves to death eventually because it cannot feed itself without a head or mouth.

2       Which creatures have strong regenerative powers? Lower animals, such as worms, lizards, spiders, and starfish, have some of the greatest regenerative powers. Crayfish, for example, have a remarkable safety device at the base of each claw and leg called a “breaking joint.” When a predator grabs a limb or claw, the appendage breaks away so the crayfish can escape. Over time, as the crayfish molts, or sheds its soft shell, the broken limb or pincer grows larger and larger until it has been completely regenerated.

3       Some animals are able to survive in large part because of their regenerative powers. A type of flatworm called planaria lives under rocks in clear creeks and streams. The flatworm has no real defense mechanisms to protect it from predators, but it can be cut into as many as 32 pieces, and each piece may form a new worm, complete with a head, eyes, and internal organs. In the case of the planaria, an event that could be fatal is turned into an awesome act of procreation.

4       Many more animals display noteworthy regenerative powers. Sharks replace lost teeth throughout their lifetimes. A single shark may grow as many as 24,000 teeth in its lifetime, ensuring a long career at the top of the food chain. Much like planaria, sea cucumbers, which have bodies that grow up to three feet long, can be cut into pieces and survive. Each piece may grow into a new sea cucumber. Spiders, like crayfish, can regrow legs. Many lizards also have “breakaway” tails that snap off when caught by predators. They then grow new ones, which lack the original spine. Starfish can lose arms and grow new ones. Sometimes an entirely new starfish can grow from a single lost arm.

5       Interestingly enough, the scales of a fish tell stories about regeneration. Much like the rings inside a tree trunk, fish scales reveal details about an organism’s past. Each scale lies in a pocket of skin and grows along with the fish. Scientists read the markings on a scale to determine the age of the fish, seasons of famine or drought, and other important information. It is often necessary to look at many scales to get a complete story, however, because scales are often lost and regenerated. These new scales lack the markings that happen over time. They are like a blank page in the history of the fish.



6 Scientists are extremely interested in regeneration because of the possible implications for healing humans. Some scientists think it is possible that higher animals retain the ability to regenerate body parts, but that the reaction triggering the body to regenerate has been lost. By studying lower animals, such as worms, spiders, and sponges, scientists hope to discover what triggers regeneration. The dream is that this knowledge could one day be used to help humans regrow internal organs and limbs. Currently, human regeneration may sound like something out of a science-fiction movie. The implications of such a discovery, however, would be so far-reaching that they are hard to fathom. For now, the miracle of regeneration is intriguing enough to keep scientists working for years to come.

Answer the questions. Mark your answers to questions 1–5 on the Answer Form to the right.

**Answer Form**

1 (A) (B) (C) (D)

2 (A) (B) (C) (D)

3 (A) (B) (C) (D)

4 (A) (B) (C) (D)

5 (A) (B) (C) (D)

**Number  
Correct**

/ 5

**1** What is the meaning of “procreation” as it is used in paragraph 3 of the passage?

- A** survival
- B** repetition
- C** cooperation
- D** reproduction

**2** Read this sentence from the passage.

Crayfish, for example, have a remarkable safety device at the base of each claw and leg called a “breaking joint.”

Which of the following best matches the author’s connotative meaning of the word “remarkable” as it is used in the sentence?

- A** unusual
- B** significant
- C** extraordinary
- D** noticeable



**3** As used in paragraphs 2, 3, and 4 of the passage, the word *powers* is **closest** in meaning to

- A** influence
- B** authority
- C** forcefulness
- D** abilities

**4** Which of the phrases from the passage **best** helps the reader understand the meaning of the word “appendage”?

- A** “have a remarkable safety device”
- B** “grabs a limb or claw”
- C** “sheds its soft shell”
- D** “grows larger and larger”

**5** Read this sentence from the passage.

The dream is that this knowledge could one day be used to help humans regrow internal organs and limbs.

