CITYTUTOR

Sixth Grade Math Lesson Materials

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Identification of the copyrighted work claimed to have been infringed, or, if multiple copyrighted works allegedly have been infringed, then a representative list of such copyrighted works;

Identification of the material that is claimed to be infringing and that is to be removed or access to which is to be disabled, and information reasonably sufficient to permit us to locate the allegedly infringing material, e.g., the specific web page address on the Platform;

Information reasonably sufficient to permit us to contact the party alleging infringement, including an email address;

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CITYTUTOR DC

G6 Unit 6:

Rational Numbers

G6 U6 Lesson 1

Explore positive and negative numbers

G6 U6 Lesson 1 - Students will explore positive and negative numbers

Materials:

- Number line for every student

Warm Welcome (Slide 1): Tutor choice.

Frame the Learning/Connect to Prior Learning (Slide 2): Today we are going to explore positive and negative numbers. Have you ever heard the word positive? What about negative? Tell me what you know about those words. Perhaps some of you have seen them in video games (you get +10 for something or -10 for something), perhaps some of you have heard of positive and negative in terms of feedback (you can get positive or negative feedback). Let's go to the next slide to continue to talk about positive and negative numbers.

Let's Talk (Slide 3): So, it sounds like we already know a bit about positive and negative numbers, let's open our exploration by looking at this number line. **What do you notice and wonder about this number line?**
Possible Student Answers, Key Points:

- There are numbers to the right of zero and to the left of zero.
- Some numbers are just "normal" and others have a minus sign in front of them.
- the numbers on the left go the opposite way.
- The distance between all of the numbers on the number line is the same.
- I wonder what the minus sign in front of those numbers means.
- I wonder how 1 and -1 are related.

Those are all terrific noticings and wonderings. Some of you have seen number lines like this before and others haven't.

- This is a number line just like the ones you've worked with before except this one extends past 0 into negative numbers.
- Anything to the right of zero is a positive number, we could write it as +1 or +2 but usually when we write numbers, we just write positive numbers as the number itself.
- Anything to the left of zero is a negative number, the opposite of the positive number. Sometimes it's helpful to think of negative numbers as like debts or deficits.
- Just like on number lines with only positive numbers, numbers that are further to the left on a number line are smaller. So the farther we go to the left, the smaller the numbers before and vice versa, the further we go to the right, the bigger the numbers become.

Another way we can think of this is with temperature. Thermometers have temperatures that are above zero (*point*), and the higher it gets above zero, the hotter it is like in the summer when it's 98 degrees, it's HOT! And there are also negative numbers, temperatures that are below zero (brr!) and the further below zero it gets, the colder it is like in the winter in Minnesota it can get to be -10 degrees, that's COLD! So, numbers that are to the right of, or above, zero are positive and numbers that are to the left of, or below, zero are negative.

Let's Think (Slide 4): So, let's use what we just learned about positive and negative numbers to help us complete the first number line (pass out number line printable for every student). **First, talk to a partner, what do you notice about this number line? How could we go about completing this number line?**
Possible Student Answers, Key Points:

- I see that between 1 and -1 there's only one space so I know that the number line is counting by 1.
- I could start at 1 and go up or start at -1 and go backwards.
- I could also start at -8 and count up.

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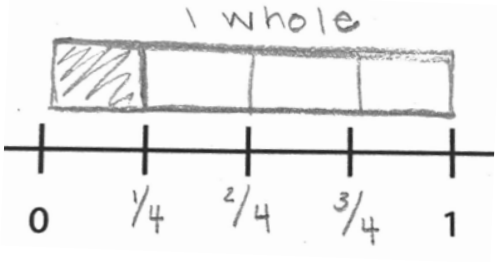
Let's Think (Slide 5): Now let's look at the second number line, it's a bit different. **Look at this number line carefully and then talk to your partner, what do you notice about *this* number line?** Possible Student Answers, Key Points:

- There are spaces between the whole numbers.
- I see 0, 1, 2 but there are also tick marks between those numbers which means it's fractions.
- Each whole number is split into fourths, or four equal parts.

Very good observations! This number line looks quite different. We have all of our whole numbers, or integers…0, 1, 2 and -1 and -2 but there are four tick marks or units between each whole number. Hmm, that means that we are talking about units that are less than 1 whole, like fractions or decimals! So if each whole number is split into four equal parts, that means that these are each fourths. Let's start by filling out the positive numbers first.

- Note: If students are struggling to understand this, draw a bar model above 0-1 and split it into fourths along the number line, like below (this should remind them of the fraction models that they're used to).
- As students progress past 1 and -1, it's most appropriate for them to write 1 ¼ not 5/4.



So we have our positive numbers filled out, now let's use that to fill out our negative numbers (students should notice and follow the pattern).

Let's Try it (Slides 6-7): Now let's work on positive and negative numbers together. We're going to work on this page together, step-by-step. Remember, numbers that are to the right of zero are positive and numbers to the left of zero are negative.

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WARM WELCOME

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Today we will explore positive and negative numbers.

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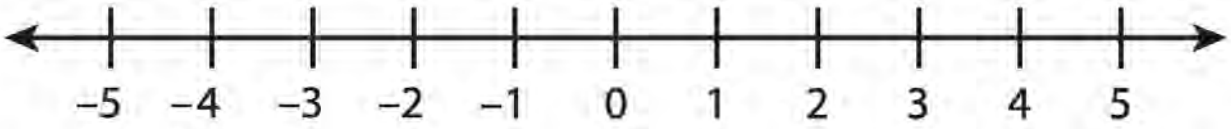
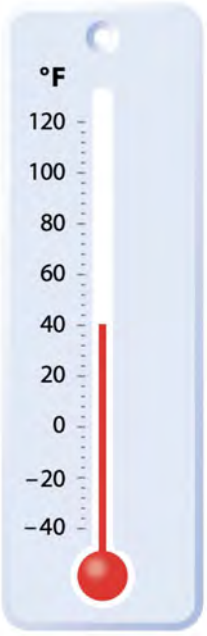
Let's Talk:

What do you notice and wonder about this number line?





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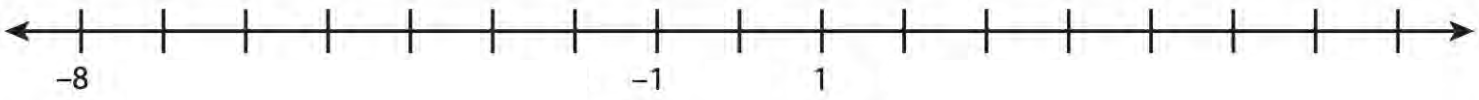
Let's Think:

Let's use what we know about positive and negative numbers to finish the number line.



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Let's Think:

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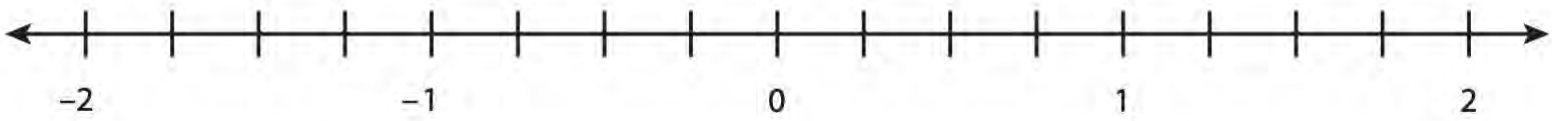

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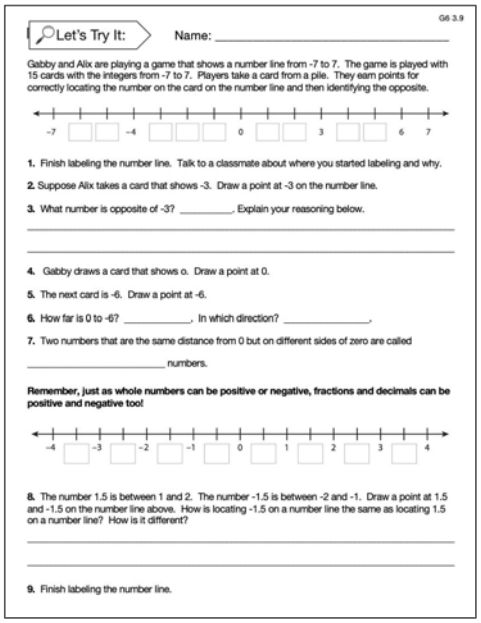
Let's Try It:

Let's explore positive and negative numbers together.



G6 3.9

Let's Try It: Name: _____

Gabby and Alix are playing a game that shows a number line from -7 to 7. The game is played with 15 cards with the integers from -7 to 7. Players take a card from a pile. They earn points for correctly locating the number on the card on the number line and then identifying the opposite.

-7 -4 0 3 6 7

1. Finish labeling the number line. Talk to a classmate about where you started labeling and why.
2. Suppose Alix takes a card that shows -3. Draw a point at -3 on the number line.
3. What number is opposite of -3? _____. Explain your reasoning below.

_____

_____

4. Gabby draws a card that shows 0. Draw a point at 0.
5. The next card is -6. Draw a point at -6.
6. How far is 0 to -6? _____. In which direction? _____.
7. Two numbers that are the same distance from 0 but on different sides of zero are called _____ numbers.

Remember, just as whole numbers can be positive or negative, fractions and decimals can be positive and negative too!

-4 -3 -2 -1 0 1 2 3 4

8. The number 1.5 is between 1 and 2. The number -1.5 is between -2 and -1. Draw a point at 1.5 and -1.5 on the number line above. How is locating -1.5 on a number line the same as locating 1.5 on a number line? How is it different?

_____

_____

9. Finish labeling the number line.

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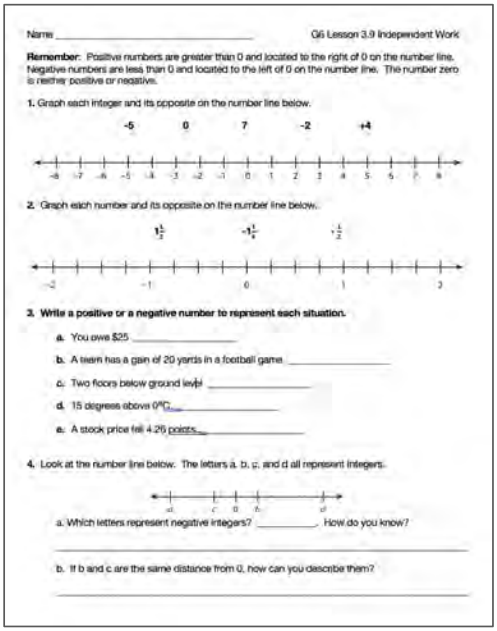
On your Own:

Now it's time to try on your own.



