FIRSTLINE SCHOOLS
EDUCATION FOR LIFE

DISTANCE LEARNING FOR FIRSTLINE STUDENTS

PACKET #2

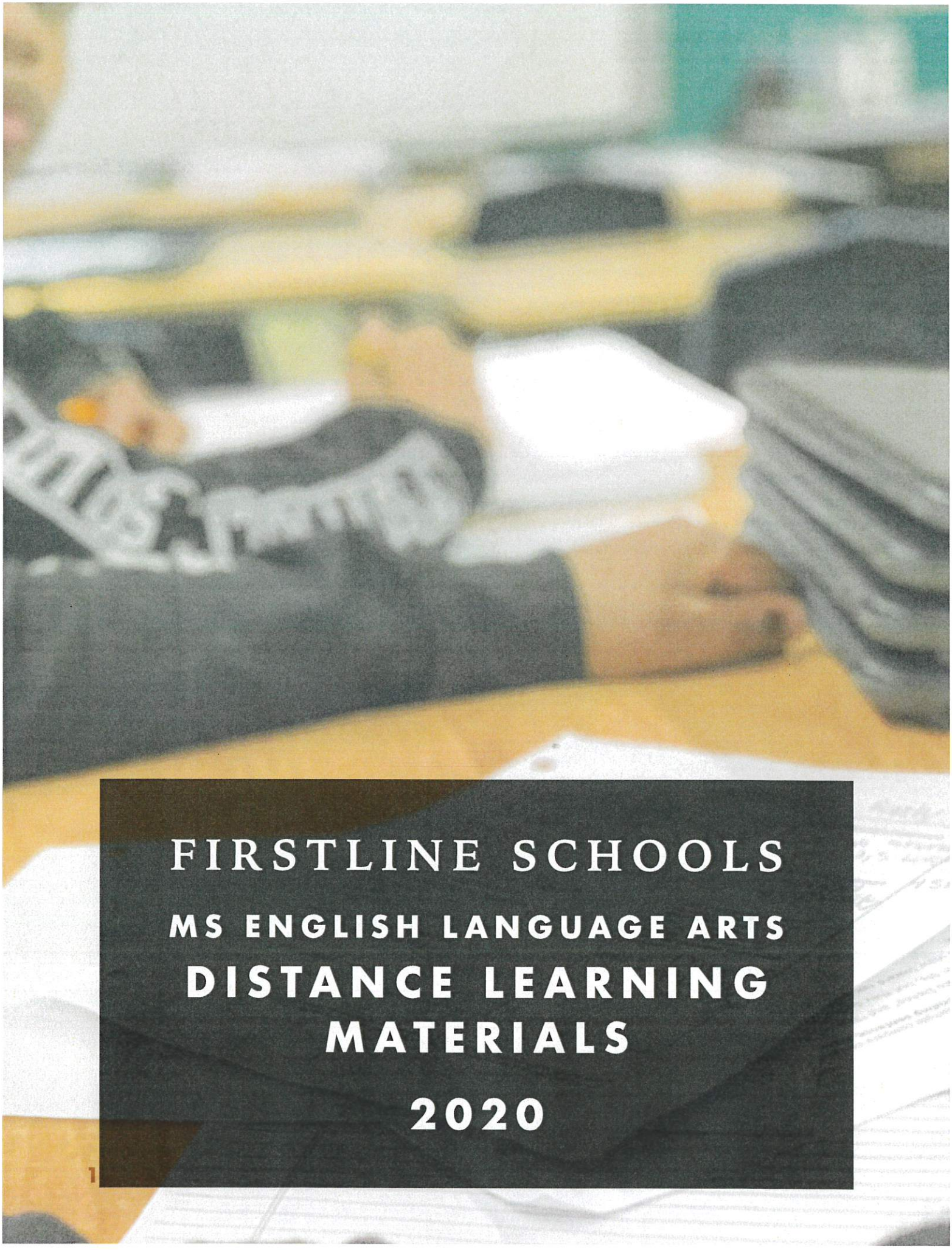
Start Date: Monday, March 30, 2020

GRADE:

K 1 2 3 4 5 6 7 8

CONTENT INCLUDED:

ELA MATH SCIENCE SOCIAL STUDIES



FIRSTLINE SCHOOLS

MS ENGLISH LANGUAGE ARTS

DISTANCE LEARNING MATERIALS

2020

Read for Deeper Meaning:

When reading fiction...

- Write a **gist** for each section or stanza
- Describe the **setting**: Where and when does the story take place? How does the setting influence the characters?
- Name the **conflict or problem:** who wants what? And what is getting in their way?
- Describe the **point of view:**
  - 1st - "I" "We" "Our"
  - 2nd- "You" "Your"
  - 3rd- "He" "She" "They"
  - Is it an all-knowing "omniscient" point of view or a limited point of view?
- Define the **perspective:** How is the narrator/ character connected to the events? How do they feel about them?
- Identify how the **characters change** over the course of the story: How did the events of the story affect the characters?
- Identify the **theme**

LITERARY ANALYSIS TASK:

Students read two fiction texts on a similar topic (which could be a story or poem) and compare the texts approach-which could include structure, point of view, setting or other literary elements.

Criteria for Success

1. *Answers the prompt with a clear claim*
2. *Gives reasons to support the claim*
3. *Includes evidence from all texts referenced in the prompt*
4. *Explains or interprets evidences' connection to reasons and claim*

Today you will analyze a passage from the book *A Single Shard* and the poem "Turn, Turn, My Wheel." As you read these texts, you will gather information and answer questions about their themes and topics so you can write an essay.

Read the passage from the book *A Single Shard* about people who make pottery. Then answer the questions that follow.

from *A Single Shard*

by Linda Sue Park

1 Breakfast that morning was a feast—a bit of the rice boiled to a gruel in a castoff earthenware pot, served up in a bowl carved from a gourd. And Crane-man produced yet another surprise to add to the meal: two chicken leg-bones. No flesh remained on the arid bones, but the two friends cracked them open and worried away every scrap of marrow from inside.

2 Afterward, Tree-ear washed in the river and fetched a gourd of water for Crane-man, who never went into the river if he could help it; he hated getting his feet wet. Then Tree-ear set about tidying up the area under the bridge. He took care to keep the place neat, for he disliked having to clear a space to sleep at the tired end of the day.

3 Housekeeping complete, Tree-ear left his companion and set off back up the road. This time he did not zigzag between rubbish heaps but strode purposefully toward a small house set apart from the others at the curve in the road.

4 Tree-ear slowed as he neared the mud-and-wood structure. He tilted his head, listening, and grinned when the droning syllables of a song-chant reached his ears. The master potter Min was singing, which meant that it was a "throwing" day.

5 Min's house backed onto the beginnings of the foothills and their brushy growth, which gave way to pine-wooded mountains beyond. Tree-ear swung wide of the house. Under the deep eaves at the back, Min kept his potter's wheel. He was there now, his gray head bent over the wheel, chanting his wordless song.

6 Tree-ear made his way cautiously to his favorite spot, behind a paulownia tree whose low branches kept him hidden from view. He peeped through the leaves and caught his breath in delight. Min was just beginning a new pot.

7 Min threw a mass of clay the size of a cabbage onto the center of the wheel. He picked it up and threw it again, threw it several more times. After one last throw he sat down and stared at the clay for a moment. Using his foot to spin the base of the wheel, he placed dampened hands on the sluggardly lump, and for the hundredth time Tree-ear watched the miracle.

8 In only a few moments the clay rose and fell, grew taller, then rounded down, until it curved into perfect symmetry. The spinning slowed. The chant, too, died out and became a mutter of words that Tree-ear could not hear.

9 Min sat up straight. He crossed his arms and leaned back a little, as if to see the vase from a distance. Turning the wheel slowly with his knee, he inspected the graceful shape for invisible faults. Then, "Pah!" He shook his head and in a single motion of disgust

GO ON ▶

scooped up the clay and slapped it back onto the wheel, whereupon it collapsed into an oafish lump again, as if ashamed.

10 Tree-ear opened his mouth to let out his breath silently, only then realizing that he had been keeping it back. To his eyes the vase had been perfect, its width half its height, its curves like those of a flower petal. Why, he wondered, had Min found it unworthy? What had he seen that so displeased him?

11 Min never failed to reject his first attempt. Then he would repeat the whole process. This day Tree-ear was able to watch the clay rise and fall four times before Min was satisfied. Each of the four efforts had looked identical to Tree-ear, but something about the fourth pleased Min. He took a length of twine and slipped it deftly under the vase to release it from the wheel, then placed the vase carefully on a tray to dry.

12 As Tree-ear crept away, he counted the days on his fingers. He knew the potter's routine well; it would be many days before another throwing day.

13 The village of Ch'ulp'o faced the sea, its back to the mountains and the river edging it like a neat seam. Its potters produced the delicate celadon ware that had achieved fame not only in Korea but as far away as the court of the Chinese emperor.

14 Ch'ulp'o had become an important village for ceramics by virtue of both its location and its soil. On the shore of the Western Sea, it had access both to the easiest sea route northward and to plentiful trade with China. And the clay from the village pits contained exactly the right amount of iron to produce the exquisite gray-green color of celadon so prized by collectors.

15 Tree-ear knew every potter in the village, but until recently he had known them only for their rubbish heaps. It was hard for him to believe that he had never taken the time to watch them at work before. In recent years the pottery from the village kilns had gained great favor among those wealthy enough to buy pieces as gifts for both the royal court and the Buddhist temples, and the potters had achieved new levels of prosperity. The pickings from their rubbish heaps had become richer in consequence, and for the first time Tree-ear was able to forget about his stomach for a few hours each day.

16 During those hours it was Min he chose to watch most closely. The other potters kept their wheels in small windowless shacks. But in the warm months Min preferred to work beneath the eaves behind his house, open to the breeze and the view of the mountains.

17 Working without walls meant that Min possessed great skill and the confidence to match it. Potters guarded their secrets jealously. A new shape for a teapot, a new inscribed design—these were things that the potters refused to reveal until a piece was ready to show to a buyer.

18 Min did not seem to care about such secrecy. It was as if he were saying, *Go ahead, watch me. No matter—you will not be able to imitate my skill.*

19 It was true, and it was also the main reason that Tree-ear loved watching Min. His work was the finest in the region, perhaps even in the whole country

GO ON ▶

1. **Part A**

How does the phrase **curves like those of a flower petal** in paragraph 10 of the passage from *A Single Shard* contribute to the story?

Ⓐ It explains the primary purpose of the pottery Min makes.

Ⓑ It shows that Min bases his pottery designs on nature.

Ⓒ It indicates that Min's pottery is bright and colorful.

Ⓓ It illustrates the delicate beauty of Min's pottery.

2. **Part B**

Which evidence from the passage supports the answer to Part A? Select **two** answers.

Ⓐ ". . . perfect symmetry." (paragraph 8)

Ⓑ ". . . spinning slowed." (paragraph 8)

Ⓒ ". . . the graceful shape . . ." (paragraph 9)

Ⓓ ". . . gray–green color of celadon . . ." (paragraph 14)

Ⓔ ". . . the breeze and the view of the mountains." (paragraph 16)

Ⓕ "A new shape for a teapot . . ." (paragraph 17)

GO ON ▶

3. **Part A**

Which statement about the passage from *A Single Shard* describes how Min responds to the process of pottery making?

Ⓐ Min is in awe of pottery making.

Ⓑ Min is pleased and entertained by pottery making.

Ⓒ Min is dedicated to perfection during pottery making.

Ⓓ Min is excited by the work involved in pottery making.

4. **Part B**

Which sentence supports the answer to Part A?

Ⓐ "He was there now, his gray head bent over the wheel, chanting his wordless song." (paragraph 5)

Ⓑ "He crossed his arms and leaned back a little, as if to see the vase from a distance." (paragraph 9)

Ⓒ "Turning the wheel slowly with his knee, he inspected the graceful shape for invisible faults." (paragraph 9)

Ⓓ "He took a length of twine and slipped it deftly under the vase to release it from the wheel, then placed the vase carefully on a tray to dry." (paragraph 11)

GO ON ▶

TURN, TURN, MY WHEEL

Read the excerpt from the poem "Turn, Turn, My Wheel." Then answer the questions.

from Turn, Turn, My Wheel

by Henry Wadsworth Longfellow

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

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

[1]marl—a red-colored clay soil
[2]sumptuously—costly and magnificently dressed

"Turn, Turn, My Wheel" — Public Domain

GO ON ▶

1 **Part A**

How does the poet use personification in "Turn, Turn, My Wheel"?

Ⓐ The poet gives the tree human qualities to show that it respects and wants to protect the potter.

Ⓑ The poet gives the potter's wheel human qualities to show how it turns smoothly to please the potter.

Ⓒ The poet gives the potter's clothing human qualities to show how it responds to the potter's energetic movement.

Ⓓ The poet gives the clay human qualities to show that it is compliant with the potter's demands.

2 **Part B**

Which **two** lines from the poem support the answer to Part A?

Ⓐ "*Without a pause, without a sound:*" (line 2)

Ⓑ "*Follows the motion of my hand;*" (line 5)

Ⓒ "The quilted sunshine and leaf-shade" (line 11)

Ⓓ "A figure woven in tapestry," (line 14)

Ⓔ "In that magnificent attire" (line 16)

Ⓕ "And even his slightest touch obey." (line 27)

GO ON ▶

3. **Part A**

In line 22 of "Turn, Turn, My Wheel," the speaker stands **in silence and apart** as the potter creates his work. Why is the speaker silent?

Ⓐ The speaker is in awe of the potter's power and skill.

Ⓑ The speaker is frightened of the potter's magical powers.

Ⓒ The speaker dislikes the final product.

Ⓓ The speaker wants to ask a question but is nervous.

4. **Part B**

Which line from "Turn, Turn, My Wheel" helps explain the speaker's response in Part A?

Ⓐ "Of sable tissue flaked with fire." (line 17)

Ⓑ "For it was magical to me—" (line 21)

Ⓒ "That shapeless, lifeless mass of clay" (line 24)

Ⓓ "And now contract and now expand," (line 26)

GO ON ▶

5. **Part A**

How does the first stanza (lines 1–7) of "Turn, Turn, My Wheel" contribute to the development of its theme?

Ⓐ It demonstrates how happy the potter is to be outdoors.

Ⓑ It explains why the potter prefers the kind of clay he is using.

Ⓒ It shows that the potter knows he can control the clay.

Ⓓ It suggests that the potter wants to work as quickly and efficiently as possible.

6. **Part B**

Which lines from the poem also support the answer to Part A? Select **two** answers.

Ⓐ "Beneath the blossoming hawthorn-tree," (line 9)

Ⓑ "The quilted sunshine and leaf-shade" (line 11)

Ⓒ "Like a magician he appeared," (line 18)

Ⓓ "That shapeless, lifeless mass of clay" (line 24)

Ⓔ "Rise up to meet the master's hand," (line 25)

Ⓕ "And even his slightest touch obey." (line 27)

GO ON ▶

Refer to the passage from *A Single Shard* and the poem "Turn, Turn, My Wheel."

You have read **two** texts about people who make pottery. Think about how the narrator in the passage from *A Single Shard* and the speaker in "Turn, Turn, My Wheel" respond to the potters in each text. Write an essay that compares and contrasts how the narrator and the speaker view the potters in the passage and in the poem.

Be sure to cite specific details and examples from **both** texts to support your essay.

GO ON ▶

GO ON ▶

GO ON ▶

STOP

Read for Deeper Meaning:

When reading non fiction...

- Write a gist for each section of the passages
- Describe the point of view: Who is the author? How are they connected to the topic? How does this influence what they include?
- Name the structure: cause & effect? chronological? description? compare/ contrast? problem/solution?
- Identify the different types of evidence used: Quotations from experts, statistics, personal anecdotes (stories), facts
- Write a central idea

RESEARCH TASK:

Students read 2-3 non fiction texts and write an informative essay in which they use evidence from all of the texts provided.

Criteria for Success

1. *Answers the prompt with a clear claim*
2. *Gives reasons to support the claim*
3. *Includes evidence from all texts referenced in the prompt*
4. *Explains or interprets evidences' connection to reasons and claim*

NAVAJO CODE TALKERS

Today you will research the use of secret codes to communicate messages. You will read a passage from *Navajo Code Talkers*. Then you will read the article "American Indians in the United States Army" and the passage "What's So Special About Secret Codes?" As you review these sources, you will gather information and answer questions about secret codes and the contributions of Native Americans to the U.S. military so you can write an analytical essay.

Read the passage from *Navajo Code Talkers* about the use of the Navajo language during World War II. Then answer the questions.

from *Navajo Code Talkers*

by Andrew Santella

1 Their long history of harsh treatment by the U.S. government did not stop the Navajos from answering their country's call during World War II. In fact, Marine recruiters at the reservation met long lines of candidates in 1942. The Navajo code project was top secret, so the Navajos didn't know they were signing up to be code talkers. They knew only that they were joining the Marines and helping to defend the United States. Some Navajos who were still in their early teens told recruiters they were 18, the minimum age for Marines. One was accepted even though he was really just 15. None of the Navajos knew what awaited them as Marines.

MILITARY TRAINING

2 The first task for any new Marine is completing the Marine Corps training course, sometimes called boot camp. In May 1942, the new Marines from the Navajo reservation were sent to the Marine Corps Recruit Training Depot in San Diego. For many, the trip west marked their first time on a bus. Some had never left the reservation before. Most had never been in a big city. Like most Marines, they struggled to complete the seven exhausting weeks of training.

3 In the training course, Marine recruits endure difficult physical fitness tests. They complete long marches carrying heavy packs. They spend hour after hour practicing basic drills. The goal is to make the training

GO ON ▶

course so difficult that it will turn new recruits into disciplined Marines who are ready for anything. Marine training instructors were surprised to find that the Navajos had little trouble with the fitness tests. Many had grown up herding sheep and hauling water on ranches. They were used to hard work and exercise. However, other parts of boot camp were more difficult to get used to.

4 In some ways, the training course clashed with Navajo traditions. Many Navajos wore their hair in thick braids, but as Marine recruits they had to shave off their hair. Marine drill instructors insisted on looking directly into the eyes of recruits, but in the Navajo culture this is considered rude. Even wearing a military uniform seemed foreign to some of the Navajos. Despite the difficulties, the 29 Navajos completed boot camp and graduated to the next step in their training. They were about to become code talkers.

CREATING THE CODE

5 After boot camp, the Navajos were sent to Camp Elliott, a Marine Corps post in Southern California. There, they received training in radio communications and basic electronics. They learned to use, care for, and repair the radios that would send their coded messages. Only at Camp Elliott did it become clear to the Navajos what their special mission would be. Finally, it came time to create the unbreakable code.

6 A Navajo code talker named Chester Nez later recalled how the code came to be. "We were told to use our language to come up with words representing each letter, from A to Z," he explained. "And they also told us to come up with code words for military terms. They put us all in a room to work it out and first everyone thought we'd never make it. It seemed impossible, because even among ourselves, we didn't agree on all the right words."

7 However, the Navajos devised a code that worked extremely well. They made a list of Navajo words that would represent each letter in the English language alphabet. For example, the Navajo word for apple (*be-la-sana*) stood for the letter A. The Navajo word for bear (*shush*) stood

GO ON ▶

for the letter B, and the Navajo word for cat (*moasi*) stood for the letter C. The code talkers sent messages by using Navajo code words to spell out words in English. For example, to say, "Navy," code talkers would say the Navajo words that stood for each letter: *Nesh-chee* (or nut, for N), *wol-la-chee* (or ant, for A), *a-keh-di-glini* (or victor, for V), and *tsah-as-zih* (or yucca, for Y).

8 Later, the Navajos made the code more difficult to crack by adding more code words. Some English letters could be represented by as many as three different Navajo words. For example, for the letter A, code talkers could use *wol-la-chee* (ant), *be-la-sana* (apple), or *tse-nill* (ax).

9 Not all words had to be spelled out letter by letter, however. The code talkers came up with a list of Navajo words or phrases that could be used to represent common military terms. Many of these code words came from the Navajo knowledge of the natural world. Fighter planes flew quickly and made a buzzing noise, so they were given the code name *dah-he-tih-hi*, which is the Navajo word for hummingbird. Dive bombers were named for chicken hawks, or *gini*. The bombs they dropped were given the code name *a-ye-shi*, the Navajo word for eggs.

10 Battleships were called *lo-tso*, or whales in Navajo. Submarines were called *besh-lo*, which translates as iron fish. The code word for the United States was *ne-he-mah*, which means "our mother" in Navajo.

11 To start with, the code had about 200 such words, but by the end of the war it had grown to include about 600 words. The code talkers had to memorize the entire code before being shipped out for active duty. To keep the code secret, no written lists were allowed outside Marine training centers. Code talkers also practiced sending and translating messages quickly. They practiced until they could send and translate a three-line message in just 20 seconds. Most important of all, they learned to send and translate messages without errors. The slightest mistake could change the meaning of a message and place troops in danger.