Which word **best** matches the meaning of “dream” as it is used in this sentence?

- A** hope
- B** fantasy
- C** plan
- D** illusion



**Self Check**

***Go back and see what you can check off on the Self Check on page 94.***

## Reading

Read the passage. Then answer the questions that follow.

# The Glowing Beagle

by Karen Brinkmann

1 Dogs have provided many services for people over the years. Working and herding dogs pull sleds and shepherd animals. Service dogs guide and protect people with special needs. Police dogs assist in tracking down and apprehending criminals. Assistance dogs perform necessary tasks for people. And of course, dogs are probably best known for their faithful companionship to individuals and families.

2 But dogs may soon be able to add another talent to their long list of abilities: the potential to help researchers cure diseases because of the dogs' ability to glow. Yes, you read that correctly: scientists in Korea have designed and bred a dog that glows under ultraviolet light. Let's take a look at this unprecedented scientific creation in order to understand why it was accomplished as well as how it could help doctors study and eradicate diseases.

3 For many years, scientists have studied bioluminescent sea creatures such as jellyfish. *Bioluminescent* means a creature can produce and emit its own light. After years of observing and experimenting with these types of creatures, scientists discovered a protein called *green-fluorescent protein*, which is responsible for giving the jellyfish and other creatures the ability to glow. They determined a way to isolate the protein. Then, they transferred it into the cells of a puppy before the puppy was even born. The result was a delightful dog named Tegan who is like any other beagle except that she appears to glow when placed under an ultraviolet light.

4 You may be wondering how in the world a glowing beagle pup could possibly help researchers find a cure for diseases such as Alzheimer's and Parkinson's. The answer to that question lies not in the fact that the dog glows but that scientists have created a method to transfer genes. Because the gene transfer process has been successful, scientists are hopeful that other gene transfers will also be successful. And these gene transfers could lead to a better understanding, if not a cure, for many different kinds of diseases.

5 Human beings and dogs share the ability to contract 268 genetic diseases. If scientists can successfully conduct research on a dog that has a disease that a human can also develop, the scientists may find clues to curing that disease by observing the dog. Dogs share some of the same physiological and anatomical body parts that people do, so studies of dogs translate well to studies of humans. Plus, dogs are social creatures and respond well to commands. They are better subjects to study than laboratory rats or mice.

6 Though transferring fluorescent genes to a dog does not harm a dog in any way, there are some critics of the process. Some animal rights groups discourage any testing on animals. Many suggest alternatives to animal testing, including testing humans instead. However, though many studies have been conducted using human volunteers, the type of gene testing that scientists have done on dogs cannot be conducted on humans.

**Go On**

7 Another drawback of the program is the expense. Scientific research is typically costly, but genetic testing requires equipment and technology that come at a very high price. Additionally, testing on dogs would require that researchers find caregivers for the dogs. Small creatures such as mice and rats can live happily in small cages, but dogs of course cannot. Researchers who want to dedicate their lives to performing gene transfers on pups would need to find a way to house the dogs in a humane way.

8 Still, scientists are optimistic. They see great potential in these developments and hope that the future of scientific research on genes is bright, not only for humans, but for their best friends, the dogs.

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**1** This question has two parts. First, answer part A. Then, answer part B.

**Part A**

What is one central idea of the article?

- A** Dogs are known for their loyal and devoted companionship to humans.
- B** Bioluminescent sea creatures may help researchers cure diseases such as Parkinson's.
- C** It is safer and easier to conduct research on dogs than on humans.
- D** Glowing beagles could help doctors effectively treat human diseases.

**Part B**

Which sentence from "The Glowing Beagle" **best** supports the answer to part A?