Name _____ G6 Lesson 3.9 Independent Work

Remember: Positive numbers are greater than 0 and located to the right of 0 on the number line. Negative numbers are less than 0 and located to the left of 0 on the number line. The number zero is neither positive or negative.

1. Graph each integer and its opposite on the number line below.

-5 0 7 -2 +4

2. Graph each number and its opposite on the number line below.

$1\frac{1}{2}$ $-1\frac{1}{4}$ $-\frac{1}{2}$

3. **Write a positive or a negative number to represent each situation.**

a. You owe $25 _____

b. A team has a gain of 20 yards in a football game _____

c. Two floors below ground level _____

d. 15 degrees above 0°C _____

e. A stock price fell 4.25 points _____

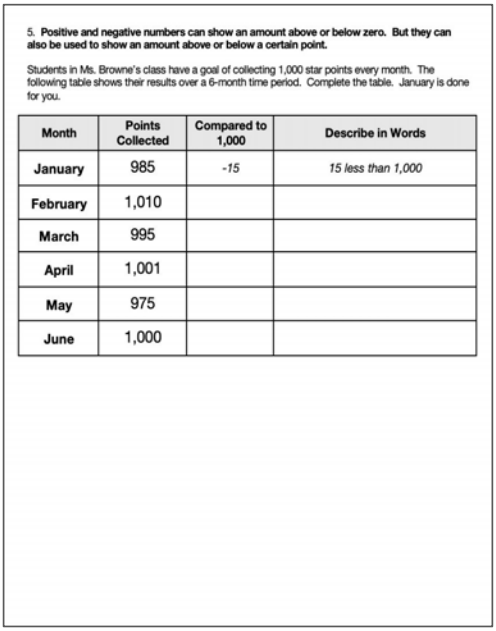
4. Look at the number line below. The letters a, b, c, and d all represent integers.

a. Which letters represent negative integers? _____. How do you know?

_____

b. If b and c are the same distance from 0, how can you describe them?

_____



5. **Positive and negative numbers can show an amount above or below zero. But they can also be used to show an amount above or below a certain point.**

Students in Ms. Browne's class have a goal of collecting 1,000 star points every month. The following table shows their results over a 6-month time period. Complete the table. January is done for you.

Month	Points Collected	Compared to 1,000	Describe in Words
January	985	*-15*	*15 less than 1,000*
February	1,010		
March	995		
April	1,001		
May	975		
June	1,000		

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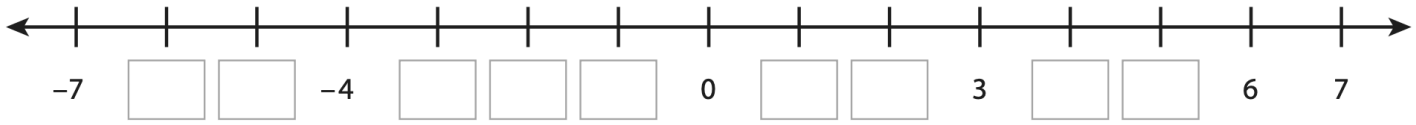
Gabby and Alix are playing a game that shows a number line from -7 to 7. The game is played with 15 cards with the integers from -7 to 7. Players take a card from a pile. They earn points for correctly locating the number on the card on the number line and then identifying the opposite.



1. Finish labeling the number line. Talk to a classmate about where you started labeling and why.

2. Suppose Alix takes a card that shows -3. Draw a point at -3 on the number line.

3. What number is opposite of -3? _____. Explain your reasoning below.

_____

_____

4. Gabby draws a card that shows o. Draw a point at 0.

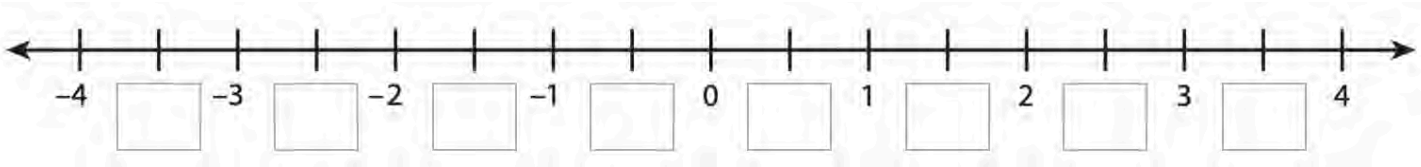
5. The next card is -6. Draw a point at -6.

6. How far is 0 to -6? _____. In which direction? _____.

7. Two numbers that are the same distance from 0 but on different sides of zero are called

_____ numbers.

Remember, just as whole numbers can be positive or negative, fractions and decimals can be positive and negative too!



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_____

_____

9. Finish labeling the number line.

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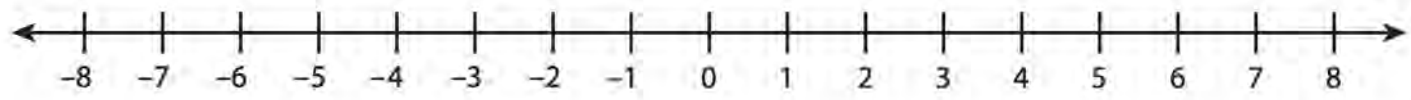
Remember: Positive numbers are greater than 0 and located to the right of 0 on the number line. Negative numbers are less than 0 and located to the left of 0 on the number line. The number zero is neither positive or negative.

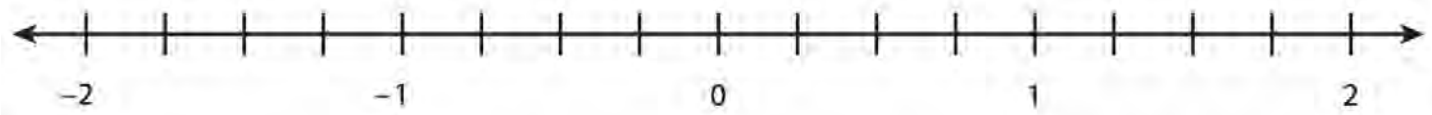
1. Graph each integer and its opposite on the number line below.

-5 **0** **7** **-2** **+4**



2. Graph each number and its opposite on the number line below.

$1\frac{1}{2}$ **$-1\frac{1}{4}$** **$-\frac{1}{2}$**



3. Write a positive or a negative number to represent each situation.

a. You owe $25 _____

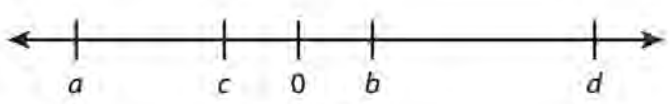
b. A team has a gain of 20 yards in a football game _____

c. Two floors below ground level _____

d. 15 degrees above 0°C _____

e. A stock price fell 4.26 points _____

4. Look at the number line below. The letters a, b, c, and d all represent integers.



a. Which letters represent negative integers? _____. How do you know?

_____

b. If b and c are the same distance from 0, how can you describe them?

_____

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5. **Positive and negative numbers can show an amount above or below zero. But they can also be used to show an amount above or below a certain point.**

Students in Ms. Browne's class have a goal of collecting 1,000 star points every month. The following table shows their results over a 6-month time period. Complete the table. January is done for you.

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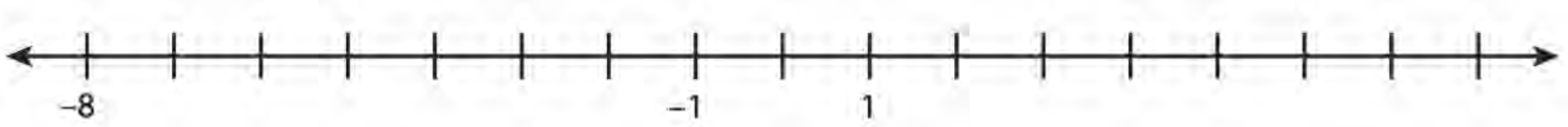
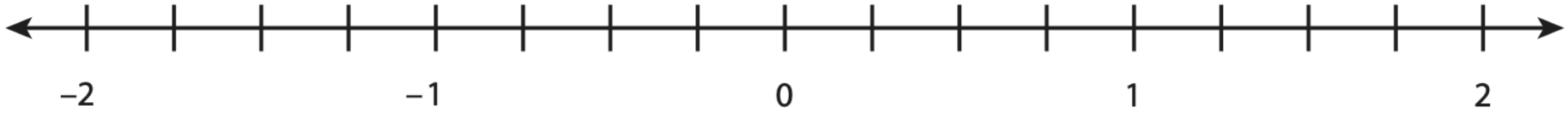
1. Let's use what we know about positive and negative numbers to finish the number line.



2. Let's use what we know about positive and negative numbers to finish the number line.



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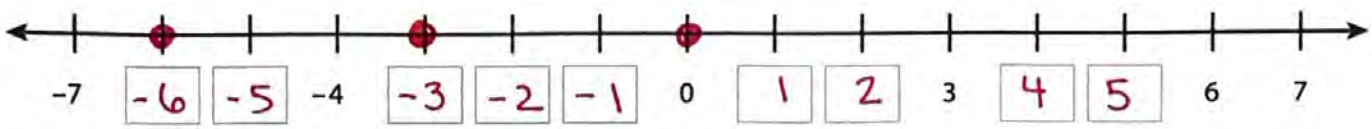
Name: ANSWER KEY

Gabby and Alix are playing a game that shows a number line from -7 to 7. The game is played with 15 cards with the integers from -7 to 7. Players take a card from a pile. They earn points for correctly locating the number on the card on the number line and then identifying the opposite.