12 Marine Corps leaders were so pleased with the code that they expanded the code talker program. Philip Johnston was placed in charge of

GO ON ▶

recruiting more Navajos. Some came from the reservation, and some transferred to the Marines from other branches of the armed forces. From the original 29 code talkers, the program grew to include about 400 Navajos.

1 **Part A**

What does the word **endure** mean as it is used in paragraph 3 of the passage from *Navajo Code Talkers*?

A. easily finished

B. decline to take

C. help create

D. suffer through

2 **Part B**

Which evidence helps the reader understand the meaning of **endure**?

A. ". . . long marches carrying heavy packs." (paragraph 3)

B. ". . . disciplined Marines who are ready for anything." (paragraph 3)

C. ". . . the Navajos had little trouble with the fitness tests." (paragraph 3)

D. "Many Navajos wore their hair in thick braids. . . ." (paragraph 4)

3

Part A

How does the author present information about the training process in the passage from *Navajo Code Talkers*?

A. by presenting the training as a solution to a problem

B. by comparing the different aspects of the training

C. by describing the effects of the training

D. by explaining the sequence of the training

4 **Part A**

What is a central idea of the passage from *Navajo Code Talkers*?

A. During World War II, the Marine Corps used Navajo recruits to create a successful code for communication.

B. The Navajo Marines often had trouble adapting to the strict culture of the Marine Corps.

C. During World War II, the Navajo bravely volunteered for military service in the Marine Corps.

D. The code created by the Navajo was the most successful code ever used by the Marine Corps.

5 **Part B**

Based on the answer in Part A, which **two** sentences belong in a summary of the passage?

A. The Navajo recruits trained by carrying heavy packs on long marches.

B. Some recruits lied about their ages in order to join the Marine Corps code talker program.

C. The Navajo code had 200 words that represented common military terms.

D. The code talker program was expanded due to the success of the Navajo code.

E. The code used the Navajo word for bear to represent the letter B.

F. The Navajo recruits invented an unbreakable code by using their native language.

AMERICAN INDIANS IN THE US ARMY

Read the article "American Indians in the United States Army." Then answer the questions.

American Indians in the United States Army

Comanche Code Talkers of the 4th Signal Company
(U.S. Army Signal Center and Ft. Gordon)

1 Napoleon once said, "the secret of war lies in the communications." If he were around today, he might have revised it to, "secure communications."

2 During World Wars I and II, the military needed a quick and reliable means of protecting its radio, telephone and telegraphic messages from enemy intelligence. American Indian tribes had their own languages and dialects that few outside the tribes understood, and many of their languages were not even written down. Their languages were ideal for the task at hand and fortunately, a large number of Indians had joined the armed forces.

World War I

3 In France during World War I, the 142nd Infantry Regiment, 36th Division, had a company of Indians who spoke 26 languages and dialects. Two Indian officers were selected to supervise a communications system staffed by 18 Choctaw. The team transmitted messages relating to troop movements and their own tactical plans in their native tongue. Soldiers from other tribes, including the Cheyenne, Comanche, Cherokee, Osage and Yankton Sioux also were enlisted to communicate as code talkers. Previous to their arrival in France, the Germans had broken every American code used, resulting in the deaths of many soldiers. However, the Germans never broke the Indians' "code," and these soldiers became affectionately known as "code talkers."

World War II

4 During World War II, the Army used Indians in its signal communications operations in both the European and Pacific theaters of operations. Student code talkers were instructed in basic military communications techniques. The code talkers then developed their own words for military

terms that never existed in their own native tongue. For instance, the word for "colonel" was translated to "silver eagle," "fighter plane" became "hummingbird," "minesweeper" became "beaver," "half-track" became "race track," and "pyrotechnic" became "fancy fire."

5 The Army and Marine Corps used a group of 24 Navajo code talkers in the Pacific Theater, who fought in the many bloody island campaigns. In North Africa, eight soldiers from the Meskwaki tribe in Iowa served as code talkers in the 168th Infantry Regiment, 34th Division. In Europe, the 4th Signal Company, 4th Infantry Division, was assigned 17 Comanche code talkers. From the D-Day landings at Normandy in June 1944, to the liberation of Paris and the Battle of the Bulge, they kept the lines of communications secure.

6 Soldiers from other tribes, including the Kiowa, Winnebago, Chippewa, Creek, Seminole, Hopi, Lakota, Dakota, Menominee, Oneida, Pawnee, Sac, Fox and Choctaw served during the war. Some were killed and wounded and at least one was taken prisoner. As a testament to their professionalism, the enemy was never able to break the code talkers' communications.

7 Many of the code talkers continued in their military careers, serving during the Korean and Vietnam wars.

Belated Recognition

8 For many years, the code talkers' work remained classified. Then on June 18, 2002, Congress passed the Code Talkers Recognition Act to recognize the important part that these soldiers played in "performing highly successful communications operations of a unique type that greatly assisted in saving countless lives and in hastening the end of World War I and World War II." The act further states that the code talkers operated "under some of the heaviest combat action . . . around the clock to provide information . . . such as the location of enemy troops and the number of enemy guns."

9 Congress recognized the remarkableness of the code talkers' achievements, despite societal discrimination against them. The act

GO ON ▶

states that at ". . . a time when Indians were discouraged from practicing their native culture, a few brave men used their cultural heritage, their language, to help change the course of history."

"American Indians in the United States Army: Comanche Code Talkers of the 4th Signal Company"—Public Domain

6

Part A

What meaning of **intelligence** is used in paragraph 2 of "American Indians in the United States Army?"

A. a high mental capacity

B. the knowledge of an event

C. the ability to understand information

D. a group that intercepts military information

7

Part B

Which sentence from the article provides an example of the type of **intelligence** discussed in paragraph 2?

A. "Previous to their arrival in France, the Germans had broken every American code used, resulting in the deaths of many soldiers." (paragraph 3)

B. "The code talkers then developed their own words for military terms that never existed in their own native tongue." (paragraph 4)

C. "From the D-Day landings at Normandy in June 1944, to the liberation of Paris and the Battle of the Bulge, they kept the lines of communications secure." (paragraph 5)

D. "Congress recognized the remarkableness of the code talkers' achievements, despite societal discrimination against them." (paragraph 9)

8 What is the central idea of "American Indians in the United States Army"?

A. A secure way of communicating is the most important element in achieving a military victory.

B. Native Americans made great contributions to United States military operations in the field of communications.

C. A code using Native American words to replace military terms helped keep soldiers safe during wartime.

D. Native Americans have served in combat positions in the United States military in recent wars.

9 **Part A**

How does the organization of "American Indians in the United States Army" help readers understand the central idea?

A. The use of comparison and contrast shows how Native Americans were treated differently from other citizens.

B. The use of problem and resolution illustrates that effective communication is essential to victory.

C. The use of cause and effect provides information about the roles Native Americans played in ending U.S. wars.

D. The use of chronological order describes the value of Native Americans to military efforts throughout U.S. history.

10 **Part B**

What information in the article supports the answer to Part A?

A. the discussion about Native American contributions to World Wars I and II, followed by an explanation of the importance of those contributions

B. the quotation from Napoleon about the importance of communications during war

C. the list of Native American tribes that contributed to different American war efforts

D. the explanation that in World War II, America's enemies were unable to crack the Native Americans' code

WHAT'S SO SPECIAL ABOUT SECRET CODES?

Read the passage "What's So Special About Secret Codes?" Then answer the questions.

What's So Special About Secret Codes?

by Mary Colson

1 Secret codes are powerful ways of sending messages and keeping information hidden. Cracking a code is about being a detective and outwitting your opponents. Creating, carrying, and cracking codes can be exciting and dangerous, and can even save lives.

2 Codes have brought down monarchs and whole armies and, today, they can make computers work or cause them to crash. Using a code makes sure that messages are understood only by the people they are intended for—from soldiers to popes. Some codes are written in letters, some in numbers, some in symbols, and some are only spoken or appear in music. Codes can also be found in pictures, in smoke, and even in string.

A very old art

3 Codes have been used since ancient times. The word *cryptography* means the "science of codes." It comes from the Greek words *kryptos* (secret) and *graphos* (writing). Cryptographers make and break codes. Many modern cryptographers use computer languages or codes to help them encrypt and decrypt their messages.

Early codes

4 Hiding a message is the earliest form of code and it is called steganography. In the 400s BCE, a man named Demaratus wrote an urgent message on a tablet and then covered it with wax. He sent the tablet to some Greek friends, who removed the wax and saw the hidden writing telling them the Persian army was going to invade!

5 Around 2,000 years ago, the Chinese wrote secret messages on hard-boiled eggs. "Invisible" ink sank into the shell, and the message was revealed on the hard white of the egg once the shell was removed.

GO ON ▶

"Doll in a hula skirt"

6 Secret messages were still being used in the 1900s. In 1941 the Japanese unexpectedly bombed the U.S. naval base at Pearl Harbor in Hawaii, killing many U.S. service people and damaging many ships. A spy for the Japanese named Velvalee Dickinson owned a doll store in New York City. She used doll orders to send messages back to the Japanese. She once wrote: "Doll in a hula skirt is in the hospital and doctors are working around the clock." This really meant: "USS *Honolulu* is badly damaged and undergoing around-the-clock repairs." Dickinson was eventually caught and convicted of espionage (spying) against the United States.

Making codes

7 Throughout history, people have wanted to keep their messages secret. But hidden writing is risky, because once the messenger or device is searched, the message is revealed easily. Codes are more secure. A code is a system of symbols, letters, words, or signals that are used instead of ordinary words and numbers to send secret messages or store information.

11 **Part A**

What does the word **encrypt** mean in paragraph 3 of the passage from "What's So Special About Secret Codes?"

A. reveal

B. observe

C. destroy

D. hide

12 **Part B**

What are **two** examples of **encrypting** in the passage?

A. In the 400s BCE, Demaratus wrote a message on a tablet and covered it with wax.

B. Demaratus's friends removed the wax from the tablet and found out the Persian army was going to invade.

C. The Chinese wrote secret messages on hard-boiled eggs using "invisible" ink.

D. People could read the message on the egg by removing the shell.

E. The Japanese bombed Pearl Harbor in Hawaii in 1941.

F. The United States convicted Velvalee Dickinson of spying for the Japanese.

Part A

13 In paragraph 5 of the passage from "What's So Special About Secret Codes?" the author describes the method used by the Chinese 2,000 years ago to hide codes. Which steps need to be followed in order to hide and show a message using this method?

A. First, the sender writes a message on an egg. The recipient boils the egg to reveal a message written in invisible ink.

B. First, the sender boils an egg in water. Next, the sender peels the egg and writes a message on it. The recipient reads the message on the egg.

C. First, the sender boils an egg in water. Next, the sender writes a message on the shell in invisible ink. The recipient peels the shell off the egg and reads the message on the egg.

D. First, the sender boils an egg in water. Next, the sender writes a message on the shell. The recipient uses special ink to reveal the message under the shell.

Part B

14 How does paragraph 5 contribute to the reader's understanding of secret codes?

A. It illustrates a common method of hiding messages still used today.

B. It demonstrates that people have been hiding messages for many centuries.

C. It shows how people have used wax to hide messages in the past.

D. It explains some of the reasons why people need to send messages.

15 You have read a passage from *Navajo Code Talkers*, the article "American Indians in the United States Army," and the passage "What's So Special About Secret Codes?"

Write an article to display at a local history museum that explains the authors' purposes for writing. Include an explanation of **each** author's purpose and what information the author includes to convey that purpose. Consider how the authors' purposes are similar and different.

GO ON ▶

GO ON ▶

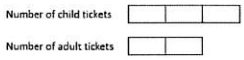
STOP

6th Grade Math			
Date	**Lesson**	**Objective**	**Assignment**
Monday, March 30	Unit 7, Lesson 13: Interpreting Points on the Coordinate Plane	• I can explain how rational numbers represent balances in a money context. • I can explain what points in a four-quadrant coordinate plane represent in a situation. • I can plot points in a four-quadrant coordinate plane to represent situations and solve problems.	Complete **Daily Warm-Up** Complete **Illustrative Mathematics Lesson** for the Day For each lesson: 1. Review Lesson Summary 2. Complete Lesson Activities 3. Complete Practice Problems
Tuesday, March 31	Unit 7, Lesson 14: Distances on a Coordinate Plane	• I can find horizontal and vertical distances between points on the coordinate plane.	
Wednesday, April 1	Unit 7, Lesson 15: Shapes on the Coordinate Plane	• I can find the lengths of horizontal and vertical segments in the coordinate plane. • I can plot polygons on the coordinate plane when I have the coordinates for the vertices.	
Thursday, April 2	Unit 7, Lesson 16: Common Factors	• I can explain what a common factor is. • I can explain what the greatest common factor is. • I can find the greatest common factor of two whole numbers.	
Friday, April 3	Unit 7, Lesson 17: Common Multiples	• I can explain what a common multiple is. • I can explain what the least common multiple is. • I can find the least common multiple of two whole numbers.	
Monday, April 6	Unit 7, Lesson 18: Using Common Multiples and Common Factors	• I can solve problems using common factors and multiples.	
Tuesday, April 7	Unit 7 Review/Practice	Complete the practice unit assessment.	
Wednesday, April 8	Unit 8, Lesson 1: Got Data	• I can collect the correct data to answer a question and use the correct units. • I can explain the difference between categorical and numerical data.	
Spring Break: April 9- April 13			

6th Grade Warm Ups

Monday, March 30

For one showing of a movie, a movie theater sold child and adult tickets in the ratio represented in the tape diagram.



Which of the following statements about the tickets sold could be true? Select **all** that apply.

- For every 5 tickets sold, 3 were adult tickets.
- The theater sold 45 child tickets and 30 adult tickets.
- The ratio of adult tickets to child tickets is 3 to 2.
- The ratio of child tickets to total tickets is 3:5.
- For every 3 child tickets sold, the theater sold 2 adult tickets.

Consider the tape diagrams.

Drag each expression into the group it matches.

Diagram A	Diagram B

$n+n+n$ | $3+n$ | $3n$ | $n+3$

Tuesday, March 31

The ratio of peanuts to cashews in Gil's trail mix recipe is 5:2. What two numbers correctly complete the table so that the ratio of peanuts to cashews is the same as Gil's recipe?

Enter your answers in the table.

Number of peanuts	Number of cashews
100	
	30

Calculator

Which expressions are equivalent to $4g+20$? Select **all** correct answers.

- $24g$
- $4(g+16)$
- $80g$
- $4(g+5)$
- $15+5+g+4$
- $2g+10+2g+10$

Wednesday, April 1

Nick ran 2 miles in 17 minutes. Consider his rate in minutes per mile and miles per minute.

Enter a number in each box to correctly complete each sentence.

Nick's rate, in minutes per mile, was [ ].

Each minute, Nick ran [ ] miles.

At this rate, it would take Nick [ ] minutes to run 5 miles.

Calculator

Which expressions are equivalent to $6 + 12x$?

Select **each** equivalent expression.

- A. $3(2 + 4x)$
- B. $3(2 + 6x) + 2x$
- C. $5(1 + 2x) + 1 + 2x$
- D. $7(1 + 2x) - 2x - 1$
- E. $7(1 + 2x) + 2x - 1$

Thursday, April 2

Dena buys 4 grapefruits for $12.00. Each grapefruit costs the same amount.

Enter a number in the empty box to correctly complete the sentence.

The rate Dena paid is $[ ] per grapefruit.

Which expressions are equivalent to $6h + 5(x + h)$?

Select **each** correct answer.

- A. $7h + 5x$
- B. $11h + 5x$
- C. $12h + x$
- D. $6h + 5x + 5h$
- E. $6(h + 5x + 5h)$

Friday, April 3

A sandwich shop prepares 3 sandwiches in 126 seconds and 8 sandwiches in 336 seconds. At this rate, how many seconds will it take to prepare 5 sandwiches?

Enter your answer in the box.

It will take [ ] seconds to prepare 5 sandwiches.

Calculator

Heather drove at a constant rate. She traveled 162 miles in 3 hours. How far, in miles, did Heather travel in 1 hour?

Monday, April 6

A ball is dropped from different heights. The table shows the height of the first bounce after the ball is dropped.

Bouncing Ball Experiment

Height of Drop (in inches)	Height of Bounce (in inches)
10	5
20	10
30	15

Part A

Using the data from the table, which equation can be used to find y, the height of the first bounce, in inches, when the ball is dropped from a height of x inches?

- A. $y = 2x$
- B. $y = \frac{x}{2}$
- C. $y = 5x$
- D. $y = \frac{x}{5}$

Select the expression that is equivalent to $48 + 12$.

- A. $6(8 + 6)$
- B. $12(4 + 1)$
- C. $4(44 + 3)$
- D. $8(6 + 4)$

Tuesday, April 7

This table shows the numbers of books, by type, checked out from the school library on Monday.

Book Checkout

Book Type	Number of Books
mystery	24
nonfiction	18
adventure	12
humor	16

Use the drop-down menus to complete the statement.

For every [▾] mystery books checked out, [▾] nonfiction books were checked out.

Sally rents a life jacket for a one-time fee of $5. She then rents a canoe for $15 per hour. Which expression represents the total cost, in dollars, to rent the life jacket and the canoe for h hours?

- A. $5 + 15h$
- B. $10h$
- C. $15 + 5h$
- D. $20h$

Wednesday, April 8

Select each expression that is equivalent to $3(n + 6)$.

Select **all** that apply.

A. $3n + 6$

B. $3n + 18$

C. $2n + 2 + n + 4$

D. $2(n + 6) + (n + 6)$

E. $2(n + 6) + n$

Joanna earns $12 per hour at her job. Last week, Joanna earned $432.

Part A

Which equation can be used to determine the number of hours (h) Joanna worked last week?

- A. $h + 12 = 432$
- B. $432h = 12$
- C. $12h = 432$
- D. $\frac{1}{12}h = 432$

March 30-April 8

Unit 7
Student Task Statements

Rational Numbers

Click on a title in the list below to scroll directly to that lesson.

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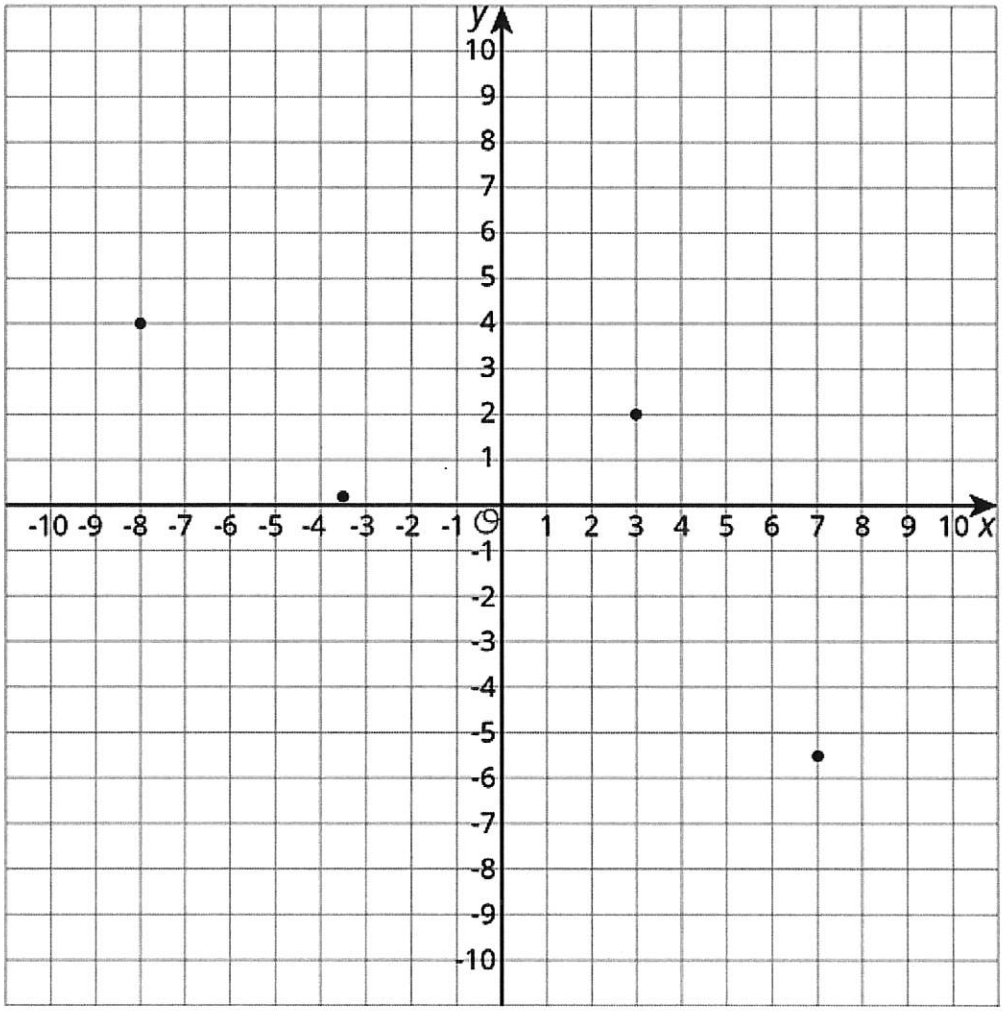
Unit 7, Lesson 13

Interpreting Points on a Coordinate Plane

Let's examine what points on the coordinate plane can tell us.