- A** "For many years, scientists have studied bioluminescent sea creatures such as jellyfish."
- B** "If scientists can successfully conduct research on a dog that has a disease that a human can also develop, the scientists may find clues to curing that disease by observing the dog."
- C** "However, though many studies have been conducted using human volunteers, the type of gene testing that scientists have done on dogs cannot be conducted on humans."
- D** "They see great potential in these developments and hope that the future of scientific research on genes is bright, not only for humans, but for their best friends, the dogs."



**2** Look at the first sentence of the passage.

Dogs have provided many services for people over the years.

What relationship does this sentence have with the rest of the first paragraph?

- A** It introduces a problem. The rest of the paragraph lists possible solutions.
- B** It states an observed effect. The rest of the paragraph examines causes.
- C** It provides an opinion. The rest of the paragraph provides reasons.
- D** It presents an idea. The rest of the paragraph gives examples.

**3** Which of the following gives the **best** summary of the ideas in “The Glowing Beagle”?

- A** Some animals, such as jellyfish, can produce their own light. By transferring the light-producing gene to dogs, scientists have found a way to make dogs glow when placed under ultraviolet light. This could lead to important discoveries.
- B** The fascinating study of bioluminescent sea creatures has led to new research for curing diseases. However, scientists now cruelly perform tests, such as gene transfers, on live animals.
- C** By successfully transferring genes from light-producing sea creatures to dogs, scientists have found a way to study and possibly cure diseases in people. Though there are several drawbacks, scientists are hopeful that the challenges can be overcome.
- D** Scientists have discovered a cure for Alzheimer’s disease. By transferring genes from bioluminescent sea creatures to dogs, researchers discovered where disease-producing genes can be found. They found ways to prevent these genes from becoming active.

**Go On**

- 4** The author believes the gene transfer process is a positive discovery, but she also wants to acknowledge that there are people who oppose it. Which sentence from the passage **best** supports this statement?
- A** "And of course, dogs are probably best known for their faithful companionship to individuals and families."
  - B** "The result was a delightful dog named Tegan who is like any other beagle except that she appears to glow when placed under an ultraviolet light."
  - C** "Though transferring fluorescent genes to a dog does not harm a dog in any way, there are some critics of the process."
  - D** "Small creatures such as mice and rats can live happily in small cages, but dogs of course cannot."
  - E** "They see great potential in these developments and hope that the future of scientific research on genes is bright, not only for humans, but for their best friends, the dogs."

- 5** Below are three claims that one could make based on the article "The Glowing Beagle."

Claims	
	Gene transfers are an important breakthrough that could greatly benefit humans.
	Because of their similarity to humans, dogs are some of the best research subjects.
	Genetic testing is too costly and controversial to hold much promise.

Draw an X by the claim that is supported by the **most** relevant and sufficient evidence within "The Glowing Beagle." Then write down two sentences from the article that **best** provide evidence to support the claim selected in part A.

First sentence: \_\_\_\_\_

\_\_\_\_\_

Second sentence: \_\_\_\_\_

\_\_\_\_\_

## Reading

Read the passage. Then answer the questions that follow.

# Cars Without Gasoline Are Here

*by Caroline Rialto*

1 People often feel as if the use of a gasoline engine has been integral to the automobile for as long as cars have been on the road. Justifiably, this makes people resist change. They feel that if the gasoline engine disappears, automobiles will never be as fast, safe, or comfortable as they are now, much like people must have felt as the car replaced the horse-drawn carriage.

2 But in fact, the first automobiles were really locomotives modified with tires. They were powered mostly by steam engines. Some early cars ran on strange fuels like gunpowder and coal gas. And some early cars were even powered by simple batteries and electric motors.

3 So the history of the early automobile is a history of changing technology, and of trying things and seeing if they work. Today, technology is changing because political and environmental concerns are forcing manufacturers away from the gasoline engine. The Earth's survival depends on our response to energy issues today. Plus, the price of gas is rising, which means new technologies must be invented to utilize other forms of energy. Because of these factors, we are experiencing a return to that glorious era of experimentation. In the same way as early automobile inventors, we're trying things and seeing if they work.