1. Finish labeling the number line. Talk to a classmate about where you started labeling and why. ✓

2. Suppose Alix takes a card that shows -3. Draw a point at -3 on the number line. ✓

3. What number is opposite of -3? 3! . Explain your reasoning below.

3 and -3 are opposites because they're the same distance from zero.

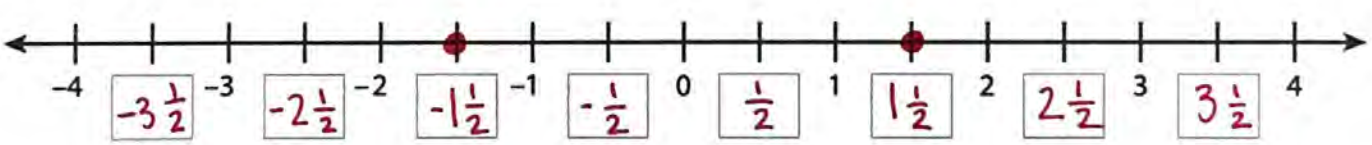
4. Gabby draws a card that shows o. Draw a point at 0. ✓

5. The next card is -6. Draw a point at -6. ✓

6. How far is 0 to -6? 6 . In which direction? left .

7. Two numbers that are the same distance from 0 but on different sides of zero are called opposite numbers.

Remember, just as whole numbers can be positive or negative, fractions and decimals can be positive and negative too!



8. The number 1.5 is between 1 and 2. The number -1.5 is between -2 and -1. Draw a point at 1.5 and -1.5 on the number line above. How is locating -1.5 on a number line the same as locating 1.5 on a number line? How is it different?

It's the same distance from zero, you pass 1/2, 1 or -1/2, -1 to get to it. But, you go a different direction to find positive or negative.

9. Finish labeling the number line.

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Name ANSWER KEY

G6 U6 Lesson 1 - Independent Work

Remember: Positive numbers are greater than 0 and located to the right of 0 on the number line. Negative numbers are less than 0 and located to the left of 0 on the number line. The number zero is neither positive or negative.

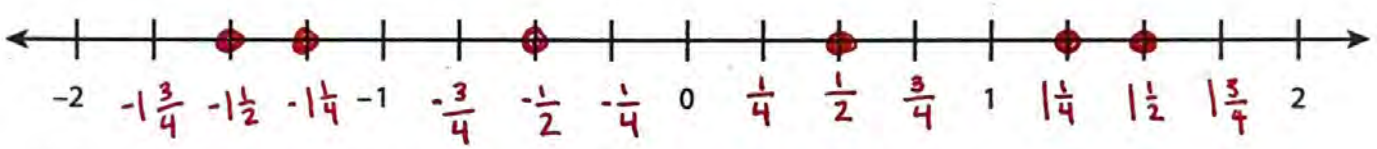
1. Graph each integer and its opposite on the number line below.

-5 0 7 -2 +4

5 ✓ -7 2 -4

2. Graph each number and its opposite on the number line below.

$1\frac{1}{2}, -1\frac{1}{2}$ $-1\frac{1}{4}, 1\frac{1}{4}$ $-\frac{1}{2}, \frac{1}{2}$



3. Write a positive or a negative number to represent each situation.

a. You owe $25 -25

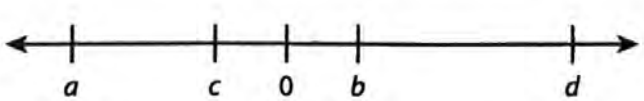
b. A team has a gain of 20 yards in a football game $+20$

c. Two floors below ground level -2

d. 15 degrees above 0°C $+15$

e. A stock price fell 4.26 points -4.26

4. Look at the number line below. The letters a, b, c, and d all represent integers.



a. Which letters represent negative integers? a, c. How do you know?

They're to the left of zero

b. If b and c are the same distance from 0, how can you describe them?

Opposite numbers

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G6 U6 Lesson 2

Find absolute value and order rational numbers

G6 U6 Lesson 2 - Students will find absolute value and order numbers

Warm Welcome (Slide 1): Tutor choice.

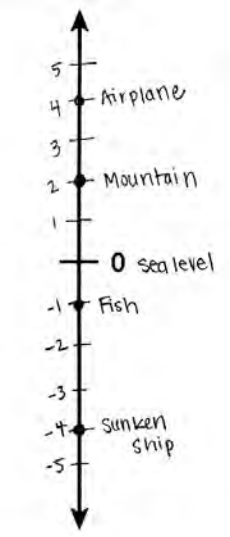
Frame the Learning/Connect to Prior Learning (Slide 2): Today we are going to use what we know about positive and negative numbers to think about absolute value, which is the distance of any number from zero. We'll also dig back into our brains to think about something we've already learned about…ordering numbers.

Let's Talk (Slide 3): So, what do you already know about comparing and ordering numbers? Possible Student Answers, Key Points:

- When we compare numbers we read from left to right.
- When we compare numbers we can say whether one number is bigger OR smaller than another number.
- When I'm comparing two things, I can write two different inequalities.
- I know that > is the greater than sign, < is the less than sign and = is the equal sign.
- When we order numbers, we can order them from least to greatest, or from greatest to least.

Let's Think (Slide 4): We have two different ideas to discuss and learn about today. First, let's talk about absolute value. Who has ever heard the word elevation? If you have, what did it mean or where did you hear it used? That's right, elevation refers to how far away from a given height something is, often sea level. When we're talking about the elevation of an object here, negative numbers represent objects that are below sea level..things that are under water like sunken shifts and coral reefs and positive numbers are used to represent objects that are above sea level, like mountains and villages.

So, this table on this slide shows the location of the mountain, a school of fish, a sunken shift, and an airplane. Based on what I just told you about elevation and the picture here, what do you notice about the location of the different objects? Some are positive and some are negative! That's right, some of the numbers are positive and some are negative, I bet that means that some are ABOVE sea level and some are BELOW sea level.



Now, let's work together to graph the location of each object on this number line on the slide. Zero is sea level, that's where we measure the distance from, I'm going to label that as SEA LEVEL. So we know that the mountain and the airplane are positive numbers, that means that they're ABOVE sea level so let's plot them as positive numbers (*plot 2 and 4, label airplane and mountain*).

We also know that the school of fish and the sunken shift are negative numbers because they're BELOW sea level (*plot -1 and -4, label fish and airplane*). So, this number line helps us see the distance each object is from sea level, whether they're above or below sea level and how far away from sea level each object is.

Now, let's answer some questions about how far each object is from sea level.

1. First, how far above sea level is the mountain? 4! That's right, we count the hops from sea level, count with me…1, 2, 3, 4.
2. How far below sea level is the school of fish? 1! It's not -1 because we're just saying the distance, it takes one hop to get from sea level to the fish.

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3. Finally, which two objects are the same distance from sea level? Think about this one and share with a partner about what you think and how you figured it out.

Let's Think (Slide 5): Guess what? We just practiced thinking about absolute value! When we are talking about the distance from 0, we're talking about absolute value! That's why both the sunken ship and airplane are the same distance to sea level.

Like you said, 4 is 4 units from 0 and -4 is 4 units from 0 (*show the hops on the number line*). When I'm counting absolute values I can count the distance forwards or backwards (*show on the number line*). And, when we write absolute value we write it like this… |-4|=4(*point*).

So, if we want to find absolute value of 4, which is written like this or |4| (*point*), we want to find the distance from 4 to zero. We can count from 0 to 4 or from 4 to 0, either way it's…4! So the absolute value of 4 is…4!

Let's Think (Slide 6): So, let's use what we know about absolute value to help us order numbers. Like you told me earlier, when we order numbers we put them in order from least to greatest or from greatest to least, you've been doing this in school (and real life!) for a while now. But, today, we're going to have to use what we know about absolute value to help us order numbers. Let's look at this set of numbers, read them with me…

- The absolute value of -2.
- -8…no absolute value there!
- 4…no absolute value there!
- The absolute value of 6.
- And finally, the absolute value of -7.

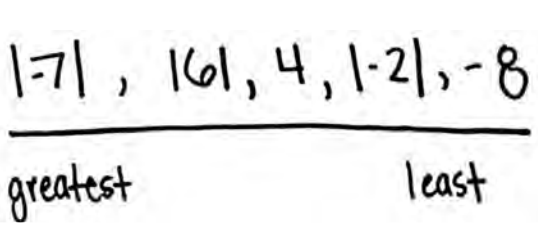
So this is a mixed set of numbers, some of them are just numbers while others have the absolute value notation. Let's interpret each number before we put them in order.

The absolute value of -2, let's find -2 on the number line and count the distance from 0 (*count forwards or backwards*). So the absolute value of -2 is 2!

Now, -8 and 4 are just regular numbers so we don't have to interpret them, let's just rewrite them so we know the value.

And finally, What's the absolute value of 6? 6! And What about the absolute value of -7? 7!

Nice work! Now, we can put them in order from greatest to least, that means from biggest to smallest. When we write them in order, we have to write them in the original form we were given to show what we were comparing but these interpretations can help us order these numbers.



Which number is the largest? 7! That's right, the absolute value of 7 is the largest number we have, let's write that first.

What's next? |6|! Nice work! And then? 4! Next? |-2|! And finally, what's the smallest number? -8!

Great job! We just put this set of numbers in order from greatest to least.

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Let's Try it (Slides 7-8): Now let's work on ordering numbers together. Remember that absolute value is the distance between a number and 0!

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WARM WELCOME

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Today we will find absolute value and compare positive and negative numbers.

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Let's Talk:

What do you know about comparing numbers?

What do you know about ordering numbers?

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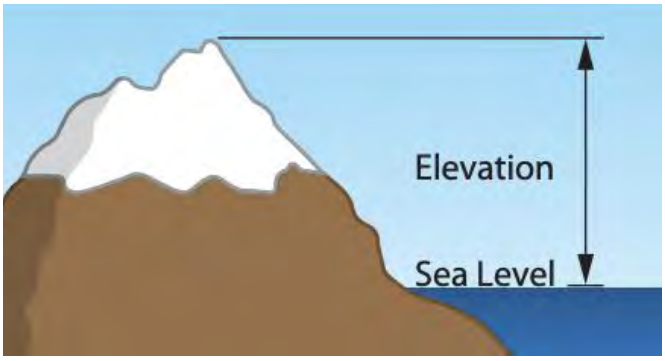
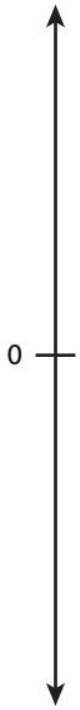
Let's Think:



Object	Mountain	Fish	Sunken Ship	Airplane
Elevation (in km)	2	−1	−4	4

The elevation of an object tells you its distance above or below sea level. Negative numbers are used to represent objects below sea level. Positive numbers are used to represent objects above sea level.