13.1 Unlabeled Points

Label each point on the coordinate plane with the appropriate letter and ordered pair.



$A = (7, -5.5)$ $B = (-8, 4)$ $C = (3, 2)$ $D = (-3.5, 0.2)$

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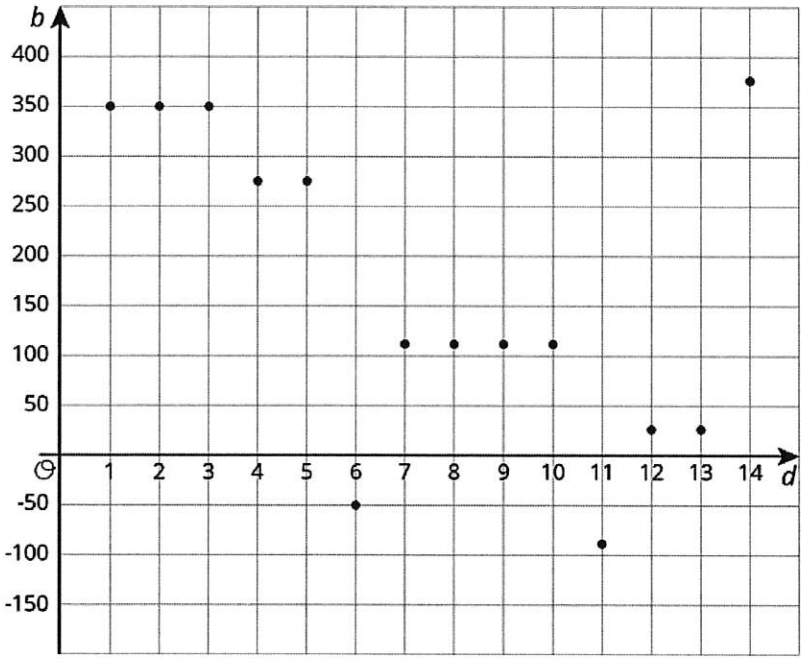
13.2 Account Balance

The graph shows the balance in a bank account over a period of 14 days. The axis labeled b represents account balance in dollars. The axis labeled d represents the day.



1. Estimate the greatest account balance. On which day did it occur?

2. Estimate the least account balance. On which day did it occur?

3. What does the point $(6, -50)$ tell you about the account balance?

4. How can we interpret $|-50|$ in the context?

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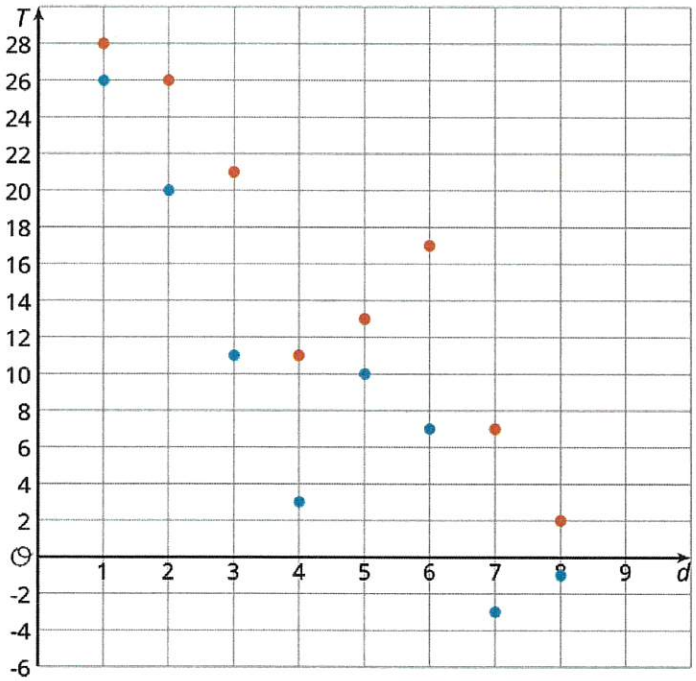
13.3 High and Low Temperatures

The coordinate plane shows the high and low temperatures in Nome, Alaska over a period of 8 days. The axis labeled T represents temperatures in degrees Fahrenheit. The axis labeled d represents the day.



1. a. What was the warmest high temperature?

   b. Write an inequality to describe the high temperatures, H, over the 8-day period.

2. a. What was the coldest low temperature?

   b. Write an inequality to describe the low temperatures, L, over the 8-day period.

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3. a. On which day(s) did the *largest* difference between the high and low temperatures occur? Write down this difference.

   b. On which day(s) did the *smallest* difference between the high and low temperatures occur? Write down this difference.

Are you ready for more?

Before doing this problem, do the problem about taxicab distance in an earlier lesson.

The point $(0, 4)$ is 5 taxicab units away from $(-4, 3)$ and 5 taxicab units away from $(2, 1)$.

1. Find as many other points as you can that are 4 taxicab units away from *both* $(-4, 3)$ and $(2, 1)$.
2. Are there any points that are 3 taxicab units away from both points?

Lesson 13 Summary

Points on the coordinate plane can give us information about a context or a situation. One of those contexts is about money.

To open a bank account, we have to put money into the account. The account balance is the amount of money in the account at any given time. If we put in $350 when opening the account, then the account balance will be 350.

Sometimes we may have no money in the account and need to borrow money from the bank. In that situation, the account balance would have a negative value. If we borrow $200, then the account balance is -200.

A coordinate grid can be used to display both the balance and the day or time for any balance. This allows to see how the balance changes over time or to compare the balances of different days.

Similarly, if we plot on the coordinate plane data such as temperature over time, we can see how temperature changes over time or compare temperatures of different times.

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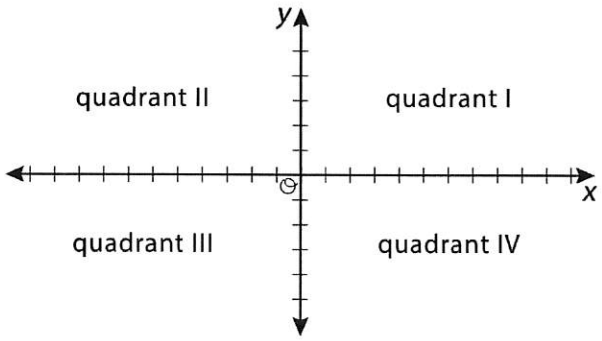
Unit 7, Lesson 13
Practice Problems

1. The elevation of a submarine is shown in the table. Draw and label coordinate axes with an appropriate scale and plot the points.

time after noon (hours)	elevation (meters)
0	-567
1	-892
2	-1,606
3	-1,289
4	-990
5	-702
6	-365

2. The x-axis represents the number of hours before or after noon, and the y-axis represents the temperature in degrees Celsius.



   a. At 9 a.m., it was below freezing. In what quadrant would this point be plotted?
   b. At 11 a.m., it was $10^\circ \mathrm{C}$. In what quadrant would this point be plotted?
   c. Choose another time and temperature. Then tell the quadrant where the point should be plotted.
   d. What does the point $(0, 0)$ represent in this context?

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3. The inequalities $h > 42$ and $h < 60$ represent the height requirements for an amusement park ride, where h represents a person's height in inches.

   Write a sentence or draw a sign or that describes these rules as clearly as possible.

4. Solve each equation.

   a. $3a = 12$

   b. $b + 3.3 = 8.9$

   c. $1 = \frac{1}{4}c$

   d. $5\frac{1}{2} = d + \frac{1}{4}$

   e. $2e = 6.4$

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Unit 7, Lesson 14

Distances on a Coordinate Plane

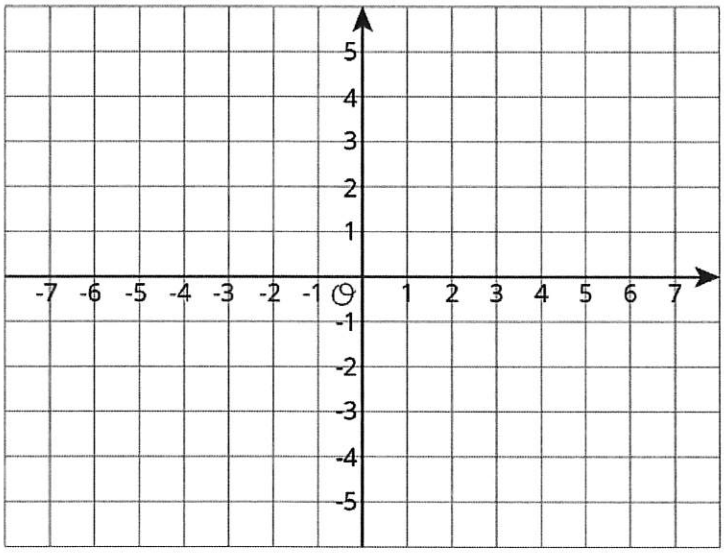
Let's explore distance on the coordinate plane.

14.1 Coordinate Patterns

Interactive digital version available

a.openup.org/ms-math/en/s/ccss-6-7-14-1

Plot points in your assigned quadrant and label them with their coordinates.



14.2 Signs of Numbers in Coordinates

Interactive digital version available

a.openup.org/ms-math/en/s/ccss-6-7-14-2

1. Write the coordinates of each point.

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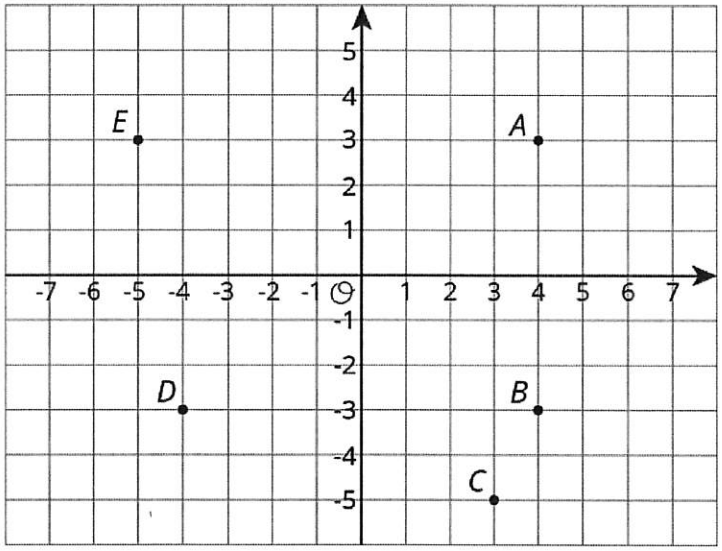

$A =$

$B =$

$C =$

$D =$

$E =$

2. Answer these questions for each pair of points.
   - How are the coordinates the same? How are they different?
   - How far away are they from the y-axis? To the left or to the right of it?
   - How far away are they from the x-axis? Above or below it?

   a. A and B

   b. B and D

   c. A and D

Pause here for a class discussion.

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3. Point F has the same coordinates as point C, except its y-coordinate has the opposite sign.

   a. Plot point F on the coordinate plane and label it with its coordinates.

   b. How far away are F and C from the x-axis?

   c. What is the distance between F and C?

4. Point G has the same coordinates as point E, except its x-coordinate has the opposite sign.

   a. Plot point G on the coordinate plane and label it with its coordinates.

   b. How far away are G and E from the y-axis?

   c. What is the distance between G and E?

5. Point H has the same coordinates as point B, except its *both* coordinates have the opposite sign. In which quadrant is point H?

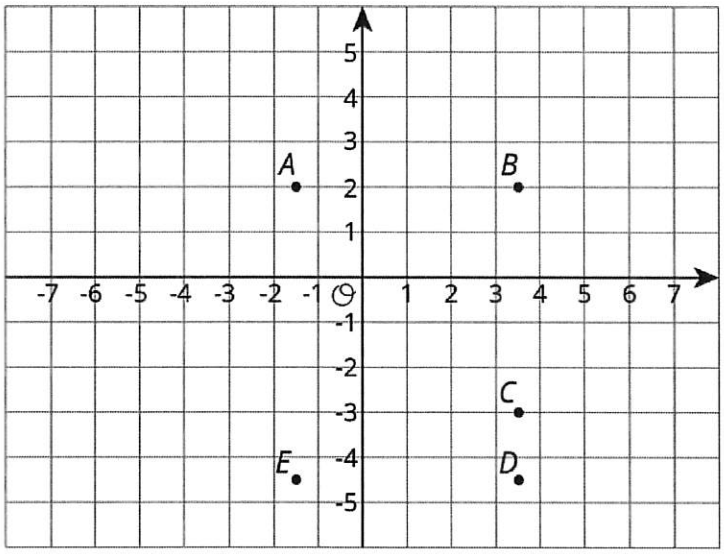
14.3 Finding Distances on a Coordinate Plane

Interactive digital version available

a.openup.org/ms-math/en/s/ccss-6-7-14-3

NAME DATE PERIOD

1. Label each point with its coordinates.



2. Find the distance between each of the following pairs of points.

   a. Point B and C

   b. Point D and B

   c. Point D and E

3. Which of the points are 5 units from $(-1.5, -3)$?

4. Which of the points are 2 units from $(0.5, -4.5)$?

5. Plot a point that is both 2.5 units from A and 9 units from E. Label that point M and write down its coordinates.

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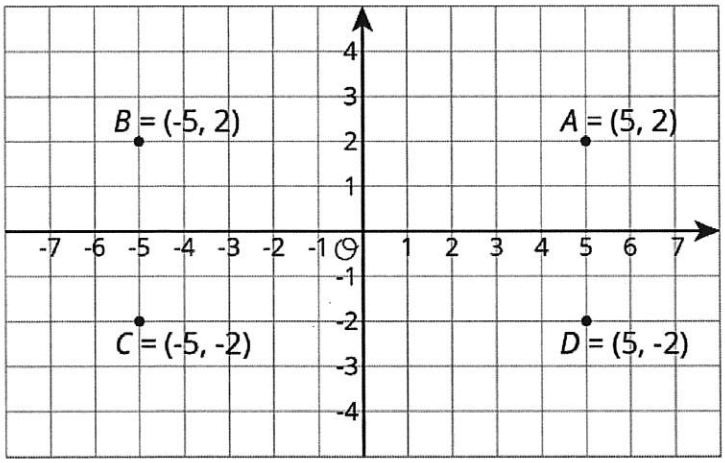
Are you ready for more?

Priya says, "There are exactly four points that are 3 units away from $(-5, 0)$." Lin says, "I think there are a whole bunch of points that are 3 units away from $(-5, 0)$."

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

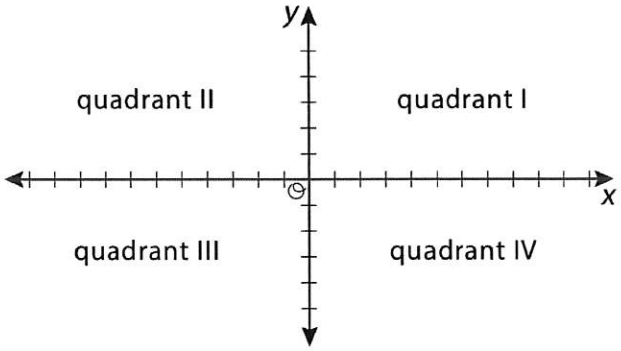
Lesson 14 Summary

The points $A = (5, 2)$, $B = (-5, 2)$, $C = (-5, -2)$, and $D = (5, -2)$ are shown in the plane. Notice that they all have almost the same coordinates, except the signs are different. They are all the same distance from each axis but are in different quadrants.



We can always tell which quadrant a point is located in by the signs of its coordinates.

x	y	**quadrant**
positive	positive	I
negative	positive	II
negative	negative	III
positive	negative	IV



In general:

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- If two points have x-coordinates that are opposites (like 5 and -5), they are the same distance away from the vertical axis, but one is to the left and the other to the right.
- If two points have y-coordinates that are opposites (like 2 and -2), they are the same distance away from the horizontal axis, but one is above and the other below.

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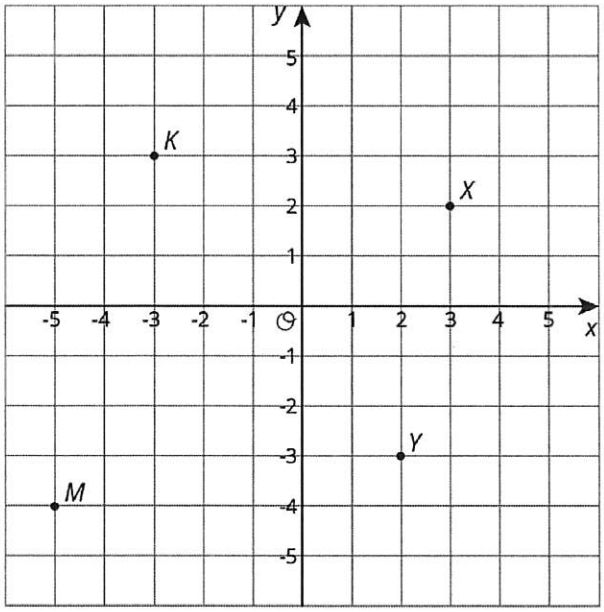
Unit 7, Lesson 14
Practice Problems

1. Here are 4 points on a coordinate plane.



   a. Label each point with its coordinates.
   b. Plot a point that is 3 units from point K. Label it P.
   c. Plot a point that is 2 units from point M. Label it W.

2. Each set of points are connected to form a line segment. What is the length of each?

   a. A = $(3, 5)$ and B = $(3, 6)$
   b. C = $(-2, -3)$ and D = $(-2, -6)$
   c. E = $(-3, 1)$ and F = $(-3, -1)$

3. On the coordinate plane, plot four points that are each 3 units away from point $P = (-2, -1)$. Write the coordinates of each point.

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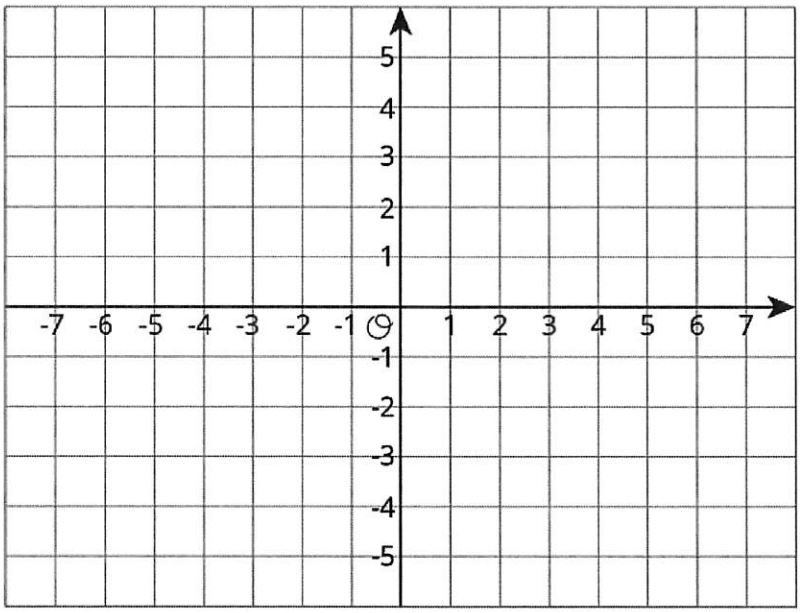

4. Noah's recipe for sparkling orange juice uses 4 liters of orange juice and 5 liters of soda water.

   a. Noah prepares large batches of sparkling orange juice for school parties. He usually knows the total number of liters, t, that he needs to prepare. Write an equation that shows how Noah can find s, the number of liters of soda water, if he knows t.

   b. Sometimes the school purchases a certain number, j, of liters of orange juice and Noah needs to figure out how much sparkling orange juice he can make. Write an equation that Noah can use to find t if he knows j.

5. For a suitcase to be checked on a flight (instead of carried by hand), it can weigh at most 50 pounds. Andre's suitcase weighs 23 kilograms. Can Andre check his suitcase? Explain or show your reasoning. (Note: 10 kilograms $\approx$ 22 pounds)

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Unit 7, Lesson 15

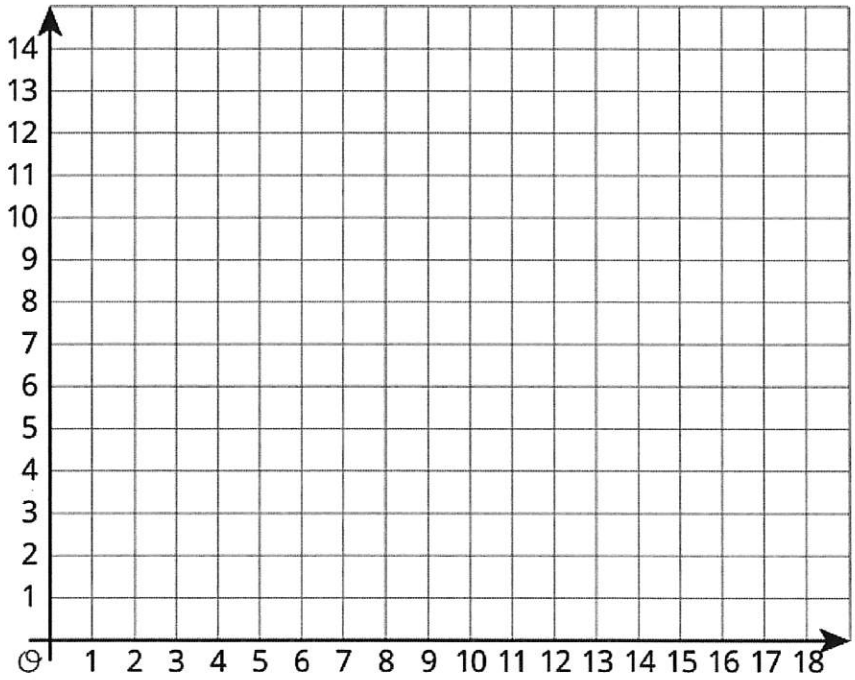
Shapes on the Coordinate Plane

Let's use the coordinate plane to solve problems and puzzles.