4 Biodiesel is a chemical very much like the diesel fuel that trucks and some cars use. But instead of being made from crude oil, it is made from renewable sources such as vegetable oil or animal fats. Biodiesel can provide much better fuel efficiency than gasoline. It can be made anywhere. Plus, many cars that now use diesel can be converted to run on biodiesel, so biodiesel could be very cost-effective.

5 Ethanol is another fuel-based alternative to gasoline power. Bioethanol, made from many common crops grown in the United States, could be a main fuel for the future of transportation. Ethanol is already added to fuels to reduce the amount of gasoline our cars consume.

6 Another set of alternative technologies uses natural gas or locally made biogas to power cars. Though natural gas is itself a fossil fuel, it burns very cleanly, so it does not pollute as much as gasoline. Biogas, made from decomposing organic matter, is a more environmentally conscious choice that has the same advantages.

7 Hybrid technology allows another route to gasoline-free driving. A hybrid car uses a small conventional engine, but gets added power through one or more electric motors linked to a set of batteries. The batteries are charged by excess power from the engine and from energy recaptured from braking. The electric motor supplements the conventional engine during peak loads, often providing full power at low speeds. The conventional engine takes over at higher speeds, often around 30 miles per hour. The most successful commercial hybrids today use a gasoline engine, but the technology could easily be used with biodiesel, bioethanol, or biogas to provide a fossil-fuel-free transportation technology.

**Go On**

8 So far we've been looking at vehicles that represent small improvements. But some new technologies are more boldly changing the face of motoring. The fully electric car does away with the conventional motor altogether, using only electric motors and battery packs. However, the limited state of battery technology today means that such vehicles rarely have real-life ranges of more than 100 miles. They can also take many hours to charge up. But there is another option. The plug-in hybrid is very much like normal hybrid technology, but it adds the capacity to be charged from a wall plug like an electric car. That way, drivers can charge the cars overnight and have them ready in the morning. Such vehicles generally use the electric motor almost exclusively until the battery pack is exhausted. This means that the car may use little fuel or no fuel at all during shorter trips.

9 Batteries are heavy. And, as we've seen, they have short range and long charging times. If we want to avoid pollution completely, there are two revolutionary fuel technologies also being deployed. For short trips inside of cities, vehicles powered off of compressed air could be valuable. Such a vehicle would emit no pollutants. It could be pumped up at stations throughout the city and would provide ample power for urban environments. For longer trips, hydrogen could be used as a fuel. Hydrogen can be safely stored in a compressed tank or incorporated into cutting-edge materials. It can be combined with oxygen from the air to produce energy that can be used to power a car. The only emission from a hydrogen-powered vehicle would be pure water. Plus, hydrogen is the most abundant natural element in the universe, so there is plenty of it around.

10 Future road cars will combine many of these technologies to provide maximum efficiency. But one thing is certain: Cars will surely get better for the consumer.

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**1** This question has two parts. First, answer part A. Then, answer part B.

**Part A**

Which meaning of the word "hybrid" **best** defines the use of the word in the passage?

- A** the offspring of two different biological beings
- B** a word that contains elements of two or more languages
- C** a custom born out of the interaction of two or more cultures
- D** something that draws on multiple sources of power

**Part B**

Which of the phrases from the passage **best** helps the reader understand the meaning of "hybrid"?

- A** "replaced the horse-drawn carriage"
- B** "supplements the conventional engine"
- C** "use the electric motor"
- D** "combined with oxygen"

- 2** Which of the following sentences from “Cars Without Gasoline Are Here” suggests that the development of “green” technology is being influenced by forces outside the auto industry?
- A** “So the history of the early automobile is a history of changing technology, and of trying things and seeing if they work.”
  - B** “Today, technology is changing because political and environmental concerns are forcing manufacturers away from the gasoline engine.”
  - C** “Ethanol is already added to fuels to reduce the amount of gasoline our cars consume.”
  - D** “Future road cars will combine many of these technologies to provide maximum efficiency.”