The table to the left shows the elevations of four objects. Let's graph their locations on a number line and then describe the distances.



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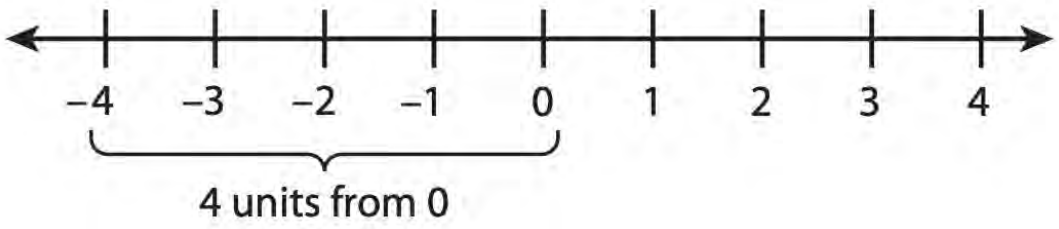
Let's Think:

The absolute value of a number is its distance from 0 on the number line |-4| means the absolute value of -4.

-4 is 4 units from 0.

|-4| = 4

|4| = _____



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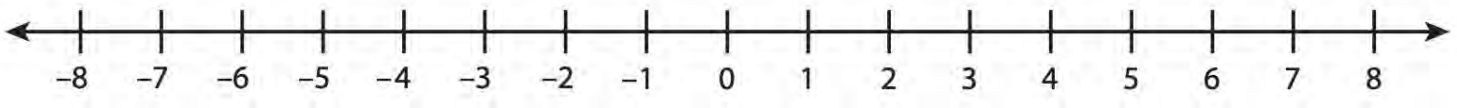
Let's Think:

We can put the numbers in order from greatest to least.

|-2| -8 4 |6| |-7|



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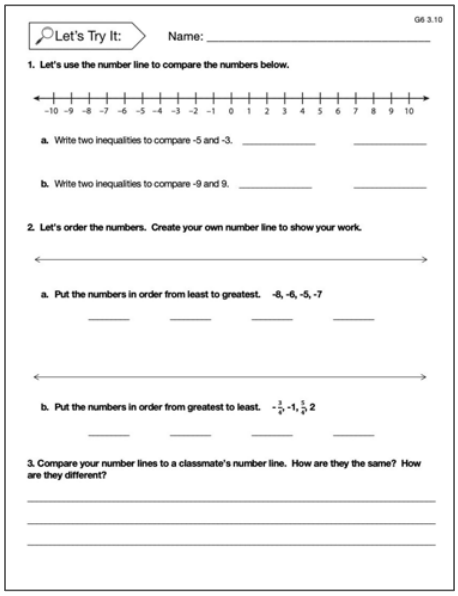
Let's Try It:

Let's explore comparing numbers and absolute together.



G6 3.10

Let's Try It: Name: _____

1. Let's use the number line to compare the numbers below.

−10 −9 −8 −7 −6 −5 −4 −3 −2 −1 0 1 2 3 4 5 6 7 8 9 10

a. Write two inequalities to compare -5 and -3. _____ _____

b. Write two inequalities to compare -9 and 9. _____ _____

2. Let's order the numbers. Create your own number line to show your work.

a. Put the numbers in order from least to greatest. -8, -6, -5, -7

b. Put the numbers in order from greatest to least. $-\frac{3}{4}$, -1, $\frac{5}{4}$, 2

3. Compare your number lines to a classmate's number line. How are they the same? How are they different?

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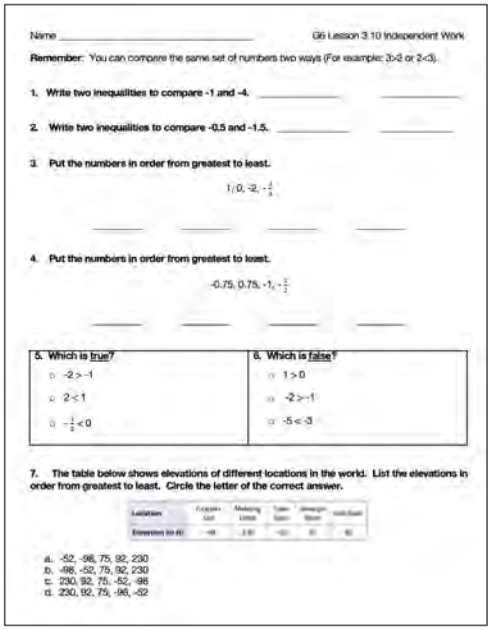
On your Own:

Now its time to try on your own.



Name _____ G6 Lesson 3.10 Independent Work

Remember: You can compare the same set of numbers two ways (For example: 3>2 or 2<3).

1. Write two inequalities to compare -1 and -4. _____ _____

2. Write two inequalities to compare -0.5 and -1.5. _____ _____

3. Put the numbers in order from greatest to least.

1, 0, -2, $-\frac{1}{3}$

4. Put the numbers in order from greatest to least.

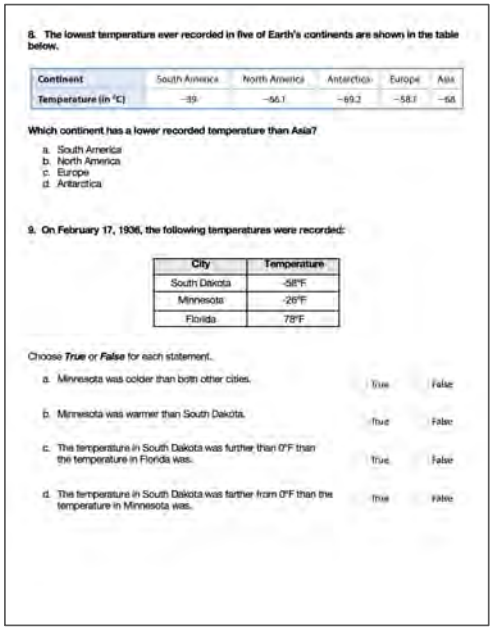
-0.75, 0.75, -1, $-\frac{1}{2}$

5. Which is true?	6. Which is false?
○ -2 > -1	○ 1 > 0
○ 2 < 1	○ -2 > -1
○ $-\frac{1}{3}$ < 0	○ -5 < -3

7. The table below shows elevations of different locations in the world. List the elevations in order from greatest to least. Circle the letter of the correct answer.

Location	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Elevation (in ft)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

a. -52, -98, 75, 92, 230
b. -98, -52, 75, 92, 230
c. 230, 92, 75, -52, -98
d. 230, 92, 75, -98, -52



8. The lowest temperature ever recorded in five of Earth's continents are shown in the table below.

Continent	South America	North America	Antarctica	Europe	Asia
Temperature (in °C)	−39	−56.1	−69.2	−58.1	−68

Which continent has a lower recorded temperature than Asia?

a. South America
b. North America
c. Europe
d. Antarctica

9. On February 17, 1936, the following temperatures were recorded:

City	Temperature
South Dakota	-58°F
Minnesota	-26°F
Florida	78°F

Choose *True* or *False* for each statement.

a. Minnesota was colder than both other cities. True False

b. Minnesota was warmer than South Dakota. True False

c. The temperature in South Dakota was further than 0°F than the temperature in Florida was. True False

d. The temperature in South Dakota was farther from 0°F than the temperature in Minnesota was. True False

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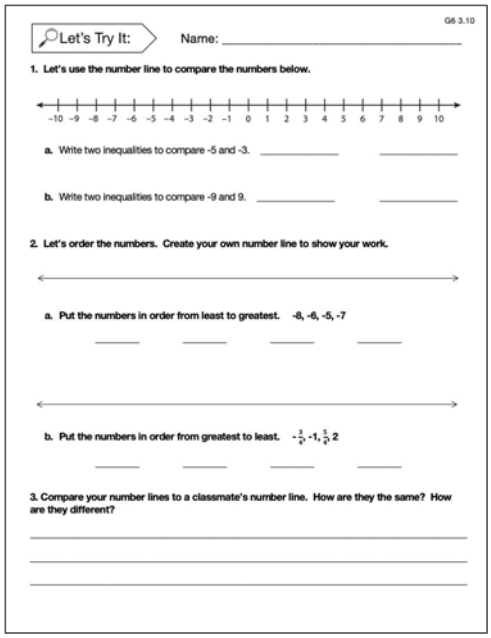
Let's Try It:

Let's explore together.



G6 3.10

Let's Try It: Name: _____

1. Let's use the number line to compare the numbers below.

−10 −9 −8 −7 −6 −5 −4 −3 −2 −1 0 1 2 3 4 5 6 7 8 9 10

a. Write two inequalities to compare -5 and -3. _____ _____

b. Write two inequalities to compare -9 and 9. _____ _____

2. Let's order the numbers. Create your own number line to show your work.

a. **Put the numbers in order from least to greatest.** -8, -6, -5, -7

_____ _____ _____ _____

b. **Put the numbers in order from greatest to least.** $-\frac{3}{5}$, -1, $\frac{5}{3}$, 2

_____ _____ _____ _____

3. Compare your number lines to a classmate's number line. How are they the same? How are they different?

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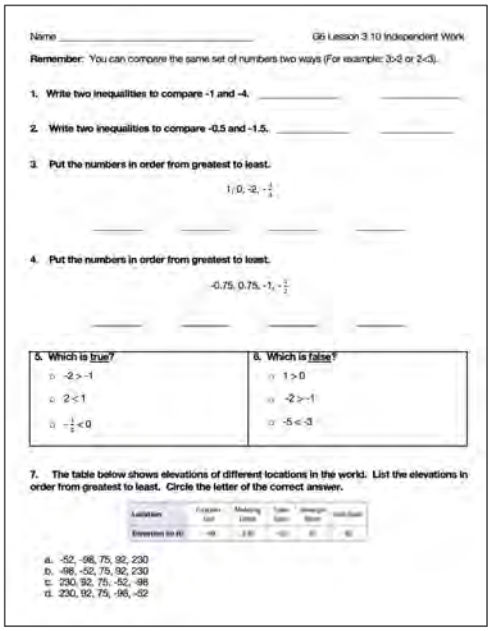
On your Own:

Now it's time to try on your own.