15.1 Figuring Out The Coordinate Plane

Interactive digital version available

a.openup.org/ms-math/en/s/ccss-6-7-15-1



1. Draw a figure in the coordinate plane with at least three of following properties:
   - 6 vertices
   - 1 pair of parallel sides
   - At least 1 right angle

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- 2 sides with the same length

2. Is your figure a polygon? Explain how you know.

15.2 Plotting Polygons

Interactive digital version available

a.openup.org/ms-math/en/s/ccss-6-7-15-2

Here are the coordinates for four polygons. Plot them on the coordinate plane, connect the points in the order that they are listed, and label each polygon with its letter name.

1. Polygon A: $(-7, 4), (-8, 5), (-8, 6), (-7, 7), (-5, 7), (-5, 5), (-7, 4)$

2. Polygon B: $(4, 3), (3, 3), (2, 2), (2, 1), (3, 0), (4, 0), (5, 1), (5, 2), (4, 3)$

3. Polygon C: $(-8, -5), (-8, -8), (-5, -8), (-5, -5), (-8, -5)$

4. Polygon D: $(-5, 1), (-3, -3), (-1, -2), (0, 3), (-3, 3), (-5, 1)$

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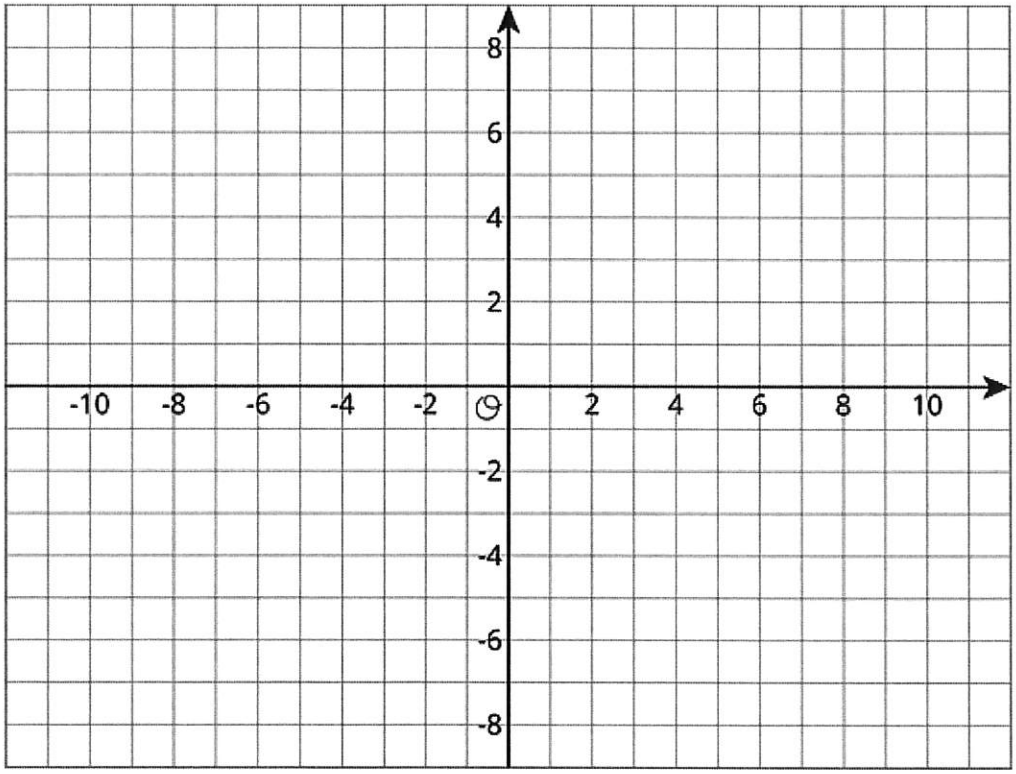

Are you ready for more?

Find the area of Polygon D in this activity.

15.3 Four Quadrants of A-Maze-ing

Interactive digital version available

a.openup.org/ms-math/en/s/ccss-6-7-15-3

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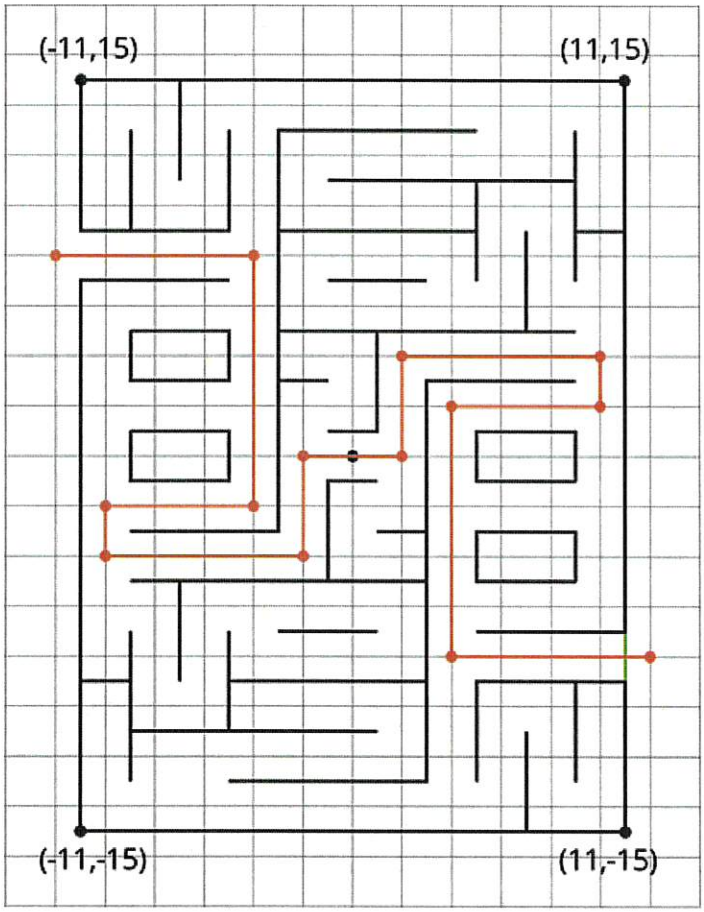
1. The following diagram shows Andre's route through a maze. He started from the lower right entrance.



a. What are the coordinates of the first two and the last two points of his route?

b. How far did he walk from his starting point to his ending point? Show how you know.

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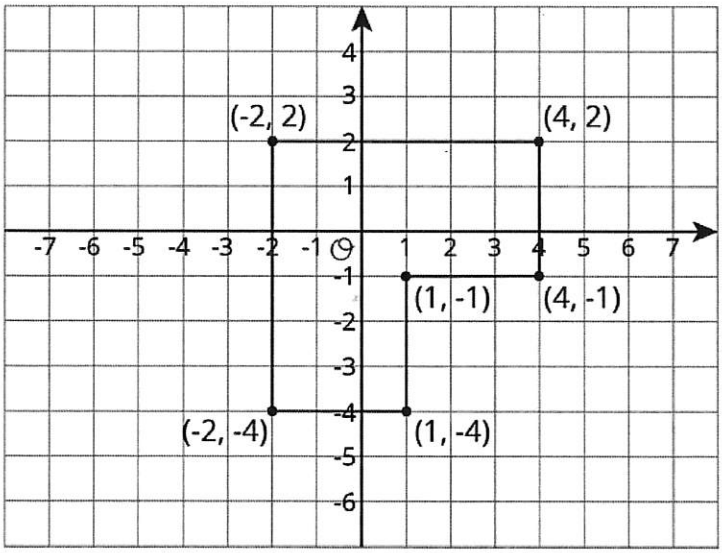
2. Jada went into the maze and stopped at $(-7, 2)$.

   a. Plot that point and other points that would lead her out of the maze (through the exit on the upper left side).

   b. How far from $(-7, 2)$ must she walk to exit the maze? Show how you know.

Lesson 15 Summary

We can use coordinates to find lengths of segments in the coordinate plane.



For example, we can find the perimeter of this polygon by finding the sum of its side lengths. Starting from $(-2, 2)$ and moving clockwise, we can see that the lengths of the segments are 6, 3, 3, 3, 3, and 6 units. The perimeter is therefore 24 units.

In general:

- If two points have the same x-coordinate, they will be on the same vertical line, and we can find the distance between them.

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- If two points have the same y-coordinate, they will be on the same horizontal line, and we can find the distance between them.

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Unit 7, Lesson 15

Practice Problems

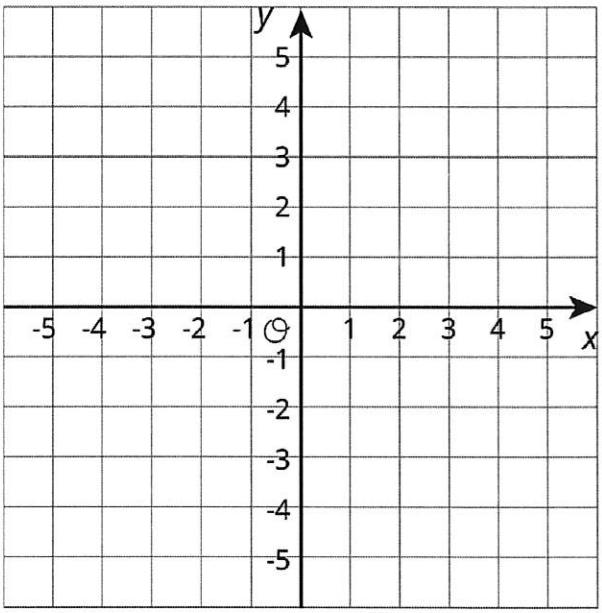
1. The coordinates of a rectangle are $(3, 0)$, $(3, -5)$, $(-4, 0)$ and $(-4, -5)$

   a. What is the length and width of this rectangle?

   b. What is the perimeter of the rectangle?

   c. What is the area of the rectangle?

2. Draw a square with one vertex on the origin $(-3, 5)$ and a perimeter of 20.



3. a. Plot and connect the following points to form a polygon.
   $(-3, 2)$, $(2, 2)$, $(2, -4)$, $(-1, -4)$, $(-1, -2)$, $(-3, -2)$, $(-3, 2)$

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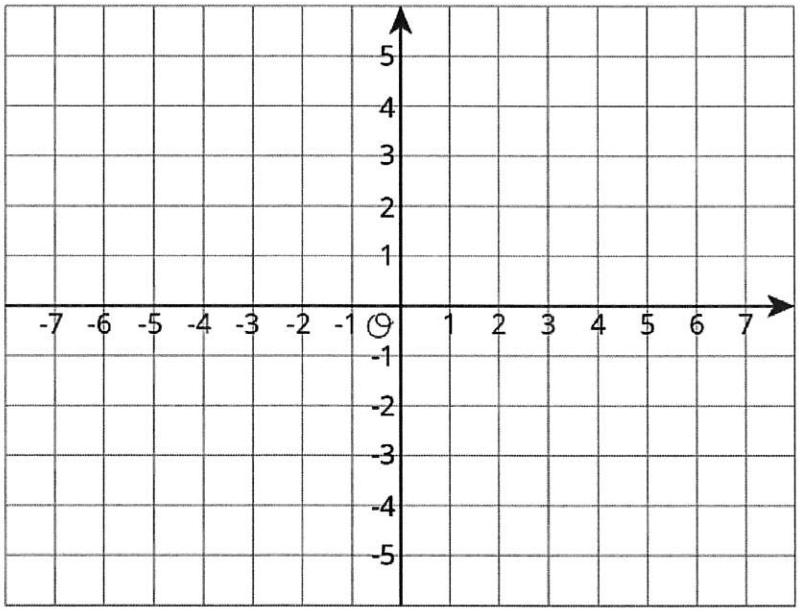

b. Find the perimeter of the polygon.

4. For each situation, select **all** the equations that represent it. Choose one equation and solve it.

   a. Jada's cat weighs 3.45 kg. Andre's cat weighs 1.2 kg more than Jada's cat. How much does Andre's cat weigh?

   $x = 3.45 + 1.2$ $x = 3.45 - 1.2$ $x + 1.2 = 3.45$ $x - 1.2 = 3.45$

   b. Apples cost $1.60 per pound at the farmer's market. They cost 1.5 times as much at the grocery store. How much do the apples cost per pound at the grocery store?

   $y = (1.5) \cdot (1.60)$ $y = 1.60 \div 1.5$ (1.5)y = 1.60 $\frac{y}{1.5} = 1.60$

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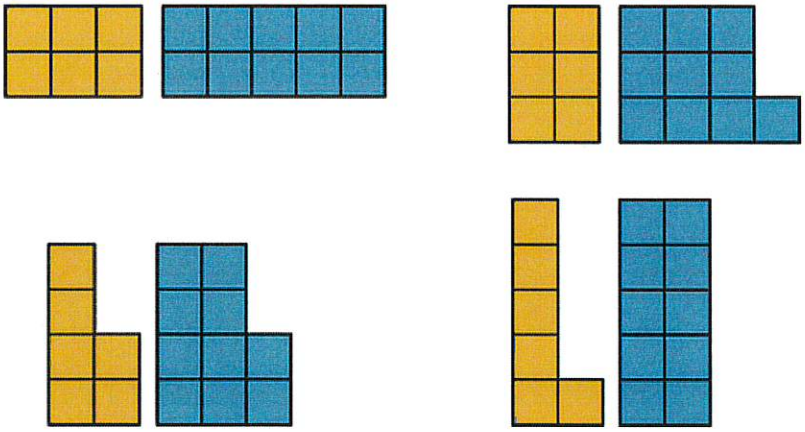
Unit 7, Lesson 16

Common Factors

Let's use factors to solve problems.

16.1 Figures Made of Squares

How are the pairs of figures alike? How are they different?



16.2 Diego's Bake Sale

Diego is preparing brownies and cookies for a bake sale. He would like to make equal-size bags for selling all of the 48 brownies and 64 cookies that he has. Organize your answer to each question so that it can be followed by others.

1. How can Diego package all the 48 brownies so that each bag has the same number of them? How many bags can he make, and how many brownies will be in each bag? Find all the possible ways to package the brownies.

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2. How can Diego package all the 64 cookies so that each bag has the same number of them? How many bags can he make, and how many cookies will be in each bag? Find all the possible ways to package the cookies.

3. How can Diego package all the 48 brownies and 64 cookies so that each bag has the same combination of items? How many bags can he make, and how many of each will be in each bag? Find all the possible ways to package both items.

4. What is the largest number of combination bags that Diego can make with no left over? Explain to your partner how you know that it is the largest possible number of bags.

16.3 Greatest Common Factor

1. The **greatest common factor** of 30 and 18 is 6. What do you think the term "greatest common factor" means?

2. Find all of the **factors** of 21 and 6. Then, identify the greatest common factor of 21 and 6.

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3. Find all of the factors of 28 and 12. Then, identify the greatest common factor of 28 and 12.

4. A rectangular bulletin board is 12 inches tall and 27 inches wide. Elena plans to cover it with squares of colored paper that are all the same size. The paper squares come in different sizes; all of them have whole-number inches for their side lengths.

   a. What is the side length of the largest square that Elena could use to cover the bulletin board completely without gaps and overlaps? Explain or show your reasoning.

   b. How is the solution to this problem related to greatest common factor?

Are you ready for more?

A school has 1000 lockers, all lined up in a hallway. Each locker is closed. Then...

- One student goes down the hall and opens each locker.
- A second student goes down the hall and closes every second locker: lockers 2, 4, 6, and so on.
- A third student goes down the hall and changes every third locker. If a locker is open, he closes it. If a locker is closed, he opens it.
- A fourth student goes down the hall and changes every fourth locker.

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This process continues up to the thousandth student! At the end of the process, which lockers will be open? (Hint: you may want to try this problem with a smaller number of lockers first.)

Lesson 16 Summary

A factor of a whole number n is a whole number that divides n evenly without a remainder. For example, 1, 2, 3, 4, 6, and 12 are all factors of 12 because each of them divides 12 evenly and without a remainder.

A **common factor** of two whole numbers is a factor that they have in common. For example, 1, 3, 5, and 15 are factors of 45; they are also factors of 60. We call 1, 3, 5, and 15 common factors of 45 and 60.

The **greatest common factor** (sometimes written as GCF) of two whole numbers is the greatest of all of the common factors. For example, 15 is the greatest common factor for 45 and 60.

One way to find the greatest common factor of two whole numbers is to list all of the factors for each, and then look for the greatest factor they have in common. Let's try to find the greatest common factor of 18 and 24. First, we list all the factors of each number.

- Factors of 18: **1**, **2**, **3**, **6**, 9,18
- Factors of 24: **1**, **2**, **3**, 4, **6**, 8, 12, 24

The common factors are 1, 2, 3, and 6. Of these, 6 is the greatest one, so 6 is the greatest common factor of 18 and 24.

Glossary Terms

common factor

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greatest common factor

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Unit 7, Lesson 16
Practice Problems

1. A teacher is making gift bags. Each bag is to be filled with pencils and stickers. The teacher has 24 pencils and 36 stickers to use. Each bag will have the same number of each item, with no items left over.

   For example, she could make 2 bags with 12 pencils and 18 stickers each.

   What are the other possibilities? Explain or show your reasoning.

2. a. List all the factors of 42.
   b. What is the greatest common factor of 42 and 15?
   c. What is the greatest common factor of 42 and 50?

3. A school chorus has 90 sixth-grade students and 75 seventh-grade students. The music director wants to make groups of performers, with the same combination of sixth- and seventh-grade students in each group. She wants to form as many groups as possible.

   a. What is the largest number of groups that could be formed? Explain or show your reasoning.
   b. If that many groups are formed, how many students of each grade level would be in each group?

4. Here are some bank transactions from a bank account last week. Which transactions represent negative values?

   Monday: $650 paycheck deposited

   Tuesday: $40 withdrawal from the ATM at the gas pump

   Wednesday: $20 credit for returned merchandise

   Thursday: $125 deducted for cell phone charges

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Friday: $45 check written to pay for book order

Saturday: $80 withdrawal for weekend spending money

Sunday: $10 cash-back reward deposited from a credit card company

5. Find the quotients.

   a. $\frac{1}{7} \div \frac{1}{8}$

   b. $\frac{12}{5} \div \frac{6}{5}$

   c. $\frac{1}{10} \div 10$

   d. $\frac{9}{10} \div \frac{10}{9}$

6. An elephant can travel at a constant speed of 25 miles per hour, while a giraffe can travel at a constant speed of 16 miles in $\frac{1}{2}$ hour.

   a. Which animal runs faster? Explain your reasoning.

   b. How far can each animal run in 3 hours?

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Unit 7, Lesson 17

Common Multiples

Let's use multiples to solve problems.

17.1 Notice and Wonder: Multiples

Circle all the multiples of 4 in this list.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

Circle all the multiples of 6 in this list.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

What do you notice? What do you wonder?

17.2 The Florist's Order

A florist can order roses in bunches of 12 and lilies in bunches of 8. Last month she ordered the same number of roses and lilies.

1. If she ordered no more than 100 of each kind of flower, how many bunches of each could she have ordered? Find all the possible combinations.

2. What is the smallest number of bunches of roses that she could have ordered? What about the smallest number of bunches of lilies? Explain your reasoning.

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17.3 Least Common Multiple

The **least common multiple** of 6 and 8 is 24.

1. What do you think the term "least common multiple" means?

2. Find all of the **multiples** of 10 and 8 that are less than 100. Find the least common multiple of 10 and 8.

3. Find all of the multiples of 7 and 9 that are less than 100. Find the least common multiple of 7 and 9.

Are you ready for more?

1. What is the least common multiple of 10 and 20?
2. What is the least common multiple of 4 and 12?
3. In the previous two questions, one number is a multiple of the other. What do you notice about their least common multiple? Do you think this will always happen when one number is a multiple of the other? Explain your reasoning.

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17.4 Prizes on Grand Opening Day

Lin's uncle is opening a bakery. On the bakery's grand opening day, he plans to give away prizes to the first 50 customers that enter the shop. Every fifth customer will get a free bagel. Every ninth customer will get a free blueberry muffin. Every 12th customer will get a free slice of carrot cake.