- 3** One of the author’s main claims in “Cars Without Gasoline Are Here” is that the limited range of the electric car can be overcome. Which statement from the passage **best** supports this statement?
- A** “The Earth’s survival depends on our response to energy issues today.”
  - B** “The fully electric car does away with the conventional motor altogether, using only electric motors and battery packs.”
  - C** “The plug-in hybrid is very much like normal hybrid technology, but it adds the capacity to be charged from a wall plug like an electric car.”
  - D** “Such a vehicle would emit no pollutants.”

**Go On**

**4** The author of "Cars Without Gasoline Are Here" claims that new technologies are changing the way modern automobiles are fueled. Which **three** details are irrelevant to this claim?

- A** Some early cars ran on gunpowder and coal gas.
- B** The survival of Earth hinges on our response to the energy crisis.
- C** Biogas powers cars and does not pollute as much as gasoline.
- D** The fully electric car is powered only by electric motors and battery packs.
- E** Hydrogen can be combined with oxygen from the air to power a car.
- F** Hydrogen is the most plentiful element in the universe.

**5** How does the author make distinctions between the different types of automobiles she discusses in the article? Use **two** details from the passage to support your response.

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Read the passage. Then answer the questions that follow.

# Code Breaking and Computers in Bletchley Park

by Thomas Bender

1 If you didn't know the history of Bletchley Park, it would be easy to walk by this sprawling yet unassuming mansion in England without giving it a second look. Today, it is the location of both the National Codes Centre and the National Museum of Computing. However, during the Second World War, it was a top-secret location where undercover codebreakers reported for duty. The codebreakers quietly but determinedly helped the Allies (the countries that joined together against German forces) to win the war. The work done at Bletchley Park was significant both because it allowed the Allies to gather information from behind enemy lines, and because it was where the first computer was developed.

## Communication During War Time

2 The Germans went to great lengths to protect sensitive military information during World War II. One of the ways they did this was by using codes to communicate. Sending important military and intelligence messages by code was meant to keep them secret from the enemy. For instance, the following string of letters uses a substitution code: GISSN. In this "word," G is used in place of H, I in place of E, S in place of L, and N in place of O. Once a person has this information, it is easy to see that these letters spell "hello." This is a simplified example, but it shows the idea of how using a code worked.

3 During the war, a person who received an encoded message would be able to comprehend its meaning because he or she would have the key necessary to interpret it. However, an average person would merely see what looked like a random string of numbers, letters, or symbols. It wouldn't make any sense at all.

4 The Germans thought that the communication system they had created was foolproof and that their code would be impossible for an outsider to decipher. Those who worked at Bletchley Park and other key players ultimately proved them wrong.

## The Players in the Code Game

5 The names of certain individuals—especially the mathematician Alan Turing—are practically synonymous with Bletchley Park. But, the drama of figuring out the various intelligence codes used during the Second World War actually involved a cast of thousands.

6 These individuals can be divided into four main groups: the informers, the interceptors, the decoders, and the reporters. The first group consisted of insiders in Poland. They not only broke an early version of the German Enigma code, but they also succeeded in recreating a machine used to read it. They shared what they knew with Britain. Without this vital information, it's quite possible nobody would know the name of Bletchley Park today. The interceptors covertly eavesdropped on Germany's radio messages, sending them along to the team at Bletchley. Here, the codebreakers made sense of the communications. The final group used the decoded messages to compile intelligence reports focusing on the activities of the German Navy, Army, and Air Force.

**Go On**

## **Enigma: Cracking the Code**

7 Enigma was a very clever code that involved using a machine by the same name. German officials would rotate the wheels of the machine into a certain position and then type their message. The recipient of the message could unscramble it using the same machine only because they knew the position of its wheels. Billions of code variations could be produced using this deceptively simple-looking contraption. The Germans also changed the code regularly to prevent anyone who might be trying to crack it from making progress.