Name _____ G6 Lesson 3.10 Independent Work

Remember: You can compare the same set of numbers two ways (For example: 3>2 or 2<3).

1. **Write two inequalities to compare -1 and -4.** _____ _____

2. **Write two inequalities to compare -0.5 and -1.5.** _____ _____

3. **Put the numbers in order from greatest to least.**

1, 0, -2, $-\frac{1}{4}$

_____ _____ _____ _____

4. **Put the numbers in order from greatest to least.**

-0.75, 0.75, -1, $-\frac{1}{2}$

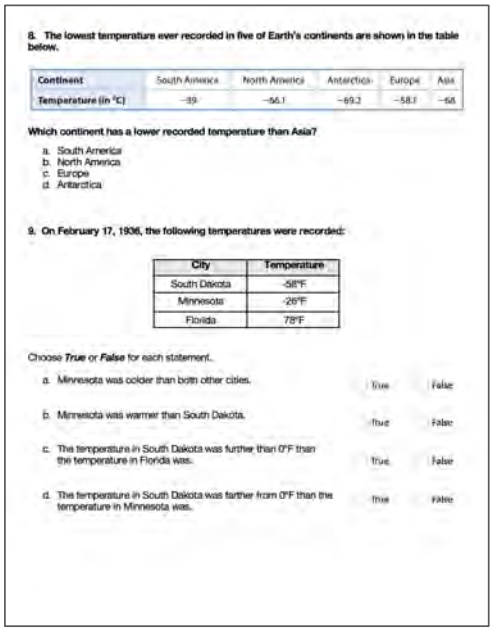
_____ _____ _____ _____

5. Which is true?	6. Which is false?
a. -2 > -1	a. 1 > 0
b. 2 < 1	b. -2 > -1
c. $-\frac{1}{3} < 0$	c. -5 < -3

7. **The table below shows elevations of different locations in the world. List the elevations in order from greatest to least. Circle the letter of the correct answer.**

Location	Caspian Sea	Mediterranean Coast	Turkey Basin	Average Ocean Floor	South Coast
Elevation (in ft)	−92	0	−52	−12	−92

a. -52, -98, 75, 92, 230
b. -98, -52, 75, 92, 230
c. 230, 92, 75, -52, -98
d. 230, 92, 75, -98, -52



8. **The lowest temperature ever recorded in five of Earth's continents are shown in the table below.**

Continent	South America	North America	Antarctica	Europe	Asia
Temperature (in °C)	−39	−56.1	−89.2	−58.1	−68

Which continent has a lower recorded temperature than Asia?

a. South America
b. North America
c. Europe
d. Antarctica

9. **On February 17, 1936, the following temperatures were recorded:**

City	Temperature
South Dakota	-58°F
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Florida	78°F

Choose ***True*** or ***False*** for each statement.

a. Minnesota was colder than both other cities. True False

b. Minnesota was warmer than South Dakota. True False

c. The temperature in South Dakota was further than 0°F than the temperature in Florida was. True False

d. The temperature in South Dakota was farther from 0°F than the temperature in Minnesota was. True False

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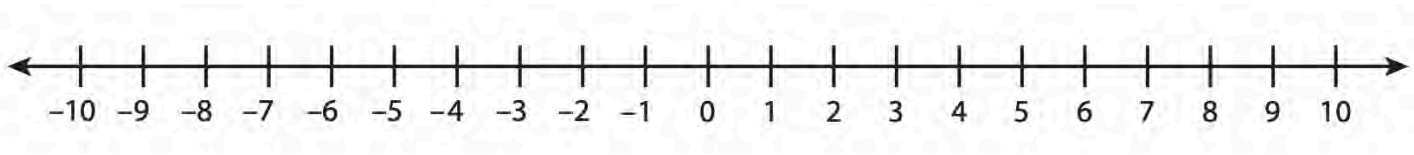
Name _____ G6 U6 Lesson 2 - Let's Try It



1. Put the following numbers in order from least to greatest.

|-5| ↓ ____ , -2 ↓ ____ , |2| ↓ ____ , 0 ↓ ____ , 4 ↓ ____

_____

1. Put the following numbers in order from greatest to least.

|-6| ↓ ____ , -1 ↓ ____ , |1| ↓ ____ , |-3| ↓ ____ , 5 ↓ ____

_____

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Name _____ G6 U6 Lesson 2 - Independent Work

Remember: You find absolute value BEFORE you start ordering numbers.

1. Put the numbers in order from greatest to least.

1, |-5|, 4, -2, |-3|

_____ _____ _____ _____ _____

2. Put the numbers in order from least to greatest.

3, |-6|, 8, -1, |-4|

_____ _____ _____ _____ _____

3. Which shows the numbers in order from least to greatest?	**4. Which shows the numbers in order from greatest to least?**
o |-4|, 3, 5	o |-7|, 1, |-2|
o 3, |-4|, 5	o |-7|, |-2|, 1
o 5, |-4|, 3	o 1, |-2|, |-7|

7. The table below shows elevations of different locations in the world. List the elevations in order from greatest to least. Circle the letter of the correct answer.

Location	Caspian Sea	Mekong Delta	Lake Eyre	Senegal River	Iron Gate
Elevation (in ft)	−98	230	−52	75	92

a. -52, -98, 75, 92, 230
b. -98, -52, 75, 92, 230
c. 230, 92, 75, -52, -98
d. 230, 92, 75, -98, -52

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8. The lowest temperature ever recorded in five of Earth's continents are shown in the table below.

Continent	South America	North America	Antarctica	Europe	Asia
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b. North America
c. Europe
d. Antarctica

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Minnesota	-26°F
Florida	78°F

Choose ***True*** or ***False*** for each statement.

a. Minnesota was colder than both other cities. ☐ True ☐ False

b. Minnesota was warmer than South Dakota. ☐ True ☐ False

c. The temperature in South Dakota was further than 0°F than the temperature in Florida was. ☐ True ☐ False

d. The temperature in South Dakota was farther from 0°F than the temperature in Minnesota was. ☐ True ☐ False

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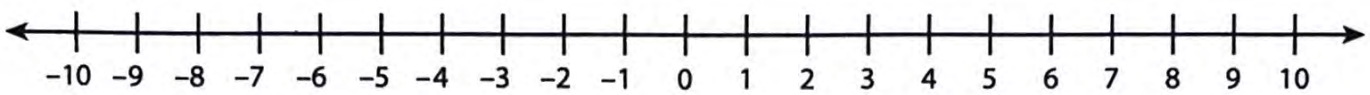
Name ANSWER KEY

G6 U6 Lesson 2 - Let's Try It



1. Put the following numbers in order from least to greatest.

|-5|	-2	|2|	0	4
↓	↓	↓	↓	↓
5	-2	2	0	4

-2, 0, |2|, 4, |-5|

least greatest

1. Put the following numbers in order from greatest to least.

|-6|	-1	|1|	|-3|	5
↓	↓	↓	↓	↓
6	-1	1	3	5

|-6|, 5, |-3|, |1|, -1

greatest least

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Name ANSWER KEY G6 U6 Lesson 2 - Independent Work

Remember: You find absolute value BEFORE you start ordering numbers.

1. **Put the numbers in order from greatest to least.**

1, |-5|, 4, -2, |-3|

1, 5, 4, -2, 3

|-5| 4 |-3| 1 -2

greatest least

2. **Put the numbers in order from least to greatest.**

3, |-6|, 8, -1, |-4|

3, 6, 8, -1, 4

-1 3 |-4| |-6| 8

least greatest

3. Which shows the numbers in order from least to greatest?	4. Which shows the numbers in order from greatest to least?
✗ |-4|, 3, 5 (4, 3, 5)	✗ |-7|, 1, |-2| (7, 1, 2)
● 3, |-4|, 5 (3, 4, 5) ✓	● |-7|, |-2|, 1 (7, 2, 1) ✓
✗ 5, |-4|, 3 (5, 4, 3)	✗ 1, |-2|, |-7| (1, 2, 7)

7. **The table below shows elevations of different locations in the world. List the elevations in order from greatest to least. Circle the letter of the correct answer.**

Location	Caspian Sea	Mekong Delta	Lake Eyre	Senegal River	Iron Gate
Elevation (in ft)	−98	230	−52	75	92

✗ a. -52, -98, 75, 92, 230
✗ b. -98, -52, 75, 92, 230
(c.) 230, 92, 75, -52, -98
✗ d. 230, 92, 75, -98, -52

230, 92, 75, -52, -98

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8. The lowest temperature ever recorded in five of Earth's continents are shown in the table below.

Continent	South America	North America	Antarctica	Europe	Asia
Temperature (in °C)	−39	−66.1	−89.2	−58.1	−68

Which continent has a lower recorded temperature than Asia?

a. South America
b. North America
c. Europe
d. Antarctica

$-89.2 < -68$

9. On February 17, 1936, the following temperatures were recorded:

City	Temperature
South Dakota	-58°F
Minnesota	-26°F
Florida	78°F

Choose ***True*** or ***False*** for each statement.

a. Minnesota was colder than both other cities. ☐ True ☒ False

b. Minnesota was warmer than South Dakota. ☐ True ☒ False

c. The temperature in South Dakota was further than 0°F than the temperature in Florida was. ☐ True ☒ False

$|-58|$ and 78

d. The temperature in South Dakota was farther from 0°F than the temperature in Minnesota was. ☒ True ☐ False

$|-58|$ and $|-26|$

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G6 U6 Lesson 3

Use absolute value and inequalities to compare and interpret rational numbers

G6 U6 Lesson 3 Objective- We will compare and interpret rational numbers using absolute value and inequalities.