1. Diego is waiting in line and is the 23rd customer. He thinks that he should get farther back in line in order to get a prize. Is he right? If so, how far back should he go to get at least one prize? Explain your reasoning.

2. Jada is the 36th customer.

   a. Will she get a prize? If so, what prize will she get?

   b. Is it possible for her to get more than one prize? How do you know? Explain your reasoning.

3. How many prizes total will Lin's uncle give away? Explain your reasoning.

Lesson 17 Summary

A multiple of a whole number is a product of that number with another whole number. For example, 20 is a multiple of 4 because $20 = 5 \cdot 4$.

A **common multiple** for two whole numbers is a number that is a multiple of both numbers. For example, 20 is a multiple of 2 and a multiple of 5, so 20 is a common multiple of 2 and 5.

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The **least common multiple** (sometimes written as LCM) of two whole numbers is the smallest multiple they have in common. For example, 30 is the least common multiple of 6 and 10.

One way to find the least common multiple of two numbers is to list multiples of each in order until we find the smallest multiple they have in common. Let's find the least common multiple for 4 and 10. First, we list some multiples of each number.

- Multiples of 4: 4, 8, 12, 16, **20**, 24, 28, 32, 36, **40**, 44...
- Multiples of 10: 10, **20**, 30, **40**, 50, ...

20 and 40 are both common multiples of 4 and 10 (as are 60, 80, . . .), but 20 is the smallest number that is on *both* lists, so 20 is the least common multiple.

Glossary Terms

common multiple

least common multiple

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Unit 7, Lesson 17

Practice Problems

1. a. A green light blinks every 4 seconds and a yellow light blinks every 5 seconds. When will both lights blink at the same time?
   b. A red light blinks every 12 seconds and a blue light blinks every 9 seconds. When will both lights blink at the same time?
   c. Explain how to determine when 2 lights blink together.

2. a. List all multiples of 10 up to 100.
   b. List all multiples of 15 up to 100.
   c. What is the least common multiple of 10 and 15?

3. Cups are sold in packages of 8. Napkins are sold in packages of 12.
   a. What is the fewest number of packages of cups and the fewest number of packages of napkins that can be purchased so there will be the same number of cups as napkins?
   b. How many sets of cups and napkins will there be?

4. Rectangle ABCD is drawn on a coordinate plane. A = $(-6, 9)$ and B = $(5, 9)$.

   What could be the locations of points C and D?

5. A school wants to raise $2,500 to support its music program.
   a. If it has met 20% of its goal so far, how much money has it raised?
   b. If it raises 175% of its goal, how much money will the music program receive? Show your reasoning.

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Unit 7, Lesson 18

Using Common Multiples and Common Factors

Let's use common factors and common multiple to solve problems.

18.1 Keeping a Steady Beat

Your teacher will give you instructions for playing a rhythm game. As you play the game, think about these questions:

- When will the two sounds happen at the same time?
- How does this game relate to common factors or common multiples?

18.2 Factors and Multiples

Work with your partner to solve the following problems.

1. **Party.** Elena is buying cups and plates for her party. Cups are sold in packs of 8 and plates are sold in packs of 6. She wants to have the same number of plates and cups.

   a. Find a number of plates and cups that meets her requirement.

   b. How many packs of each supply will she need to buy to get that number?

   c. Name two other quantities of plates and cups she could get to meet her requirement.

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2. **Tiles.** A restaurant owner is replacing the restaurant's bathroom floor with square tiles. The tiles will be laid side-by-side to cover the entire bathroom with no gaps, and none of the tiles can be cut. The floor is a rectangle that measures 24 feet by 18 feet.

   a. What is the largest possible tile size she could use? Write the side length in feet. Explain how you know it's the largest possible tile.

   b. How many of these largest size tiles are needed?

   c. Name more tile sizes that are whole number of feet that she could use to cover the bathroom floor. Write the side lengths (in feet) of the square tiles.

3. **Stickers.** To celebrate the first day of spring, Lin is putting stickers on some of the 100 lockers along one side of her middle school's hallway. She puts a skateboard sticker on every 4th locker (starting with locker 4), and a kite sticker on every 5th locker (starting with locker 5).

   a. Name three lockers that will get both stickers.

   b. After Lin makes her way down the hall, will the 30th locker have no stickers, 1 sticker, or 2 stickers? Explain how you know.

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4. **Kits.** The school nurse is assembling first-aid kits for the teachers. She has 75 bandages and 90 throat lozenges. All the kits must have the same number of each supply, and all supplies must be used.

   a. What is the largest number of kits the nurse can make?

   b. How many bandages and lozenges will be in each kit?

5. What kind of mathematical work was involved in each of the previous problems? Put a checkmark to show what the questions were about.

problem	finding multiples	finding least common multiple	finding factors	finding greatest common factor
Party				
Tiles				
Stickers				
Kits				

Are you ready for more?

You probably know how to draw a five-pointed star without lifting your pencil. One way to do this is to start with five dots arranged in a circle, then connect every second dot.

If you try the same thing with six dots arranged in a circle, you will have to lift your pencil. Once you make the first triangle, you'll have to find an empty dot and start the process over. Your six-pointed star has two pieces that are each drawn without lifting the pencil.

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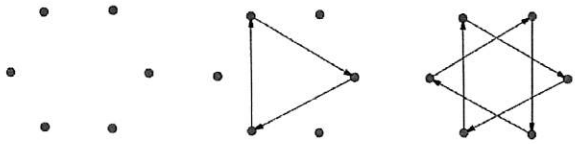
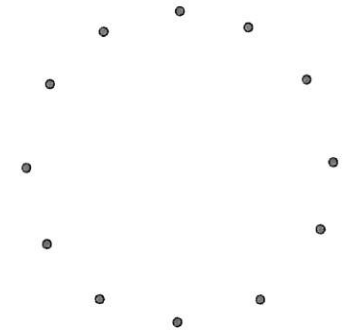
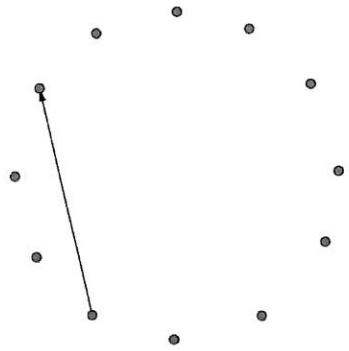


With twelve dots arranged in a circle, we can make some twelve-pointed stars.

1. Start with one dot and connect every second dot, as if you were drawing a five-pointed star. Can you draw the twelve-pointed star without lifting your pencil? If not, how many pieces does the twelve-pointed star have?

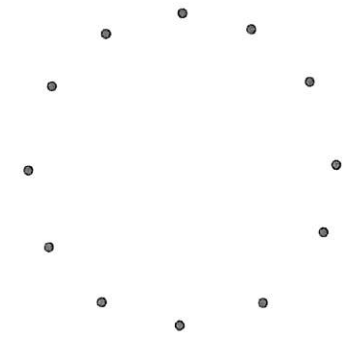


2. This time, connect every third dot. Can you draw this twelve-pointed star without lifting your pencil? If not, how many pieces do you get?



3. What do you think will happen if you connect every fourth dot? Try it. How many pieces do you get?

4. Do you think there is any way to draw a twelve-pointed star without lifting your pencil? Try it out.



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5. Now investigate eight-pointed stars, nine-pointed stars, and ten-pointed stars. What patterns do you notice?

18.3 More Factors and Multiples

Here are five more problems. Read and discuss each one with your group. *Without solving*, predict whether each problem involves finding common multiples or finding common factors. Circle one or more options to show your prediction.

1. **Soccer.** Diego and Andre are both in a summer soccer league. During the month of August, Diego has a game every 3rd day, starting August 3rd, and Andre has a game every 4th day, starting August 4th.

   - common multiples
   - common factors
   - least common multiple
   - greatest common factor

   a. What is the first date that both boys will have a game?

   b. How many of their games fall on the same date?

2. **Performances.** During a performing arts festival, students from elementary and middle schools will be grouped together for various performances. There are 32 elementary students and 40 middle-school students. The arts director wants identical groups for the performances, with students from both schools in each group. Each student can be a part of only one group.

   - common multiples
   - common factors
   - least common multiple
   - greatest common factor

   a. Name all possible groupings.

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b. What is the largest number of groups that can be formed? How many elementary school students and how many middle school students will be in each group?

3. **Lights.** There is a string of holiday lights with red, gold, and blue lights. The red lights are set to blink every 12 seconds, the gold lights are set to blink every 8 seconds, and the blue lights are set to blink every 6 seconds. The lights are on an automatic timer that starts each day at 7:00 p.m. and stops at midnight.

- common multiples
- common factors
- least common multiple
- greatest common factor

a. After how much time with all 3 lights blink at the exact same time?

b. How many times total will this happen in one day?

4. **Banners.** Noah has two pieces of cloth. He is making square banners for students to hold during the opening day game. One piece of cloth is 72 inches wide. The other is 90 inches wide. He wants to use all the cloth, and each square banner must be of equal width and as wide as possible.

- common multiples
- common factors
- least common multiple
- greatest common factor

a. How wide should he cut the banners?

b. How many banners can he cut?

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5. **Dancers.** At Elena's dance recital her performance begins with a line of 48 dancers that perform in the dark with a black light that illuminates white clothing. All 48 dancers enter the stage in a straight line. Every 3rd dancer wears a white headband, every 5th dancer wears a white belt, and every 9th dancer wears a set of white gloves.

   - common multiples
   - common factors
   - least common multiple
   - greatest common factor

   a. If Elena is the 30th dancer, what accessories will she wear?

   b. Will any of the dancers wear all 3 accessories? If so, which one(s)?

   c. How many of each accessory will the dance teacher need to order?

6. Your teacher will assign your group a problem. Work with your group to solve the problem on another sheet of paper. Show your reasoning. Pause here so that your teacher could review your work.

7. Work with your group to create a visual display that includes a diagram, an equation, and a math vocabulary word that would help to explain your mathematical thinking while solving the problem.

8. Prepare a short presentation in which all group members are involved. Your presentation should include: the problem (read aloud), your group's prediction of what mathematical concept the problem involved, and an explanation of each step of the solving process.

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18.4 Factors and Multiples Bingo

Your teacher will explain the directions for a bingo game. Here are some things to keep in mind:

- Share one bingo board and some bingo chips with a partner.
- To play the game, your teacher will read statements aloud. You may help one another decide what numbers fit each statement, but speak only in a whisper. If the teacher hears anything above a whisper, you are out.
- The first person to call bingo needs to call out each number and identify the statement that it corresponds to. If there is an error in identifying statements, that player is out and the round continues.

Good luck, and have fun!

Lesson 18 Summary

If a problem requires dividing two whole numbers by the same whole number, solving it involves looking for a common factor. If it requires finding the *largest* number that can divide into the two whole numbers, we are looking for the *greatest common factor*.

Suppose we have 12 bagels and 18 muffins and want to make bags so each bag has the same combination of bagels and muffins. The common factors of 12 and 18 tell us possible number of bags that can be made.

The common factors of 18 are 1, 2, 3, and 6. For these numbers of bags, here are the number of bagels and muffins per bag.

- 1 bag: 12 bagels and 18 muffins
- 2 bags: 6 bagels and 9 muffins
- 3 bags: 4 bagels and 6 muffins
- 6 bags: 2 bagels and 3 muffins

We can see that the largest number of bags that can be made, 6, is the greatest common factor.

If a problem requires finding a number that is a multiple of two given numbers, solving it involves looking for a common multiple. If it requires finding the *first* instance the two numbers share a multiple, we are looking for the *least common multiple*.

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Suppose forks are sold in boxes of 9 and spoons are sold in boxes of 15, and we want to buy an equal number of each. The multiples of 9 tell us how many forks we could buy, and the multiples of 15 tell us how many spoons we could buy, as shown here.

- Forks: 9, 18, 27, 36, 45, 54, 63, 72, 90. . .
- Spoons: 15, 30, 45, 60, 75, 90. . .

If we want as many forks as spoons, our options are 45, 90, 135, and so on, but the smallest number of utensils we could buy is 45, the least common multiple. This means buying 5 boxes of forks ($5 \cdot 9 = 45$) and 3 boxes of spoons ($3 \cdot 15 = 45$).

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Unit 7, Lesson 18

Practice Problems

1. Mai, Clare, and Noah are making signs to advertise the school dance. It takes Mai 6 minutes to complete a sign, it takes Clare 8 minutes to complete a sign, and it takes Noah 5 minutes to complete a sign. They keep working at the same rate for a half hour.

   a. Will Mai and Clare complete a sign at the same time? Explain your reasoning.

   b. Will Mai and Noah complete a sign at the same time? Explain your reasoning.

   c. Will Clare and Noah complete a sign at the same time? Explain your reasoning

   d. Will all three students complete a sign at the same time? Explain your reasoning

2. Diego has 48 chocolate chip cookies, 64 vanilla cookies, and 100 raisin cookies for a bake sale. He wants to make bags that have all three cookie flavors and the same number of each flavor per bag.

   a. How many bags can he make without having any cookies left over?

   b. Find the another solution to this problem.

3. a. Find the product of 12 and 8.

   b. Find the greatest common factor of 12 and 8.

   c. Find the least common multiple of 12 and 8.

   d. Find the product of the greatest common factor and the least common multiple of 12 and 8.

   e. What do you notice about the answers to question 1 and question 4?

   f. Choose 2 other numbers and repeat steps 1-5. Do you get the same results?

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4. a. Given the point $(5.5, -7)$, name a second point so that the two points form a vertical segment.

   b. Given the point $(3, 3.5)$, name a second point so that the two points form a horizontal segment.

5. Find the value of each expression mentally.

   a. $\frac{1}{2} \cdot 37 - \frac{1}{2} \cdot 7$ b. $3.5 \cdot 40 + 3.5 \cdot 60$ c. $999 \cdot 5$

Unit 7 Practice Assessment

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~~Unit 7 End-of-Unit Assessment~~

Do not use a calculator.

1. These four numbers are plotted on a number line:

$$-\frac{2}{3}, \frac{5}{8}, -\frac{3}{5}, -\frac{1}{2}$$

Which is the correct ordering on the number line, from left to right?

A. $-\frac{1}{2}, -\frac{3}{5}, -\frac{2}{3}, \frac{5}{8}$

B. $-\frac{1}{2}, -\frac{3}{5}, \frac{5}{8}, -\frac{2}{3}$

C. $-\frac{2}{3}, -\frac{3}{5}, -\frac{1}{2}, \frac{5}{8}$

D. $-\frac{3}{5}, -\frac{2}{3}, -\frac{1}{2}, \frac{5}{8}$

2. Diego's dog weighs more than 10 kilograms and less than 15 kilograms.

Select **all** the inequalities that *must* be true if w is the weight of Diego's dog in kilograms.

A. $w > 10$

B. $w < 10$

C. $w > 11$

D. $w < 11$

E. $w > 15$

F. $w < 15$

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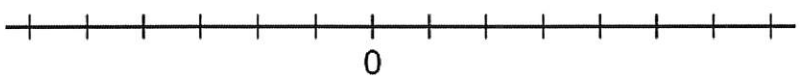
3. Select **all** the numbers that are common multiples of 4 and 6.

   A. 1
   B. 2
   C. 10
   D. 12
   E. 24
   F. 40
   G. 60

4. Given $x = -2$, mark and place these expressions on the same number line.

   $x, -x, |-1.5|, -4, |5|, |-6|$



5. a. Which temperature is warmer, -2 degrees Celsius, or -5 degrees Celsius?

   b. Write an inequality to express the relationship between -2 and -5.

   c. On this number line, graph all the temperatures that are warmer than -2 degrees Celsius.

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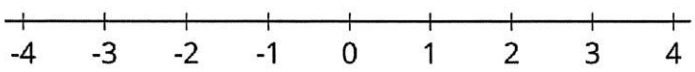
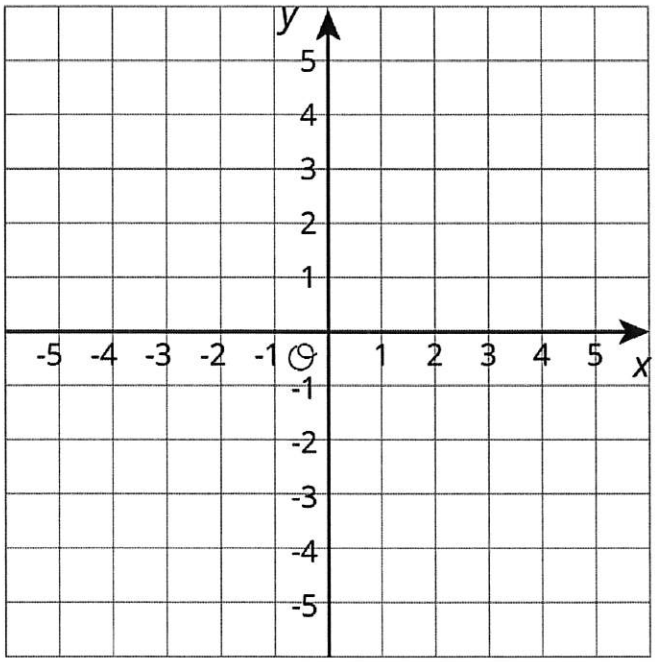
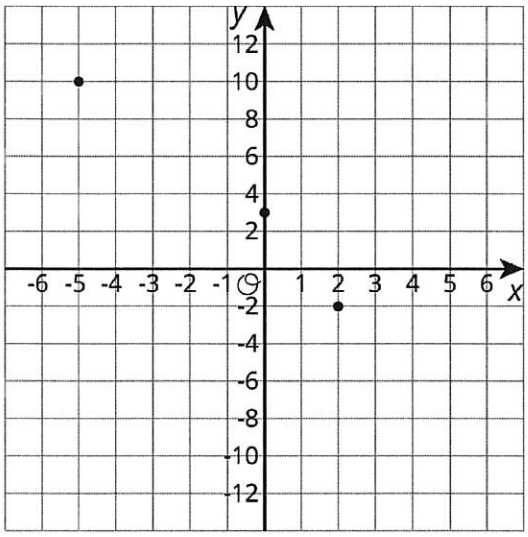


6. Draw polygon ABCDEF in this coordinate plane, given its vertices $A = (-2, -3)$, $B = (0, -3)$, $C = (0, 1)$, $D = (3, 1)$, $E = (3, 3)$, $F = (-2, 3)$.



NAME DATE PERIOD

7. Starting at 7:00 a.m., Lin spent a day hiking through a canyon. This graph shows her elevation (in meters) at some different times. Negative values of x represent times earlier than noon, and positive values of x represent times later than noon.



a. What was Lin's elevation at noon? Explain how you know.

b. At 10:00 a.m., Lin's elevation was 7 meters. Add this point to the graph.

c. At 1:00 p.m., Lin was at sea level. Add this point to the graph.

d. Did Lin's elevation increase or decrease between 7:00 a.m. and 2:00 p.m.? Explain how you know.

e. Lin climbed downward from 2:00 p.m. to 3:00 p.m. Add a point to the graph that shows her possible elevation at 3:00 p.m. Explain your reasoning.

NAME DATE PERIOD

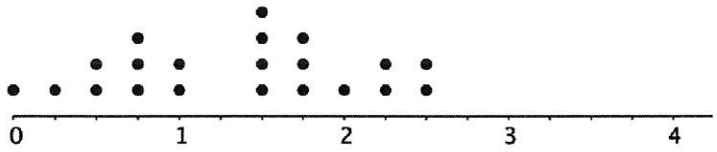
Unit 8, Lesson 1

Got Data?

Let's explore different kinds of data.

1.1 Dots of Data

Here is a **dot plot** for a data set.



1. Determine if each of the following would be an appropriate label to represent the data in the dot plot. Be prepared to explain your reasoning.

   a. Number of children per class.

   b. Distance between home and school, in miles.

   c. Hours spent watching TV each day.

   d. Weight of elephants, in pounds.

   e. Points received on a homework assignment.

2. Think of another label that can be used with the dot plot.

   a. Write it below the scale of the dot plot. Be sure to include the unit of measurement.

NAME DATE PERIOD

b. In your scenario, what does one dot represent?

c. In your scenario, what would a data point of 0 mean? What would a data point of $3\frac{1}{4}$ mean?

1.2 Surveying the Class

Here are some survey questions. Your teacher will explain which questions can be used to learn more about the students in your class and how the responses will be collected. The data that your class collects will be used in upcoming activities.

1. How long does it usually take you to travel to school? Answer to the nearest minute.

2. How do you travel to school on most days? Choose one.

   - Walk
   - Bike
   - Scooter or skateboard
   - Car
   - School bus
   - Public transport
   - Other

3. How tall are you without your shoes on? Answer to the nearest centimeter.

4. What is the length of your right foot without your shoe on? Answer to the nearest centimeter.

NAME DATE PERIOD

5. What is your arm span? Stretch your arms open, and measure the distance from the tip of your right hand's middle finger to the tip of your left hand's middle finger, across your back. Answer to the nearest centimeter.

6. How important are the following issues to you? Rate each on a scale from 0 (not important) to 10 (very important).

   a. Reducing pollution b. Recycling c. Conserving water

7. Do you have any siblings? _____ Yes _____ No

8. How many hours of sleep per night do you usually get when you have school the next day? Answer to the nearest half hour.