8 The mathematicians Alan Turing and Gordon Welchman created a device called the Bombe to convert German messages into a form that could be easily understood. The machine worked by using the process of elimination principle. By ruling out potential code variations, the correct one could eventually be pinpointed.

9 The Bombe creators knew that messages often had commonly used words and phrases. They also knew that no letter would ever stand for itself; the letter A, for instance, would always represent another letter. This knowledge allowed them to reduce the billions of possibilities down to a more manageable number.

## **Keeping Up: Deciphering Later Codes and the First Computer**

10 After the team at Bletchley Park figured out the Enigma code, the Germans moved on to an even more sophisticated method of encryption that they honed and perfected. The British called this new code Fish. By 1944, cracking the code by hand was no longer possible. It became necessary to invent a machine that could process more digital information in a much shorter time than a human codebreaker was capable of processing.

11 The ultimate solution to figuring out Fish was a machine called Colossus. It is often described as the ancestor of the modern computer, but comparing it to an Internet-wired laptop is a little like equating a house cat to a tiger. They are related, but the differences are at least as numerous as the similarities.

12 Colossus was absolutely massive, and it operated thanks to well over 1,000 vacuum tubes. Still, its capabilities were impressive, at least for the time. Using it, the Bletchley Park team could complete mathematical calculations that would have taken weeks to do by hand in a matter of hours. This allowed them to do the extensive work necessary to crack the mind-boggling German code. Colossus also laid the groundwork for the development of the faster, smaller, and more user-friendly computers people use today.



**22** This question has two parts. First, answer part A. Then, answer part B.

**Part A**

How does the author acknowledge the viewpoint of people who might not agree that Colossus was the first computer?

- A** He admits that Colossus was extremely different from modern computers.
- B** He agrees that Colossus was more like a calculator than a laptop.
- C** He points out that Colossus wasn't able to process digital information very efficiently.
- D** He recognizes that today's computers would exist even if Colossus had never been built.

**Part B**

Which sentence from the passage **best** supports the answer to part A?

- A** "It became necessary to invent a machine that could process more digital information in a much shorter time than a human codebreaker was capable of processing."
- B** "The ultimate solution to figuring out Fish was a machine called Colossus."
- C** "It is often described as the ancestor of the modern computer, but comparing it to an Internet-wired laptop is a little like equating a house cat to a tiger."
- D** "Colossus also laid the groundwork for the development of the faster, smaller, and more user-friendly computers people use today."

**23** Which describes an important similarity between codemakers and codebreakers?

- A** Both groups depend on perfect secrecy to accomplish their missions.
- B** Historically, both groups have relied on machines to do their work.
- C** Both groups need the code, but not necessarily the key, to do their jobs.
- D** In order to succeed, both groups must constantly improve their technology.

**Go On**

**24** Read the following sentence from the passage.

But, the drama of figuring out the various intelligence codes used during the Second World War actually involved a cast of thousands.

What does the word “drama” suggest about the events at Bletchley Park during World War II?

- A** They didn’t seem real at the time.
- B** They were full of emotion and excitement.
- C** They involved numerous conflicts between the decoders.
- D** They would later be turned into a stage play.
- E** They were made stressful by people who overreacted.
- F** They were more complicated than they needed to be.

**25** Read the last paragraph of the passage. Which sentence **most clearly** develops the idea that a technology’s effect is relative to its era?

- A** “Colossus was absolutely massive, and it operated thanks to well over 1,000 vacuum tubes.”
- B** “Still, its capabilities were impressive, at least for the time.”
- C** “Using it, the Bletchley Park team could complete mathematical calculations that would have taken weeks to do by hand in a matter of hours.”
- D** “This allowed them to do the extensive work necessary to crack the mind-boggling German code.”