Warm Welcome (Slide 1): Tutor choice.

Frame the Learning/Connect Prior Learning (Slide 2): Previously you learned about absolute value and ordering rational numbers. Today, we will explore how to use absolute value and inequalities to compare and interpret rational numbers. Absolute value and inequalities are essential tools for comparing and interpreting rational numbers in real-world situations. They help us understand the relationships and magnitudes, or sizes, of quantities, making it easier to make decisions, solve problems, and draw meaningful conclusions from data.

Let's Talk (Slide 3): Before we start today's lesson, let's review what we know about rational numbers. **Can anyone tell me what rational numbers are? Give me an example of a rational number.** Possible Answer Answers, Key Points:

- Rational numbers are numbers that can be expressed as a fraction,decimal, or whole numbers.
- Rational numbers include positive and negative numbers, as well as whole numbers and fractions.
- Rational numbers can be represented on a number line

That's correct! Rational numbers include fractions, decimals, and whole numbers. Now, let's move on to absolute value. **Does anyone remember what absolute value means?** Possible Answer Answers, Key Points:

- Absolute value is the distance or how far a number is from zero on the number line.
- Finding the absolute value will always result in a positive value.

Excellent! Absolute value is the distance of a number from zero on the number line. It tells us how far a number is from zero, regardless of its sign or whether it's positive or negative. For example, the absolute value of -5 is 5 because it's 5 units away from zero. Now, let's see how we can use absolute value and inequalities to compare rational numbers.

Let's Think (Slide 4): Now, let's talk about inequalities. Inequalities are comparisons between two numbers using symbols like < (less than), > (greater than), = (equal to), ≤ (less than or equal to), or ≥ (greater than or equal to). It's important to remember the names of each of these symbols so that we can use them to quickly compare quantities. When we compare we read from left to right and then use the appropriate symbol to compare the first number to the second number.

We can write TWO inequalities for one set of numbers. We can say that one number is bigger than another number like 2 is greater than 1. But we can also switch it around and say that the other number is smaller than another number, like 1 is less than 2.

Let's Think (Slide 5): So, let's explore how we can compare -9 and -4. Let's use the number line to help us compare these numbers. Help me out, someone please point to -4 on the number line, now point to -9 on the number line. Now comparing positive and negative numbers is the same as comparing only positive numbers. Numbers to the right are bigger, numbers to the left are smaller, in other words numbers to the left are always smaller than numbers on the right. So, if we want to write two inequalities for -9 and -4, we can say -9 is less than -4 (*Note: say this as words FIRST!*) or -9<-4 (*then write it with a symbol*) or if we wanted to start with -4 we could say -4 is greater than -9 or we could write -4>-9.

Let's Think (Slide 6): But, we can also compare absolute value, which is the same idea but just adds an extra step before we can compare. Let me show you.

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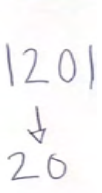
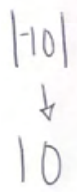
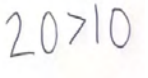


Imagine you and your friend have piggy banks, and you both saved some money. You saved $20, and your friend saved -$10, which means they owe someone $10.

We need to determine the absolute value of each number first. The two lines next to the number symbolize absolute value. I need to determine the absolute value of 20. Well, we know 20 is 20 units away from zero so the absolute value of 20 is 20.

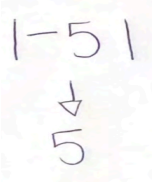


Now, we need to determine the absolute value of negative 10. That means that we want to determine how far -10 is away from 0. If we started at -10 and hopped to 0 on a number line, like we did yesterday, it would be 10 hops away. So the absolute value of -10 is 10!

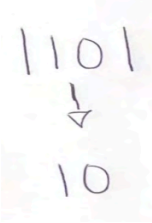


Now that we found the absolute value we can compare the amounts using inequalities. We're comparing 20 to 10 and we have to read from the left to right. So, $20 is…greater than $10, you have more money in your piggy bank than your friend (*fill in symbol*).

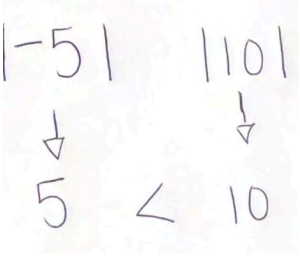
Let's Think (Slide 7): Now let's try another example. Imagine you have two cities, City A and City B. City A has a temperature of 10 degrees Celsius, and City B has a temperature of -5 degrees Celsius. We can use absolute value to find how far the temperatures are from zero and then we can compare them.



Remember, absolute value is how far away a number is from 0. So, the absolute value of -5 is 5, which means it's 5 degrees away from zero.



What's the absolute value of 10? 10! That's right because 10 is 10 units away from zero.



Now, we can compare the temperatures using inequalities. We can compare the temperature of the cities two ways, first we can compare them by saying which temperature is colder. So, colder means that the temperature is less. So 5 is less than 10 (*write 5<10*), which means that City B is colder. But we can also say which city is warmer with a different inequality, this time we're going to use greater than to compare the cities. So, 10 is greater than 5 (*write 10>5*), which means that City A is warmer than City B.

Let's Try it (Slides 8-9): Great job, everyone! Now, it's time to practice using absolute value and inequalities to compare and interpret rational numbers together. Remember that the absolute value is the distance from zero and will always result in a positive value. Be sure to show your work and think about the meaning of the rational numbers in real-life situations.

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WARM WELCOME

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Today, we will explore how to use absolute value and inequalities to compare and interpret rational numbers.

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What are rational numbers?

What is absolute value?

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We can use symbols to compare quantities.

<	>	=	≤	≥
less than	greater than	equal to	less than or equal to	greater than or equal to

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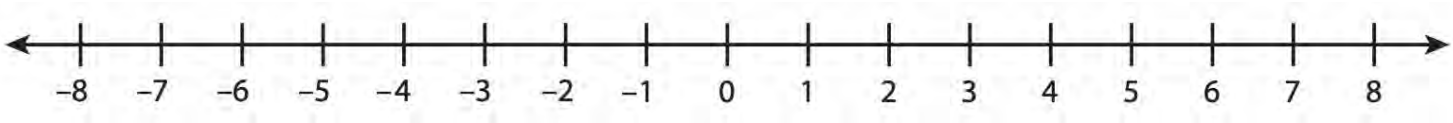
Let's Think:

We can use symbols to compare numbers. Let's write two inequalities.

-9 and -4



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Let's Think:

Let's determine the absolute value and use an inequality to compare.

Imagine you and your friend have piggy banks, and you both saved some money

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Let's Think:

Let's determine the absolute value and use an inequality to compare.

Imagine you have two cities, City A and City B. City A has a temperature of 10 degrees Celsius, and City B has a temperature of -5 degrees Celsius

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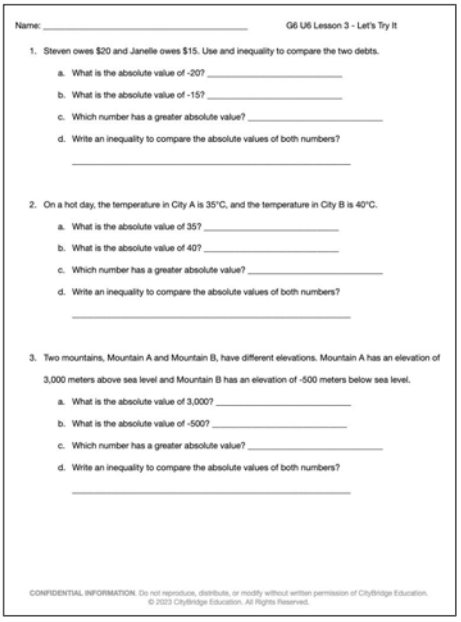
Let's Try It:

Now let's try using absolute value to compare rational numbers together.



Name: _____ G6 U6 Lesson 3 - Let's Try It

1. Steven owes $20 and Janelle owes $15. Use and inequality to compare the two debts.
   a. What is the absolute value of -20? _____
   b. What is the absolute value of -15? _____
   c. Which number has a greater absolute value? _____
   d. Write an inequality to compare the absolute values of both numbers?
   _____

2. On a hot day, the temperature in City A is 35°C, and the temperature in City B is 40°C.
   a. What is the absolute value of 35? _____
   b. What is the absolute value of 40? _____
   c. Which number has a greater absolute value? _____
   d. Write an inequality to compare the absolute values of both numbers?
   _____

3. Two mountains, Mountain A and Mountain B, have different elevations. Mountain A has an elevation of 3,000 meters above sea level and Mountain B has an elevation of -500 meters below sea level.
   a. What is the absolute value of 3,000? _____
   b. What is the absolute value of -500? _____
   c. Which number has a greater absolute value? _____
   d. Write an inequality to compare the absolute values of both numbers?
   _____

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4. On a winter day, the temperature in City A is 8°C, and the temperature in City B is -5°C.
   a. What is the absolute value of 8? _____
   b. What is the absolute value of -5? _____
   c. Which number has a greater absolute value? _____
   d. Write an inequality to compare the absolute values of both numbers?
   _____

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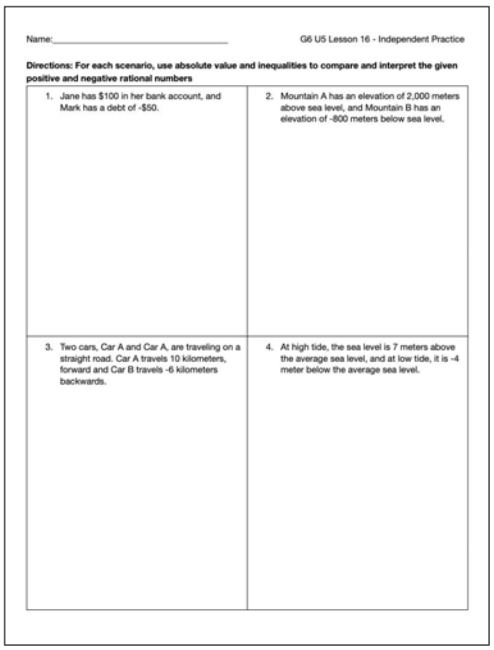
On your Own:

It's your turn to try using absolute value to compare rational numbers on your own.