9. How many hours of sleep per night do you usually get when you do not have school the next day? Answer to the nearest half hour.

10. Other than traveling from school, what do you do right after school on most days?

- Have a snack
- Do homework
- Read a book
- Talk on the phone
- Practice a sport
- Do chores
- Use the computer
- Participate in an extracurricular activity

NAME DATE PERIOD

11. If you could meet one of these celebrities, who would you choose?

- A city or state leader
- A champion athlete
- A movie star
- A musical artist
- A best-selling author

12. Estimate how much time per week you usually spend on each of these activities. Answer to the nearest quarter of an hour.

a. Playing sports or doing outdoor activities

b. Using a screen for fun (watching TV, playing computer games, etc.)

c. Doing homework

d. Reading

1.3 Numerical and Categorical Data

The list of survey questions in the activity earlier can help you complete these exercises.

1. The first survey question about travel *time* produces **numerical data**. Identify two other questions that produce numerical data. For each, describe what was measured and its unit of measurement.

a. Question #: _____ What was measured:

Unit of measurement:

b. Question #: _____ What was measured:

Unit of measurement:

NAME DATE PERIOD

2. The second survey question about travel *method* produces **categorical data**. Identify two other questions that produce categorical data. For each, describe what characteristic or feature was being studied.

   a. Question #: _____ Characteristic being studied:

   b. Question #: _____ Characteristic being studied:

3. Think about the responses to these survey questions. Do they produce numerical or categorical data? Be prepared to explain how you know.

   a. How many pets do you have?

   b. How many years have you lived in this state?

   c. What is your favorite band?

   d. What kind of music do you like best?

   e. What is the area code of your school's phone number?

   f. Where were you born?

   g. How much does your backpack weigh?

4. Name two characteristics you could investigate to learn more about your classmates. Make sure one would give categorical data and the other would give numerical data.

NAME DATE PERIOD

Are you ready for more?

Priya and Han collected data on the birth months of students in their class. Here are tables showing their records for the same group of students.

This table shows Priya's records.

Jan	Apr	Jan	Feb	Oct	May	June	July	Aug	Aug
Sep	Jan	Feb	Mar	Apr	Nov	Nov	Dec	Feb	Mar

This table shows Han's records.

1	4	1	2	10	5	6	7	8	8
9	1	2	3	4	11	11	12	2	3

1. How are their records alike? How are they different?
2. What kind of data—categorical or numerical—do you think the variable "birth month" produces? Explain how you know.

Lesson 1 Summary

The table contains data about 10 dogs.

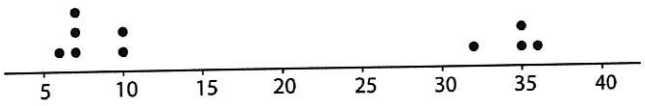
dog name	weight (kg)	breed
Duke	36	German shepherd
Coco	6	pug
Pierre	7	pug
Ginger	35	German shepherd

NAME DATE PERIOD

dog name	weight (kg)	breed
Lucky	10	beagle
Daisy	10	beagle
Buster	35	German shepherd
Pepper	7	pug
Rocky	7	beagle
Lady	32	German shepherd

- The weights of the dogs are an example of **numerical data**, which is data that are numbers, quantities, or measurements. The weights of the dogs are measurements in kilograms.
- The dog breeds are an example of **categorical data**, which is data containing values that can be sorted into categories. In this case, there are three categories for dog breeds: pug, beagle, and German shepherd.

Some data with numbers are categorical because the numbers are *not* quantities or measurements. For example, telephone area codes are categorical data, because the numbers are labels rather than quantities or measurements.
Numerical data can be represented with a **dot plot** (sometimes called a line plot). Here is a dot plot that shows the weights of the dogs.



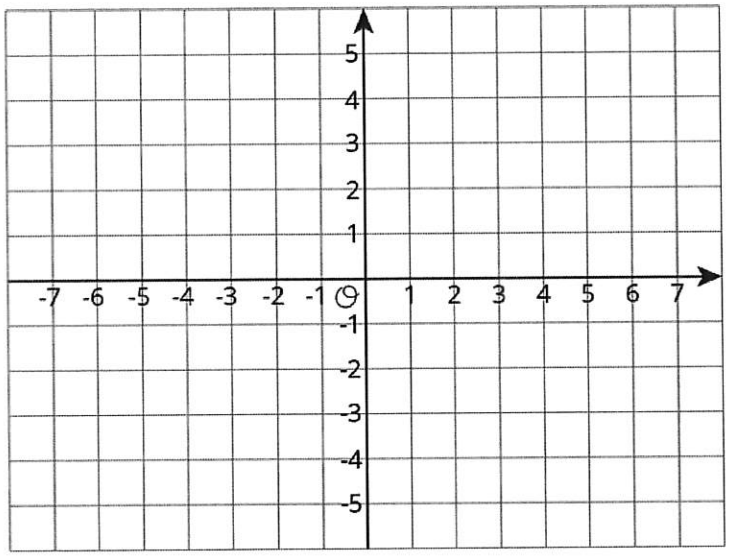
dog weights in kilograms

We can collect and study both kinds of data by doing surveys or taking measurements. When we do, it is important to think about what feature we are studying (for example, breeds of dogs or weights of dogs) and what units of measurement are used.

NAME DATE PERIOD

b. Write two questions that you could ask the students in your class that would result in numerical data. For each question, explain how you know that responses to it would produce numerical data.

4. Triangle DEF has vertices $D = (-4, -4)$, $E = (-2, -4)$, and $F = (-3, -1)$.



a. Plot the triangle in the coordinate plane and label the vertices.

b. Name the coordinates of 3 points that are inside the triangle.

c. What is the area of the triangle? Show your reasoning.

6th Grade

Week of 3/16	Day 0	Day 1		Day 2	
Objective	SWBAT review Earth's rotation and revolution	SWBAT explain how the revolution of the moon and its relative position to the sun causes moon or lunar phases		SWBAT define eclipses	SWBAT explain and model when a lunar eclipse occurs
Assignment Read the pages assigned and answer any questions associated	p. 410-413	p.77-78	p. 538-540	p. 541 page 78	p. 542
To Be Graded	N/A	Day 1 Assignment		Day 2 Assignment	

Week of 3/23	Day 3		Day 4	Day 5
Objective	SWBAT explain and model when solar eclipses occur	SWBAT explain why new moons are not the same as solar eclipses	SWBAT explain and model how Earth's tilt on its axis causes seasons	SWBAT show knowledge of content learned by taking a quiz
Assignment Read the pages assigned and answer any questions associated	p. 541		p.534-535 p.73-76	Take the quiz P. 1-2 in Assignments Section of Student Packet 2
To Be Graded	Day 3 Assignment p. 79-80		P. 75-76 of Workbook- What causes Earth's seasons	Quiz

Updated 3/18/2020

Week of 3/30	Day 6	Day 7	
Objective	SWBAT review what is in our Solar System	SWBAT review how gravity affects the orbits of objects in our Solar System	
Assignment Read the pages assigned and answer any questions associated	In Readings Section p. 594-598 p. 66	In Readings Section p. 510-512	
To Be Graded	Day 6 Assignment p. 3-4 in Assignments Section	Day 7 Assignment p. 5-6 in Assignments Section	
Week of 4/6	**Day 8**	**Day 9**	**Day 10**
Objective	Catch Up Day	SWBAT Take the Unit Assessment	**No Instruction Thursday-Spring Break 4/9-4/13**
Assignment Read the pages assigned and answer any questions associated	We started this scope and sequence 1-2 days late, so this is a day to catch up with lessons/review any other materials needed before the Unit Assessment	Unit Assessment	
To Be Graded	N/A		

Updated 3/18/2020

READINGS

Louisiana

LESSON 2

Introducing the Solar System

UNLOCK THE BIG ?

- **What Makes Up the Solar System?**
  GLE 38 (ESS-M-C2); 42 (ESS-M-C5)
- **How Did the Solar System Form?**
  GLE 38 (ESS-M-C2)

MY PLANET DIARY

Extreme Conditions

Imagine a place where the sun shines 11 times brighter than it does on Earth. How could you keep anything cool there? Engineers had to solve just that problem when designing the Mercury *MESSENGER* spacecraft. In 2008, this spacecraft began to visit Mercury, where temperatures can reach up to 370°C. Engineers designed a sunshade to protect *MESSENGER*'s instruments. It's made from ceramic fabric! The fabric, made of elements such as silicon, aluminum, and boron, is resistant to heat. It reflects most of the sun's heat away from the *MESSENGER* spacecraft, keeping all the instruments at a comfortable room temperature (about 20°C).

TECHNOLOGY

Use what you have read to answer the questions below.

1. Why did engineers need to design a sunshade for Mercury *MESSENGER*?

2. What other challenges do you think there would be for engineers designing a spacecraft to travel to Mercury?

PLANET DIARY Go to **Planet Diary** to learn more about the solar system.

Lab zone® Do the Inquiry Warm-Up *How Big Is Earth?*

Vocabulary

- solar system
- astronomical unit
- planet
- dwarf planet
- planetesimal

Skills

- Reading: Identify Supporting Evidence
- Inquiry: Calculate

What Makes Up the Solar System?

Grade 8 Grade Level Expectations

GLE 38 Use data to compare the planets in terms of orbit, size, composition, density, rotation, revolution, and atmosphere. (ESS-M-C2)

GLE 42 Interpret a scale model of the solar system. (ESS-M-C5)

Mercury is just one of many objects that make up the solar system. **Our solar system consists of the sun, the planets, their moons, and a variety of smaller objects.** The sun is at the center of the solar system, with other objects orbiting around it. The force of gravity holds the solar system together.

Distances in the Solar System Distances within the solar system are so large that they cannot be easily measured in meters or kilometers. Instead, scientists often use a unit called the astronomical unit. One **astronomical unit** (AU) equals the average distance between Earth and the sun, about 150,000,000 kilometers. The solar system extends more than 100,000 AU from the sun.

do the math!

Converting Units

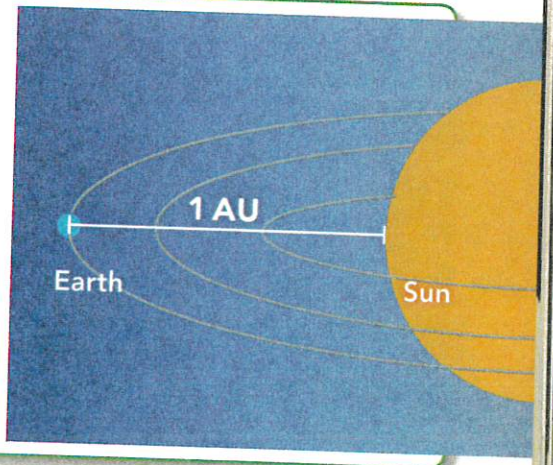
To convert from astronomical units (AU) to kilometers (km), you can multiply the number of AU by 150,000,000.

1 **Calculate** Mars is 1.52 AU from the sun. About how many kilometers is Mars from the sun? _____

2 **Apply Concepts** If you know an object's distance from the sun in kilometers, how can you find its distance in AU? _____

_____

Mathematics GLE 23 (G-2-M)



The Sun At the center of our solar system is the sun. The sun is much larger than anything else in the solar system. About 99.85 percent of the mass of the solar system is contained within the sun. Despite being more than a million times the volume of Earth, our sun is actually a very ordinary mid-sized star. Using telescopes, we see stars that have volumes a thousand times greater than the sun's! This turns out to be a very good thing for us. Large stars burn out and die quickly, but our sun will last for five billion more years.

Identify Supporting Evidence Underline a sentence that supports the statement, "The sun is much larger than anything else in the solar system."

10 AU

FIGURE 1

INTERACTIVE ART **The Solar System**

The planets' sizes are shown to scale, but their distances from the sun are not.

Mark the position of each planet on the distance scale above.

1. **Interpret Data** Where is the largest gap between planets?

2. **CHALLENGE** Could you show the planets' relative sizes and distances from the sun in the same diagram on one page? Why or why not?

Mercury
Diameter: 4,879 km
Distance from the sun: 0.39 AU
Orbital period: 87.97 Earth days
Moons: 0

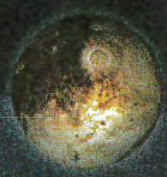
Venus
Diameter: 12,104 km
Distance from the sun: 0.72 AU
Orbital period: 224.7 Earth days
Moons: 0

Earth
Diameter: 12,756 km
Distance from the sun: 1 AU
Orbital period: 365.26 Earth days
Moons: 1

Mars
Diameter: 6,794 km
Distance from the sun: 1.52 AU
Orbital period: 687 Earth days
Moons: 2

Planets

There are many different objects in the solar system. How do you decide what is a planet and what isn't? In 2006, astronomers decided that a **planet** must be round, orbit the sun, and have cleared out the region of the solar system along its orbit. The first four planets are small and are mostly made of rock and metal. The last four planets are very large and are mostly made of gas and liquid. Like Earth, each planet has a "day" and a "year." Its day is the time it takes to rotate on its axis. Its year is the time it takes to orbit the sun. **Figure 1** shows some basic facts about the planets.



Dwarf Planets

For many years, Pluto was considered the ninth planet in the solar system. But Pluto shares the area of its orbit with other objects. Pluto is now considered a dwarf planet. A **dwarf planet** is an object that orbits the sun and has enough gravity to be spherical, but has not cleared the area of its orbit. There are five known dwarf planets in our solar system: Pluto, Eris, Ceres, Makemake (MAH keh MAH keh), and Haumea (how MAY uh). As scientists observe more distant objects, the number of dwarf planets might grow.

20 AU

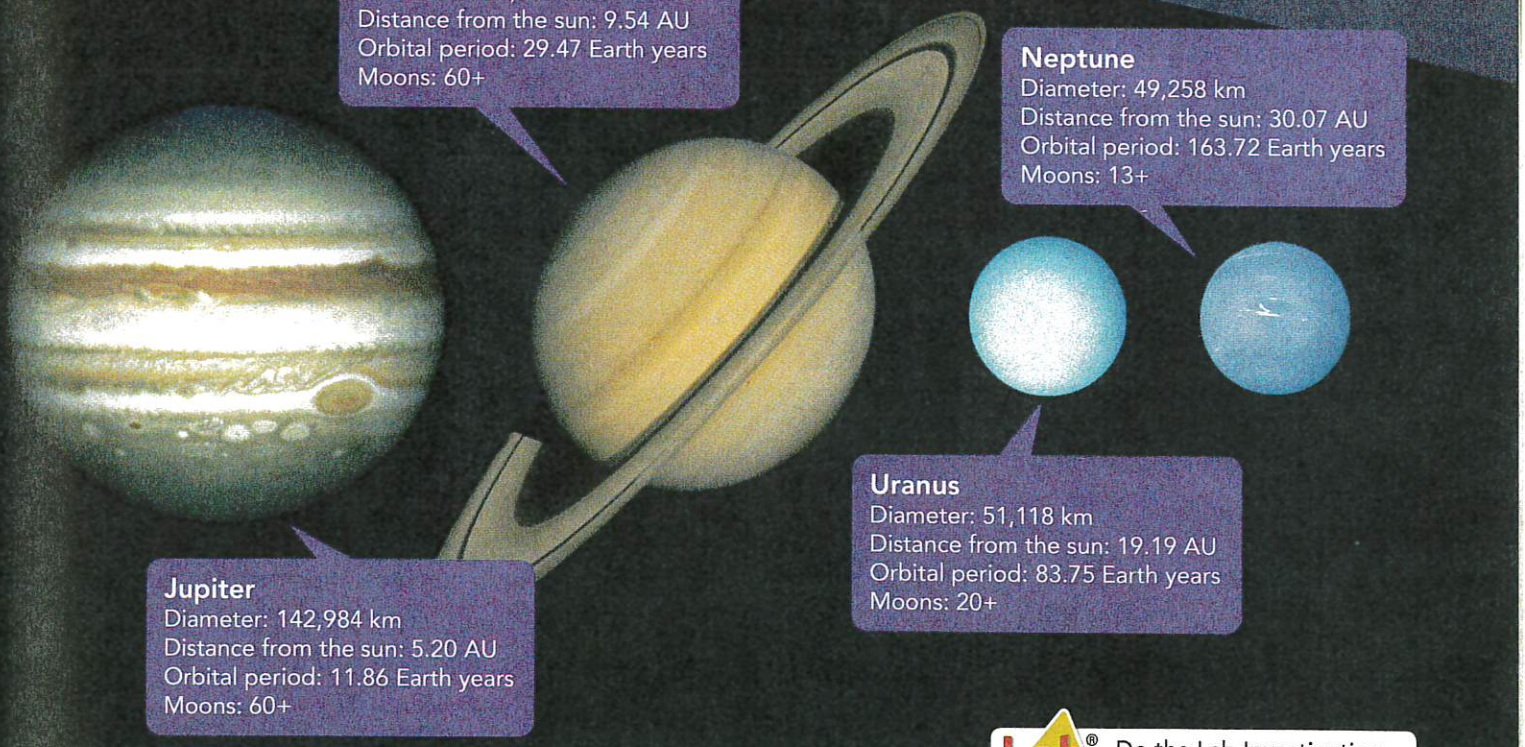
30 AU

Satellites

Except for Mercury and Venus, every planet in the solar system has at least one natural satellite, or moon. Earth has the fewest moons, with just one. Jupiter and Saturn each have more than 60! Some dwarf planets also have satellites.

Smaller Objects

The solar system also includes many smaller objects that orbit the sun. Some, called asteroids, are small, mostly rocky bodies. Many asteroids are found in an area between the orbits of Mars and Jupiter. Comets are another large group of solar system objects. Comets are loose balls of ice and rock that usually have very long, narrow orbits.



Saturn
Diameter: 120,536 km
Distance from the sun: 9.54 AU
Orbital period: 29.47 Earth years
Moons: 60+

Neptune
Diameter: 49,258 km
Distance from the sun: 30.07 AU
Orbital period: 163.72 Earth years
Moons: 13+

Uranus
Diameter: 51,118 km
Distance from the sun: 19.19 AU
Orbital period: 83.75 Earth years
Moons: 20+

Jupiter
Diameter: 142,984 km
Distance from the sun: 5.20 AU
Orbital period: 11.86 Earth years
Moons: 60+

Lab zone® Do the Lab Investigation *Speeding Around the Sun.*

Assess Your Understanding

1a. Sequence List the planets in order of increasing distance from the sun.

_____

_____

_____

GLE 38

b. Make Generalizations What is the relationship between a planet's distance from the sun and the length of its year?

_____

_____

GLE 42

got it?

○ I get it! Now I know that the solar system includes _____

_____

_____

○ I need extra help with _____

_____

Go to my science coach *online for help with this subject.*

GLE 38, 42

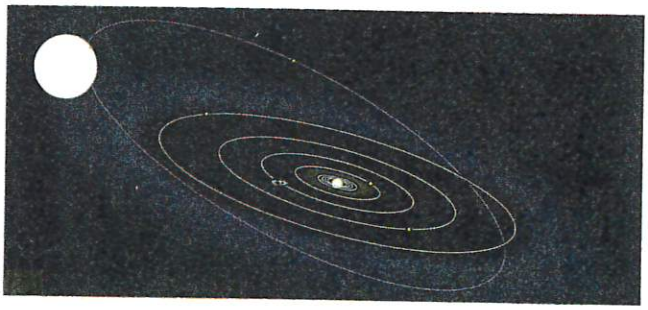
Grade 8 Grade Level Expectation

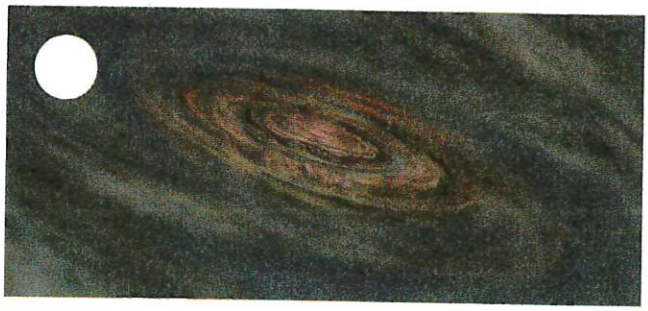
GLE 38 Use data to compare the planets in terms of orbit, size, composition, density, rotation, revolution, and atmosphere. (ESS-M-C2)

FIGURE 2

ART IN MOTION **Formation of the Solar System**

Sequence **Write the numbers 1 through 4 in the circles to put the images in order.**





How Did the Solar System Form?

Where did the objects in the solar system come from? **Scientists think the solar system formed about 4.6 billion years ago from a cloud of hydrogen, helium, rock, ice, and other materials pulled together by gravity.**

A Spinning Disk The process began as gravity pulled the cloud's material together. The cloud collapsed and started to rotate, forming a disk. Most of the material was pulled to the center. As this material became tightly packed, it got hotter and the pressure on it increased.