Name:_____ G6 U5 Lesson 16 - Independent Practice

Directions: For each scenario, use absolute value and inequalities to compare and interpret the given positive and negative rational numbers

1. Jane has $100 in her bank account, and Mark has a debt of -$50.	2. Mountain A has an elevation of 2,000 meters above sea level, and Mountain B has an elevation of -800 meters below sea level.
3. Two cars, Car A and Car A, are traveling on a straight road. Car A travels 10 kilometers, forward and Car B travels -6 kilometers backwards.	4. At high tide, the sea level is 7 meters above the average sea level, and at low tide, it is -4 meter below the average sea level.

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Name: _____ G6 U6 Lesson 3 - Let's Try It

1. Steven owes $20 and Janelle owes $15. Use and inequality to compare the two debts.
    a. What is the absolute value of -20? _____
    b. What is the absolute value of -15? _____
    c. Which number has a greater absolute value? _____
    d. Write an inequality to compare the absolute values of both numbers?

    _____

2. On a hot day, the temperature in City A is 35°C, and the temperature in City B is 40°C.
    a. What is the absolute value of 35? _____
    b. What is the absolute value of 40? _____
    c. Which number has a greater absolute value? _____
    d. Write an inequality to compare the absolute values of both numbers?

    _____

3. Two mountains, Mountain A and Mountain B, have different elevations. Mountain A has an elevation of 3,000 meters above sea level and Mountain B has an elevation of -500 meters below sea level.
    a. What is the absolute value of 3,000? _____
    b. What is the absolute value of -500? _____
    c. Which number has a greater absolute value? _____
    d. Write an inequality to compare the absolute values of both numbers?

    _____

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4. On a winter day, the temperature in City A is 8°C, and the temperature in City B is -5°C.

    a. What is the absolute value of 8? _____

    b. What is the absolute value of -5? _____

    c. Which number has a greater absolute value? _____

    d. Write an inequality to compare the absolute values of both numbers?

    _____

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Name:_____ G6 U6 Lesson 3 - Independent Work

Directions: For each scenario, use absolute value and inequalities to compare and interpret the given positive and negative rational numbers

1. Jane has $100 in her bank account, and Mark has a debt of -$50.	2. Mountain A has an elevation of 2,000 meters above sea level, and Mountain B has an elevation of -800 meters below sea level.
3. Two cars, Car A and Car A, are traveling on a straight road. Car A travels 10 kilometers, forward and Car B travels -6 kilometers backwards.	4. At high tide, the sea level is 7 meters above the average sea level, and at low tide, it is -4 meter below the average sea level.

Name: Answer Key

G6 U6 Lesson 3 - Let's Try It

1. Steven owes $20 and Janelle owes $15. Use and inequality to compare the two debts.

   a. What is the absolute value of -20? 20

   b. What is the absolute value of -15? 15

   c. Which number has a greater absolute value? 20

   d. Write an inequality to compare the absolute values of both numbers?

   $20 > 15$

2. On a hot day, the temperature in City A is 35°C, and the temperature in City B is 40°C.

   a. What is the absolute value of 35? 35

   b. What is the absolute value of 40? 40

   c. Which number has a greater absolute value? 40

   d. Write an inequality to compare the absolute values of both numbers?

   $35 < 40$

3. Two mountains, Mountain A and Mountain B, have different elevations. Mountain A has an elevation of 3,000 meters above sea level and Mountain B has an elevation of -500 meters below sea level.

   a. What is the absolute value of 3,000? 3,000

   b. What is the absolute value of -500? 500

   c. Which number has a greater absolute value? 3,000

   d. Write an inequality to compare the absolute values of both numbers?

   $3{,}000 > 500$

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4. On a winter day, the temperature in City A is 8°C, and the temperature in City B is -5°C.

   a. What is the absolute value of 8? 8

   b. What is the absolute value of -5? 5

   c. Which number has a greater absolute value? 8

   d. Write an inequality to compare the absolute values of both numbers?

   8 > 5

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Name: Answer Key

G6 U6 Lesson 3 - Independent Practice

Directions: For each scenario, use absolute value and inequalities to compare and interpret the given positive and negative rational numbers

1. Jane has $100 in her bank account, and Mark has a debt of -$50.

$|100| = 100$

$|-50| = 50$

$100 > 5$

2. Mountain A has an elevation of 2,000 meters above sea level, and Mountain B has an elevation of -800 meters below sea level.

$|2,000| = 2,000$

$|-800| = 800$

$2,000 > 800$

3. Two cars, Car A and Car A, are traveling on a straight road. Car A travels 10 kilometers, forward and Car B travels -6 kilometers backwards.

$|10| = 10$

$|-6| = 6$

$10 > 6$

4. At high tide, the sea level is 7 meters above the average sea level, and at low tide, it is -4 meter below the average sea level.

$|7| = 7$

$|-4| = 4$

G6 U6 Lesson 4

Find and plot pairs of rational numbers on a 4-quadrant coordinate plane

G6 U6 Lesson 1 – Explore the coordinate plane

Materials/Prep:

- Copies of coordinate planes for every student

Warm Welcome (Slide 1): Tutor choice.

Frame the Learning/Connect to Prior Learning (Slide 2): Today we are going to explore the coordinate plane. We're going to take what we learned about positive and negative numbers and think about how they apply to graphing numbers on a coordinate plane.

Let's Talk (Slide 3): So, let's start with talking about what we already know. Some of you probably explored this last year, and maybe you already began to explore it this year. Let's discuss what we know about graphing points on a coordinate plane. If students are struggling, show them the coordinate plane on Slide 4. Possible Student Answers, Key Points:

- When we graph points on the coordinate, there is an x and y coordinate.
- We usually graph the x coordinate first, then the y coordinate.
- When we write the coordinate of a point, we always right the x coordinate first then the y coordinate like (1, 2).
- The x axis goes across, the y axis goes up and down.
- If I'm graphing the x coordinate, I go across. If I'm graphing the y coordinate, I go up (or down).

Let's Talk (Slide 4): Wow, you all know a lot about graphs and graphing points. I know most of you have experience graphing positive integers. So, let's look at this graph, what do you notice and wonder about this graph? Have you ever seen a graph like this before (some students likely have)? Possible Student Answers, Key Points:

- How do you plot points on this graph?
- What do the negative numbers mean?
- Do I graph points the same way on this graph? First x and then y?
- This graph has positive numbers and negative numbers.
- Different portions (quadrants) of the graph will always have positive or negative x or y coordinates.

Those are all great questions and ideas! This is called a coordinate plane and you're exactly right that this coordinate plane has positive and negative numbers. Where the x and y axes intersect is called the origin. The origin is (0,0). We know that the x axis goes across or horizontally (*model with your hands something going across*). So, anything on the x axis that is to the right of the origin will be a positive integer and anything to the left of the origin will be a negative number, just like the number lines we were looking at yesterday. The same is true for the y-axis. The y-axis goes up and down, it's vertical. So, anything above the origin is positive (*point to positive*) and anything below the origin is negative (*point to negative*).

Let's Talk (Slide 5): Each of these sections is called a quadrant.

- Here is quadrant 1 (*point*). Quadrant 1 will always be the top right corner. What can you say about the points in quadrant 1? What will always be true about the x and y axis of ANY point in quadrant 1? The x and y are both positive!
- Here is quadrant 2 (*point*). Quadrant 2 will always be to the top left corner. What can you say about the points in quadrant 2? What will always be true about the x and y axis of ANY point in quadrant 2? The y will be positive but the x will be negative.
- Here is quadrant 3 (*point*). Quadrant 3 will always be the bottom left corner. What can you say about the points in quadrant 3? What will always be true about the x and y axis of ANY point in quadrant 3? They'll both be negative!

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- Here is quadrant 4 (*point*). And finally, quadrant 4 will always be the bottom right corner. They're always counted counter clockwise. What can you say about the points in quadrant 4? What will always be true about the x and y axis of ANY point in quadrant 4? The x will be positive but the y will be negative!

Let's Think (Slide 5-9): So, let's spend some more time exploring the coordinate plane together (*pass out coordinate planes printable for every student*). Let's start at the origin, we know that the origin is where the x and y-axis intersect, it's (0,0). One really, really, really important thing to remember is that when we're plotting points, we always plot the x-axis first (across) and then the y-axis (up and down). So we always go over and then up/down. Say that with me ACROSS FIRST, then UP OR DOWN!

Let's follow the directions, with our fingers let's move to units to the left, where are we? That's right, we're at -2 because anything to the left of 0 is negative! Now it says move 3 units up. Where are we (A, B, C, D)? And what's the ordered pair for Point A? Remember, just like we go across first, we always write the x first and then the y. So we're at (-2, 3).

Repeat steps for Slides 6-9.

Let's Think (Slide 10): Whoa, you all just plotted points in all four quadrants of our coordinate plane. Let's look at Points A, B, C, and D and talk about how they're the same and how they're different. Possible Student Answers, Key Points:

- The points all have 3 and 2 in them but they switch from positive to negative and from the x-axis to the y-axis.
- One point has a positive x and a positive y, another point has a positive x and a negative y, etc.
- A and B share the same y but have different points on the x-axis.
- A and C share the same x but have different points on the y-axis.
- Follow-Up: Imagine that your friend told you that the coordinates for Point A were (3, -2), what would you say to them?

Let's Try it (Slides 11-12): Now let's work on plotting points on the coordinate plane together. We're going to work on this page together, step-by-step. Remember, we plot the x point first (horizontally) and then the y point!

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WARM WELCOME

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Today we will explore the coordinate plane.

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Let's Talk:

What do you know about graphing points on a coordinate plane?