Eventually, the temperature and pressure became so high that hydrogen atoms were pressed together to form helium. This process, called nuclear fusion, releases large amounts of energy. Once nuclear fusion began, the sun gave off light and became a stable star. Sunlight is one form of the energy produced by fusion.

The Planets Form Away from the sun, planets began to form as gravity pulled rock, ice, and gas together. The rock and ice formed small bodies called **planetesimals** (pla nuh TE suh muhlz). Over time, planetesimals collided and stuck together, eventually combining to form all the other objects in the solar system.

Inner Planets Close to the sun, the solar system was very hot. Most water evaporated, preventing ice from forming. The bodies that formed in this region were comparatively low in mass. Their gravity was too weak to hold on to light gases such as hydrogen and helium. This is why the inner planets are small and rocky.

Outer Planets At greater distances from the sun, temperatures were cooler. Ice formed, adding mass to the planets that formed at these distances. As the planets grew, their gravity was strong enough to hold hydrogen and helium, forming the gas giant planets. Beyond the gas giants, temperatures were even lower. Ice and other materials produced comets and dwarf planets.

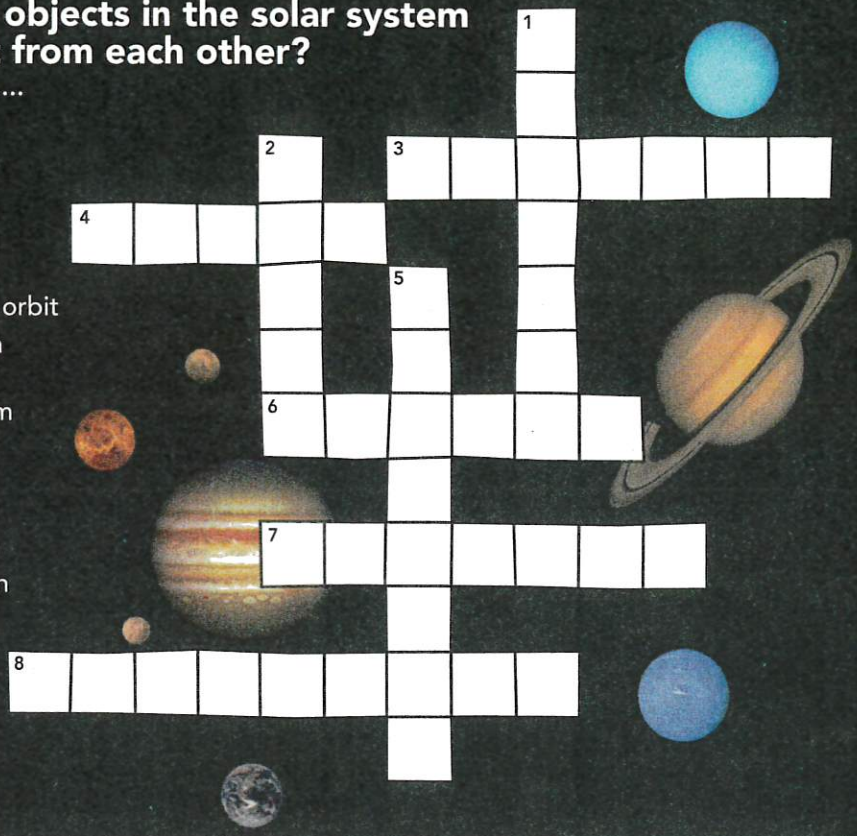
EXPLORE THE BIG ?

Solve THE SOLAR SYSTEM

Why are objects in the solar system different from each other?

FIGURE 3

Use the clues to complete the puzzle. Then answer the question.



ACROSS

3 The planet farthest from the sun
4 A loose, icy body with a long, narrow orbit
6 A gas giant planet that is smaller than Jupiter but larger than Neptune
7 The smallest planet in the solar system
8 An object that orbits a planet

DOWN

1 The largest planet in the solar system
2 A planet that formed closer to the sun than Earth but not closest to the sun
5 A small rocky body that orbits the sun

Why are the objects in clues 2 and 6 so different?

Lab zone® Do the Quick Lab *Clumping Planets.*

Assess Your Understanding

2a. Explain What force formed the solar system?

GLE 38

b. ANSWER THE BIG ? Why are objects in the solar system different from each other?

GLE 38

got it?

○ I get it! Now I know that the solar system formed when _____

○ I need extra help with _____

Go to my science coach *online for help with this subject.*

GLE 38

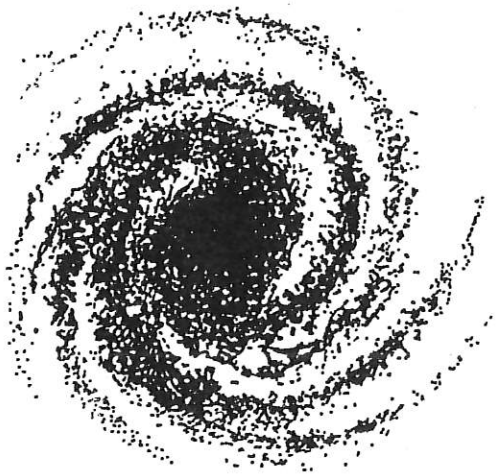
Have you ever looked at a bright star early in the evening? If you look for it again later that night, it will seem to be in a different spot. The stars do not actually move, however; it is the rotation of the Earth that causes their apparent movement. As Earth rotates on its axis, you see different parts of the sky. As a result, the stars look like they are moving across the sky at night. There are stars in the sky during the day as well, but the brightness of the sun makes it impossible for you to see them.

Galaxies

The sun, the planets, and the moons are part of the solar system. The solar system is part of a larger group, too. It is part of a galaxy, which is a huge system, or group, of stars held together by gravity.

The solar system is in a spiral-shaped galaxy called the Milky Way. The stars and planets that you see at night are in the Milky Way. Not all galaxies are spiral shaped, however. Some are oval or round, and others are irregular.

The universe is made up of all the matter and energy there is, including all the galaxies and their stars, planets, and moons. There are billions of galaxies in the universe, and no one knows how big the universe truly is. Scientists have discovered that it continues to grow larger and larger.



Louisiana

LESSON 2

Gravity and Motion

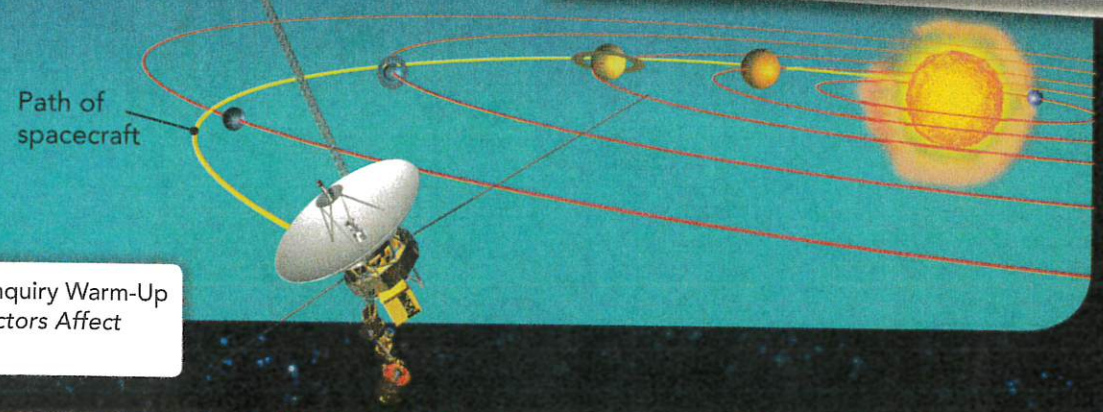
UNLOCK THE BIG ?

- What Determines Gravity?
  GLE 5, 6 (PS-M-B2)
- What Keeps Objects in Orbit?
  GLE 39 (ESS-M-C3)

MY PLANET DIARY

Gravity Assists

You might think that gravity only brings objects down. But gravity can also speed things up and send them flying! If a space probe comes close to a planet, the planet's gravity changes the probe's path. Engineers plan space missions to take advantage of these "gravity assists." A gravity assist can shorten a probe's interplanetary trip by many years. The diagram shows how the probe *Voyager 2* used gravity assists to visit all four outer planets.



TECHNOLOGY

Use what you know about gravity to answer this question.

How does a planet's gravity change the path of a space probe?

_____

_____

_____

PLANET DIARY Go to **Planet Diary** to learn more about gravity.

Lab zone® Do the Inquiry Warm-Up *What Factors Affect Gravity?*

Grade 8 Grade Level Expectations

GLE 5 Define gravity and describe the relationship among the force of gravity, the mass of objects, and the distance between objects. (PS-M-B2)

GLE 6 Predict how the gravitational attraction between two masses will increase or decrease when changes are made in the masses or in the distance between the objects. (PS-M-B2)

What Determines Gravity?

Earth revolves around the sun in a nearly circular orbit. The moon orbits Earth in the same way. But what keeps Earth and the moon in orbit? Why don't they just fly off into space?

The first person to answer these questions was Isaac Newton. Newton realized that there must be a force acting between Earth and the moon that kept the moon in orbit. Recall that a force is a push or a pull.

Vocabulary

- gravity
- law of universal gravitation
- mass
- weight

Skills

- Reading: Ask Questions
- Inquiry: Draw Conclusions

Gravity Newton hypothesized that the force that pulls an apple to the ground also pulls the moon toward Earth, keeping it in orbit. This force, called **gravity,** attracts all objects toward one another. Newton's **law of universal gravitation** states that every object in the universe attracts every other object. **The strength of the force of gravity between two objects depends on two factors: the mass of the objects and the distance between them.**

Gravity, Mass, and Weight The strength of gravity depends in part on the mass of each of the objects. **Mass** is the amount of matter in an object. Because Earth is so massive, it exerts a much greater force on you than this book does.

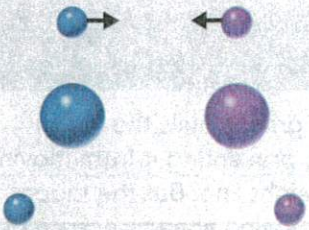
The measure of the force of gravity on an object is called **weight.** Mass doesn't change, but an object's weight can change depending on its location. On the moon, you would weigh about one-sixth as much as on Earth. This is because the moon has less mass than Earth, so the pull of the moon's gravity on you would also be less.

Gravity and Distance Gravity is also affected by the distance between two objects. The force of gravity decreases rapidly as distance increases. If the distance between two objects doubles, the force of gravity decreases to one-fourth of its original value.

FIGURE 1

VIRTUAL LAB **Gravity, Mass, and Distance**

Compare and Contrast Draw arrows showing the force of gravity in the second and third pictures.



Vocabulary Identify Multiple Meanings Underline the sentence that uses the scientific meaning of *mass*.

- Miners discovered a mass of gold underground.
- The mass of a large piece of gold is greater than the mass of a small piece of gold.

did you know?

In 1665, Isaac Newton was a student. Then a disease called plague shut down the university for 18 months. Newton had to go home. While he was there, he thought of the ideas that led to his theory of gravity.

Lab zone® Do the Lab Investigation *Weight and the Force of Gravity.*

Assess Your Understanding

got it?

- I get it! Now I know that the force of gravity between two objects depends on _____
- I need extra help with _____

Go to my science coach *online for help with this subject.*

GLE 5, 6

Grade 8 Grade Level Expectation

GLE 39 Relate Newton's laws of gravity to the motions of celestial bodies and objects on Earth. (ESS-M-C3)

Ask Questions Before you read the paragraphs under Inertia, write a question you would like to have answered. Look for the answer as you read.

What Keeps Objects in Orbit?

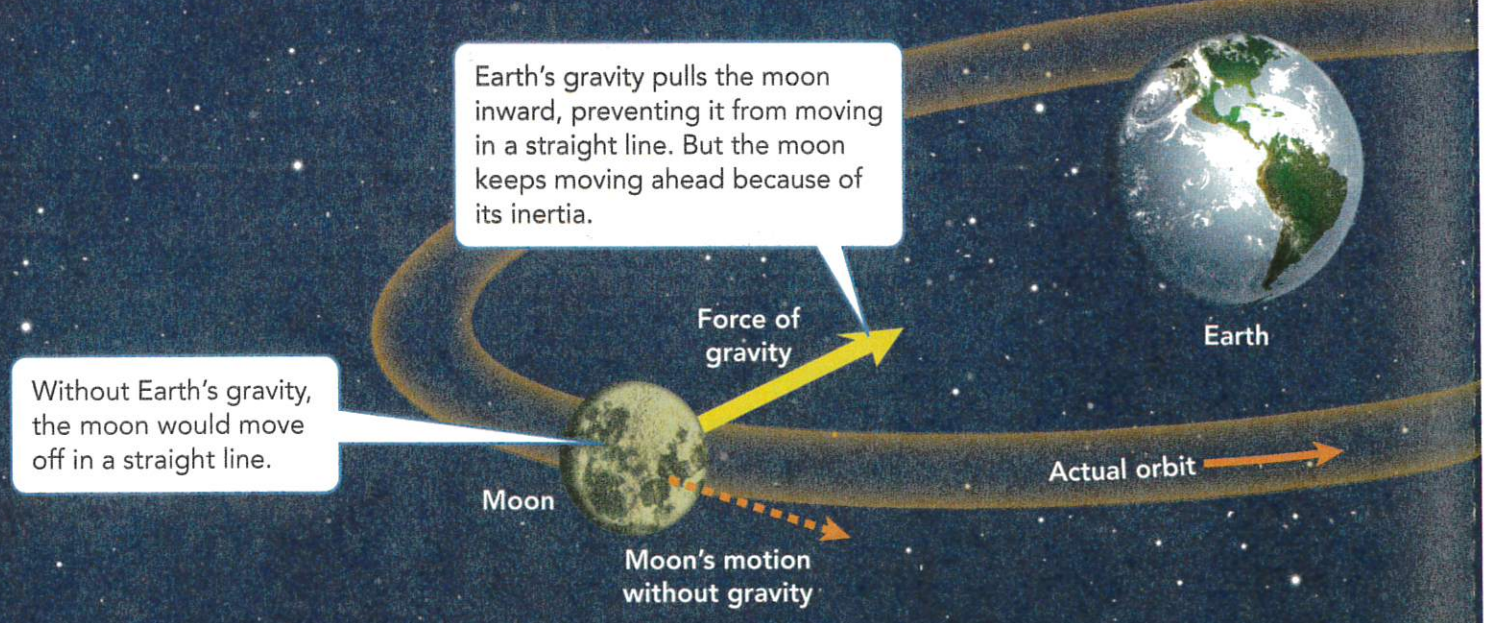
If the sun and Earth are constantly pulling on one another because of gravity, why doesn't Earth fall into the sun? Similarly, why doesn't the moon crash into Earth? The fact that such collisions have not occurred shows that there must be another factor at work. That factor is called inertia.

Inertia Recall that the tendency of an object to resist a change in motion is inertia. You feel the effects of inertia every day. When you are riding in a car and it stops suddenly, you keep moving forward. If you didn't have a seat belt on, your inertia could cause you to bump into the car's windshield or the seat in front of you. The more mass an object has, the greater its inertia. An object with greater inertia is more difficult to start or stop.

Isaac Newton stated his ideas about inertia as a scientific law. Newton's first law of motion says that an object at rest will stay at rest and an object in motion will stay in motion at a constant speed and direction unless acted on by a force.

Orbital Motion Why do Earth and the moon remain in orbit? **Newton concluded that inertia and gravity keep Earth in orbit around the sun, and the moon in orbit around Earth.** You can see how in **Figure 2.**

FIGURE 2
Orbital Motion
Predict How would the moon move if Earth's mass increased?



ASSIGNMENTS

Name: _____

March 27, 2020

1. Which statement best explains the movement of Earth?

- **A.** The Earth rotates on its axis once every year as it revolves around the Sun.
- **B.** The Earth revolves on its axis once every year as it rotates around the Sun.
- **C.** The Earth rotates on its axis once a day as it revolves around the Sun.
- **D.** The Earth revolves on its axis once a day as it rotates around the Sun.

Jasmine's family wants to go on an overnight canoe trip on the Ouiska Chitto River as soon as possible. Her dad says that it is best to go when there is a full moon since there is more visibility at night. Jasmine has observed the moon for three nights in a row (Tuesday, Wednesday, Thursday). Her observations of the moon are shown below:

Tuesday **Wednesday** **Thursday**

2. Based on the pattern in Jasmine's observations, when would be the best time for Jasmine's family to take their canoe trip?

- **A.** They should go on the upcoming weekend.
- **B.** They should go in about one week.
- **C.** They should go in about two and a half weeks.
- **D.** They should go in about four weeks.

3. Select the model using the symbols below that best illustrates the relative positions of the Earth, Moon, and Sun that will result in a full moon and the best visibility for the camping trip.

Sun	
Earth	
Moon	

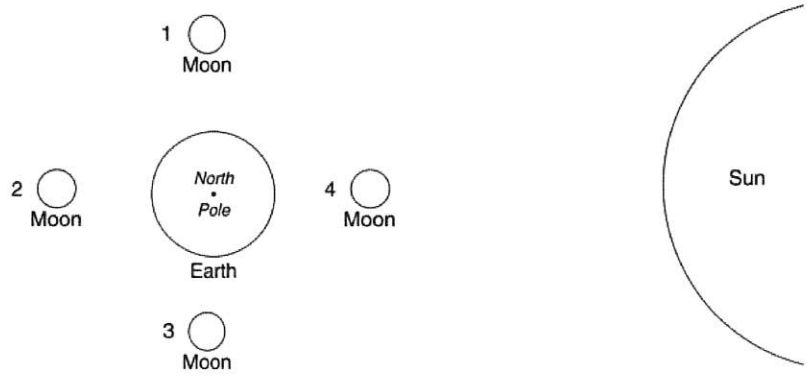
A.

B.

C.

D.

The diagram below shows 4 positions of the moon around the Earth.



4. At which position of the moon could the students see a solar eclipse?

A. 1
B. 2
C. 3
D. 4

Name: _____

KEY IDEAS

- Earth is part of the solar system
- The solar system is part of the Milky Way galaxy
- A galaxy is a system of millions or billions of stars, together with gas and dust.
- The milky way galaxy is one of many galaxies in the universe
- There are many other galaxies in the Universe, each containing many other stars.
- The solar system contains the sun, planets, moons and asteroids.
- The solar system formed from gas and dust
- The planets orbit the sun and moons orbit their planets
- The Moon orbits the Earth, the Earth/Moon system orbits the Sun

Questions to Answer

1. What is our Solar system? What objects can be found in our solar system?

_____

_____

_____

_____

_____

2. What is the Milky Way? What objects can be found in the MIlky Way?

_____

_____

_____

_____

_____

_____

3. What is the universe? What can be found in the Universe?

4. Rank the following in order from smallest to largest:

Solar system, asteroid, Star, Galaxy, Saturn, Universe

Smallest → **Largest**

5. How did the Solar System form?

Name: _____

KEY IDEAS

- Gravity is a force
- Gravity is always attractive and always present
- Gravity exists between any two objects that have mass- but is only noticeable when one or both masses is VERY large.
- The milky way's gravity keeps our solar systems, and other systems, in orbit around it
- Everything in our solar system is held together by gravity
- The Sun's gravity keeps Earth and other planets in orbit around it
- The Sun's gravity keeps other objects like asteroids in orbit around it
- The gravity of planets keeps their moons in orbit around them
- The force of gravity increases as the mass of an object increases
- The force of gravity increases as the distance between two objects decreases
- An object with a large mass will cause a larger force of gravity between objects compared to an object with a small mass.
- Within the solar system, a larger object will cause a smaller object to orbit around it.

Questions to Answer

1. What are the two factors that affect the strength of the force of gravity?

_____

2. How does gravity affect Earth and its motion?

_____

_____

_____

3. If you move two objects farther apart, how does the force of gravity between the two objects change?

_____

_____

_____

Use the table and your knowledge of science to answer question 4

Distance of Asteroid Eros from Earth	
Year	**Distance from Earth (millions kilometers)**
1901	48
1931	26
1975	22

4. The asteroid Eros orbits the sun. Suppose that Eros is predicted to be about 27 million km from earth in the year 2022. Would the force of Earth's gravity on Eros in 2022 be greater than or less than it was in 1975? Explain your answer.

Name: _____

April 8, 2020

CONTENT KNOWLEDGE

1. Which statement best explains the movement of Earth?

- **A.** The Earth rotates on its axis once, every year, as it revolves around the Sun.
- **B.** The Earth revolves on its axis once, every year, as it rotates around the Sun.
- **C.** The Earth rotates on its axis once a day as it revolves around the Sun.
- **D.** The Earth revolves on its axis once a day as it rotates around the Sun.

2. Which statement describes gravity's role in our Solar System and galaxy?

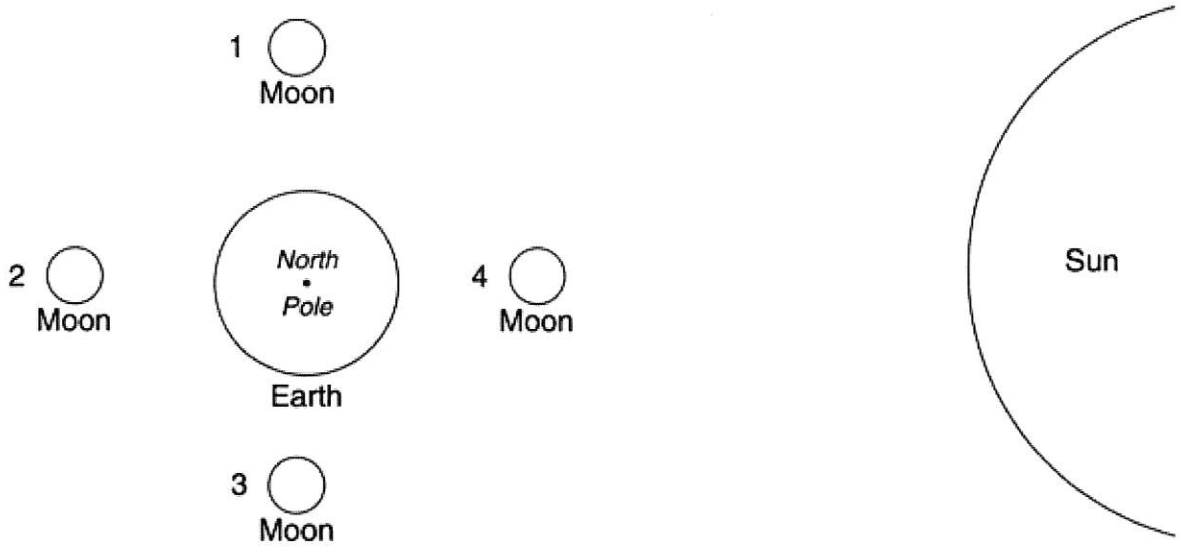
- **A.** The Sun's gravity keeps the moon orbiting the Earth.
- **B.** The Earth's gravity keeps the Sun orbiting the Earth.
- **C.** The Sun's gravity keeps the Milky Way in orbit around its center.
- **D.** The Milky Way's gravity keeps our Solar System orbiting around its center

3. Which statements are true about gravity?

Select the **two** correct answers

- **A.** Gravity is only an attractive force.
- **B.** Gravity is an attractive and repulsive force.
- **C.** Gravity only acts when two objects are in contact with each other.
- **D.** Gravity only exists between large objects and smaller objects.
- **E.** Gravity acts between all objects of any size.

The diagram below shows 4 positions of the moon around the Earth.

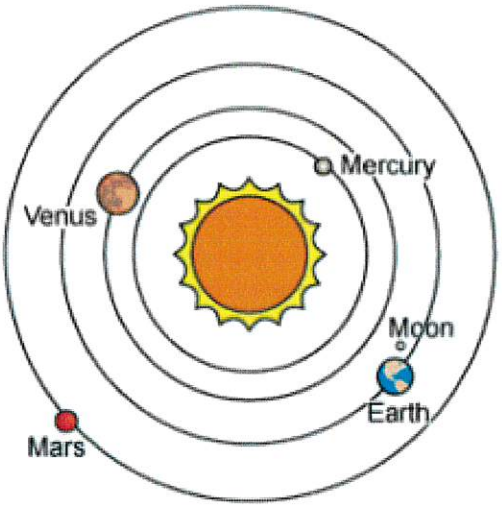


4. At which position of the moon could we see a lunar eclipse?

A. 1
B. 2
C. 3
D. 4

DISCRETE ITEMS

The Earth–Moon system orbits the Sun in the inner solar system. A model of the inner solar system is shown in the figure below.



Note: Not to scale

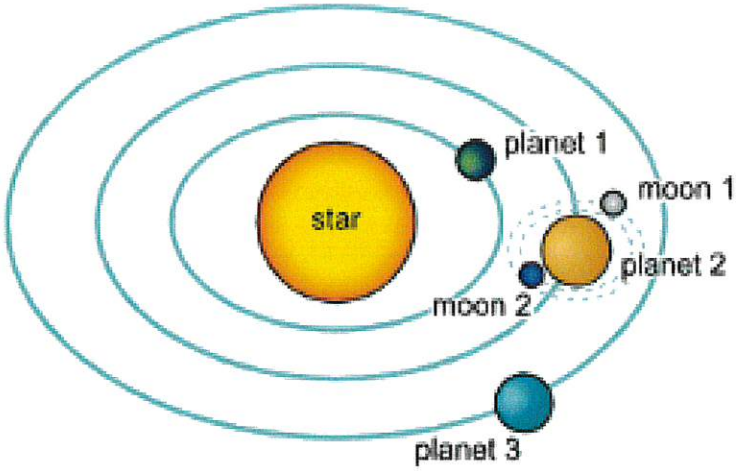
5. Which statement best explains the orbital motion of objects within this system?

Select the three best answers.

A. The moon orbits the Earth.
B. The Earth orbits the moon.
C. The Earth-Moon system orbits the Sun
D. All planets orbit the Sun.
E. Planets orbit other planets that are closest to them.
F. The Sun orbits the objects within its system.

Use the information given and your knowledge of science to answer the question

A scientist is designing a model for a system of planets outside the solar system. The model includes a star, three planets and two moons, as shown in the figure.



6. Which property of the objects in the model has the **largest** effect on the motion of moon 1?

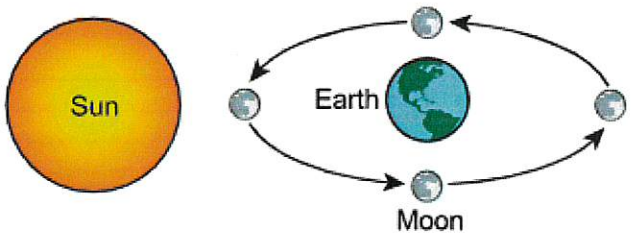
- **A.** The orbital paths of planet 1 and planet 3
- **B.** The rotational speed of moon 2
- **C.** The force of gravity from planet 2
- **D.** The force of gravity from planet 3

Use your knowledge of science to answer the question.

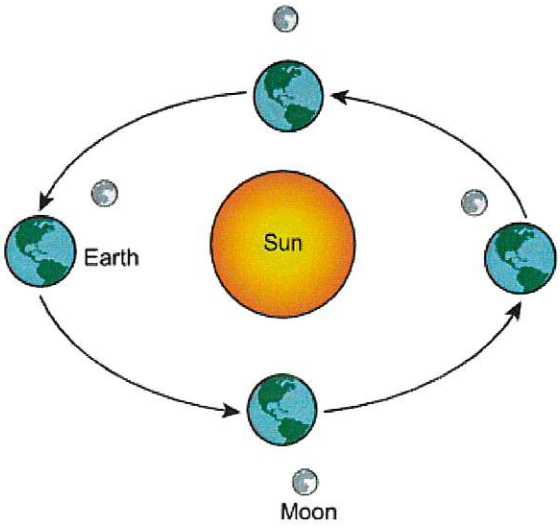
7. Which model of the Sun, Earth, and Moon **best** supports why Earth has different seasons?

A.

B.



C.



D.

Use the information given and your knowledge of science to answer the question

The properties of five different objects in the solar system are shown in the table.

Object	Orbital Period (Earth years)	Distance from Sun (Earth = 1)	Surface Gravity (Earth = 1)
object 1	0.2	0.39	0.38
object 2	0.6	0.72	0.90
object 3	11.9	5.20	2.53
object 4	29.5	9.58	1.06
object 5	164.4	30.05	1.13

Source: NASA.

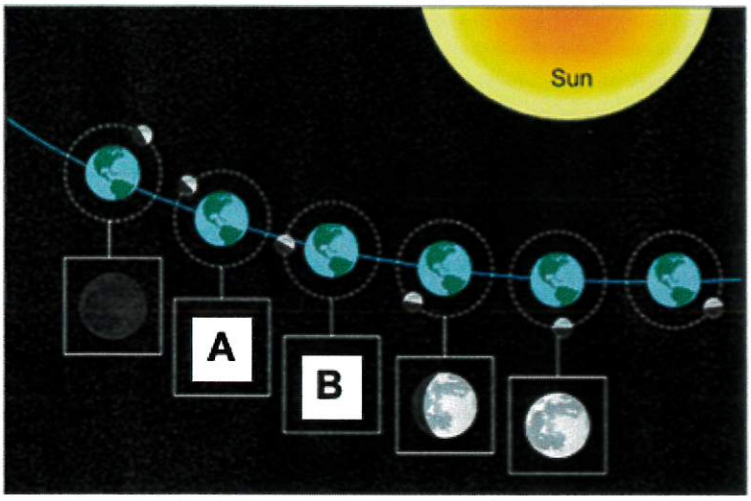
8. Which claim about the mass of the different objects is **best** supported by the data in the table?

A. Object 1 has the greatest mass because it is closest to the Sun.
B. Object 2 has the greatest mass because its orbital period and distance from the Sun are most similar.
C. Object 3 has the greatest mass because it has the largest surface gravity.
D. Object 5 has the greatest mass because it has the longest orbital period.

Use the information given and your knowledge of science to answer the question

Observers from Earth see different phases of the Moon as the Moon orbits around Earth.

Moon Phases as Seen from Earth



Note: Not to scale

9. Which phase of the moon belongs in box "A?"

A. 

B. 

C. 

D. 

10. Which phase of the moon belongs in box "B?"

A. 

B. 

C. 

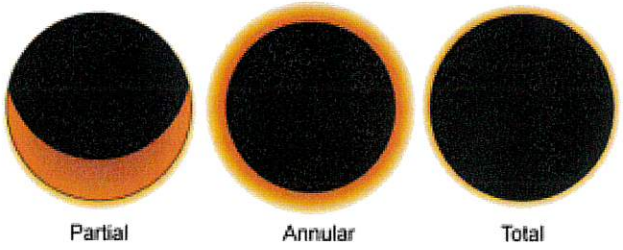
D. 

Use the information about eclipses and your knowledge of science to answer the questions

Eclipses

The orbits of Earth and the Moon around the Sun follow elliptical paths that sometimes result in different types of eclipses. During a solar eclipse, people in certain locations on Earth can view changes in the appearance of the Sun. The changes depend on whether the solar eclipse is partial, annular, or total. An annular solar eclipse has a visible ring of light around its shadow. The three different types of solar eclipses are shown in Figure 1.

Figure 1. Types of Solar Eclipses

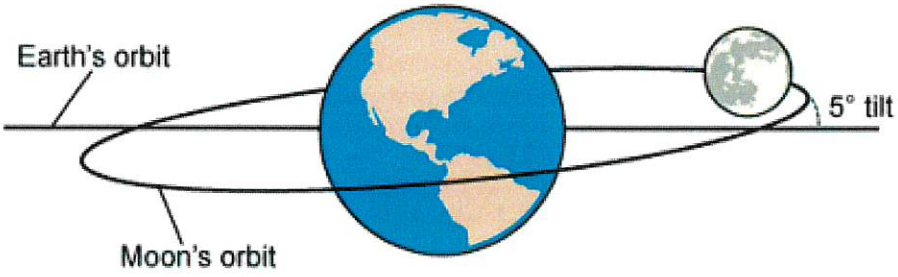


During a lunar eclipse, people on the night side of Earth can view changes in the appearance of the Moon. In a total lunar eclipse, the Moon appears to have a reddish-orange color before turning dark, as shown in Figure 2.

Figure 2. Appearance of the Moon during a Lunar Eclipse

Solar and lunar eclipses occur, on average, a few times per year. They do not occur every month because the orbit of the Moon is tilted about 5 degrees, compared to Earth's orbit, as shown in the model in Figure 3. As a result, Earth, the Moon, and the Sun rarely line up exactly.

Figure 3. Tilt of the Moon's Orbit around Earth



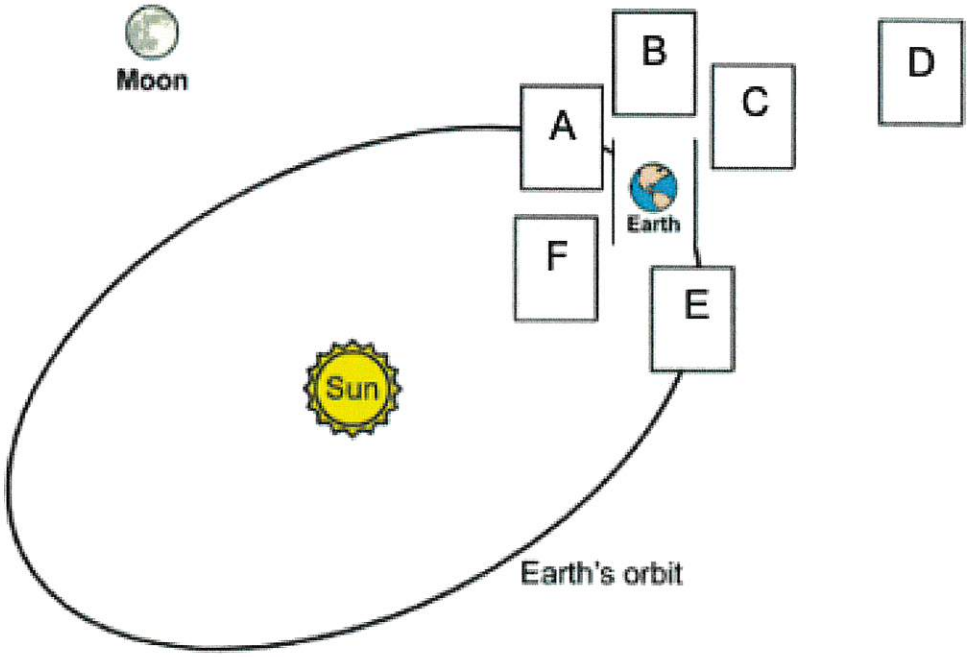
Note: Not to scale

11. Which factors affect the motion of the Earth–Moon system and therefore affect the timing of solar and lunar eclipses?

Select the **two** correct answers.

A. the color of the Moon
B. the tilt of the Moon's orbit
C. the distance between Earth and the Moon
D. the amount of sunlight emitted by the Sun
E. the amount of sunlight reflected by the Moon

Students want to model the positions of both the Earth and the Moon that result in annular and total solar eclipses. The students place the Earth in one box, as shown.



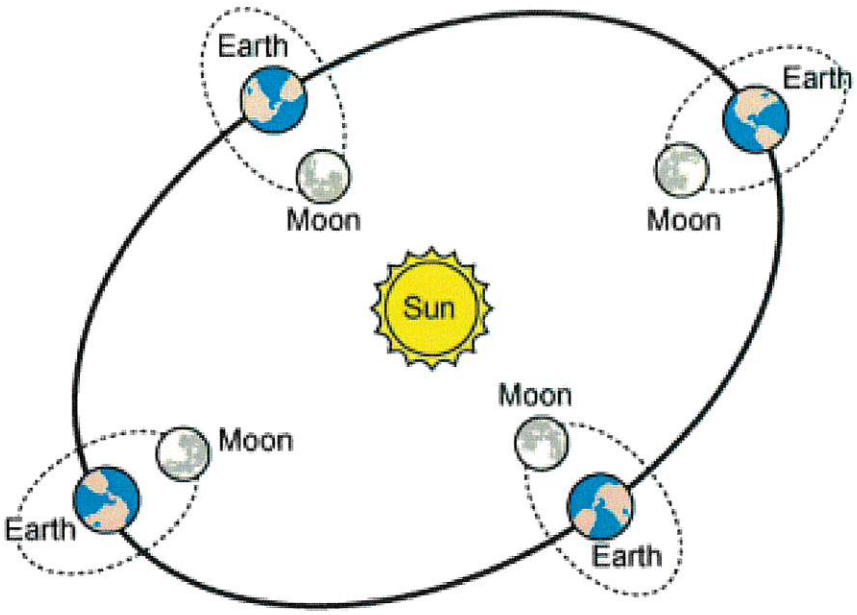
12. In which box should the students place the moon to complete the model during annular and total solar eclipses?

A. A
B. B
C. C
D. D
E. E
F. F

13. The students also know that lunar eclipses are visible from larger areas of Earth, compared to solar eclipses. Which statement best explains why lunar eclipses are more easily visible than solar eclipses?

A. The Sun is larger than Earth, so Earth creates a larger shadow on the Moon.
B. The Earth is larger than the Moon, so the Moon creates a larger shadow on Earth.
C. The Earth is larger than the Moon, so Earth creates a larger shadow on the Moon.
D. The Sun is larger than the Moon, so the Moon creates a larger shadow on Earth.

Four positions of the Earth-Moon system that result in a new moon when viewed from Earth are shown in the model.

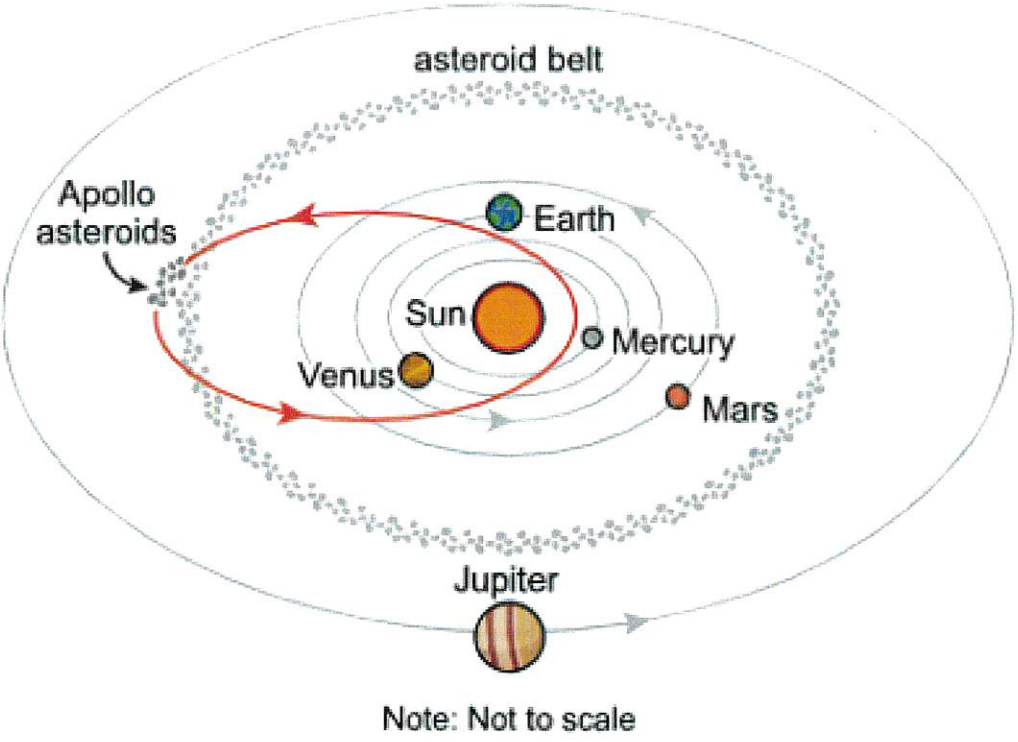


14. Use the model and the model in Figure 3 to explain why a solar eclipse does **not** occur at every new moon. Explain how information from the two models and your knowledge of patterns could be combined to predict when a solar eclipse could occur.

Use the information and your knowledge of science to answer the questions

Asteroids are rocky objects that orbit the Sun. They can be as small as a meter across or as big as a few hundred kilometers across. Most asteroids have orbits in the asteroid belt, a region located between Mars and Jupiter. Some asteroids, called Apollo asteroids, have orbits that actually cross Earth's orbit. **Figure 1** shows the orbits of some Apollo asteroids.

FIgure 1: Apollo asteroids orbit



15. Which observation from the figure can **best** be used as evidence to support the claim that the Sun has a gravitational pull on asteroids in the solar system?

- **A.** Most of the asteroids in the solar system are between Jupiter and the Sun.
- **B.** All of the planets and asteroids in the solar system orbit around the Sun.
- **C.** Apollo asteroids have orbits closer to the Sun than other asteroids in the Solar system.
- **D.** Only the planets with the largest masses in the solar system orbit around the Sun.

Scientists have researched the masses of some of the objects in our Solar System. The table below shows their findings.

Table 1. Solar System Mass Data

Object	Mass ($\times 10^{24}$ kg)
Sun	1,988,500.00
Mercury	0.33
Venus	4.87
Earth	5.97
Mars	0.64
Jupiter	1,898.00

Source: NASA.

16. Based on evidence from FIgure 1 and Table 1, which planet has the **greatest** effect on the orbit of most asteroids?

- **A.** Mercury
- **B.** Earth
- **C.** Mars
- **D.** Jupiter

17. Which property of the planet identified in question 3 has the **greatest** effect on an asteroid?

- **A.** The shape of the planet's orbit
- **B.** The planet's distance from the Sun
- **C.** The mass of the planet
- **D.** The size of the planet's orbit

18. Scientists must consider many factors when using a spacecraft to change the path of asteroids traveling close to Earth. Using Figure 1, describe how the force of gravity from Earth could affect nearby Apollo asteroids and explain how the effect of Earth's gravity could change the orbital motion of an Apollo asteroid.