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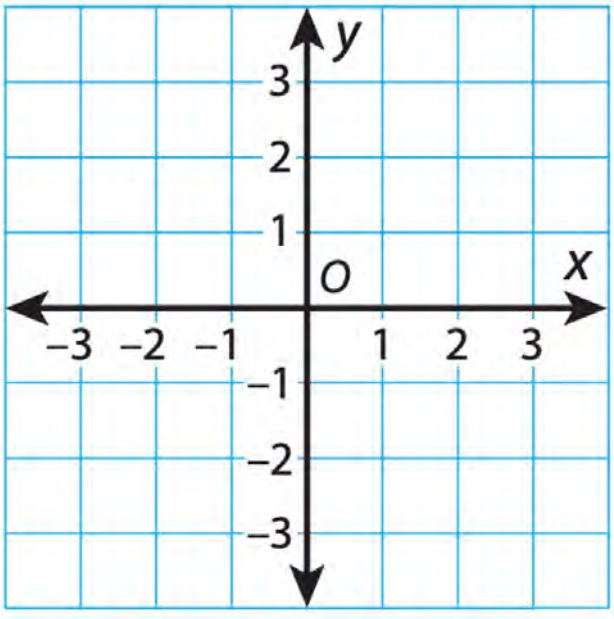
Let's Talk:

What do you notice and wonder about the graph to the right?



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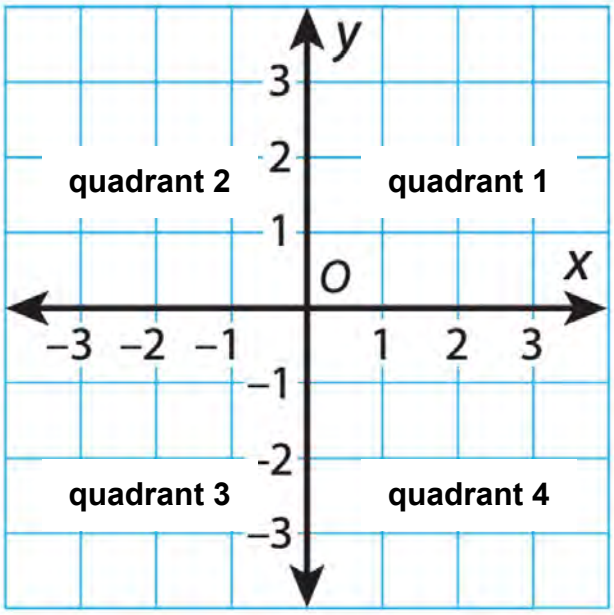
Let's Talk:

What do you notice and wonder about the graph to the right?



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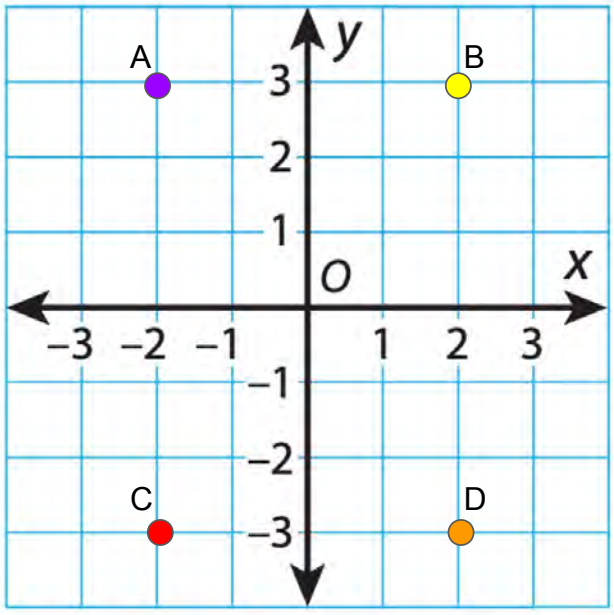
Let's Think:

Put your finger on the origin.

Move 2 units to the left and 3 units up.

Where are you? _____

What's the ordered pair? (____, ____)



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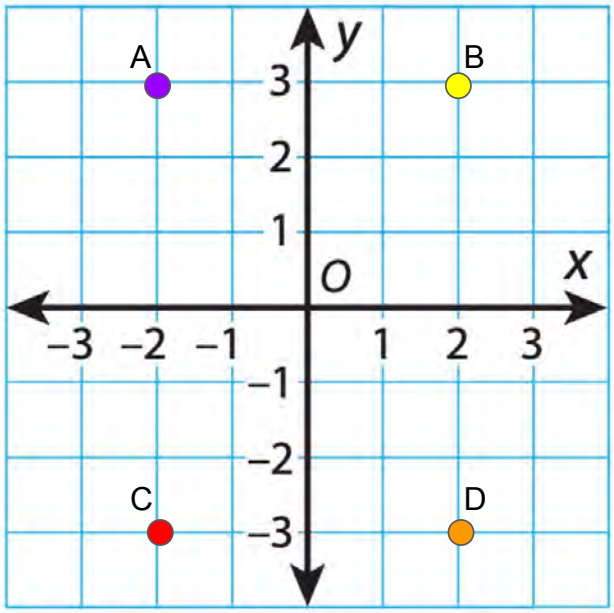
Let's Think:

Put your finger on the origin.

Move 2 units to the left and 3 units down.

Where are you? _____

What's the ordered pair? (____, ____)



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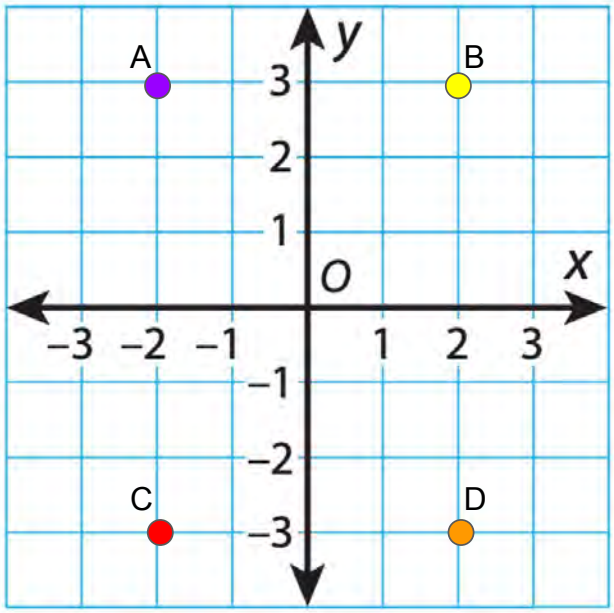
Let's Think:

Put your finger on the origin.

Move 2 units to the right and 3 units down.

Where are you? _____

What's the ordered pair? (____, ____)



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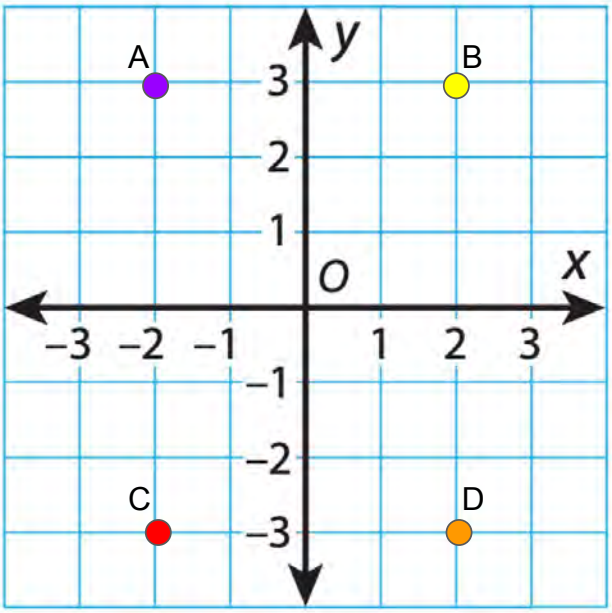
Let's Think:

Put your finger on the origin.

Move 2 units to the right and 3 units up.

Where are you? _____

What's the ordered pair? (____, ____)



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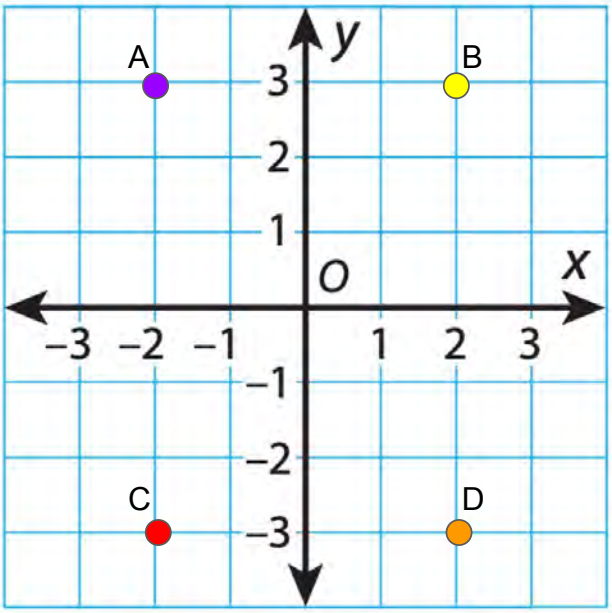
Let's Think:

Let's Talk:
How are Points A, B, C, and D similar and different?



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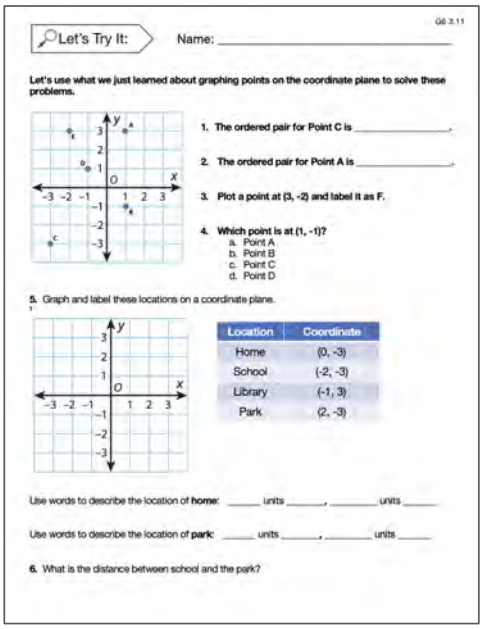
Let's Try It:

Let's explore coordinate planes together.



G6 3.11

Let's Try It: Name: _____

Let's use what we just learned about graphing points on the coordinate plane to solve these problems.

1. **The ordered pair for Point C is** _____.
2. **The ordered pair for Point A is** _____.
3. **Plot a point at (3, -2) and label it as F.**
4. **Which point is at (1, -1)?**
   a. Point A
   b. Point B
   c. Point C
   d. Point D

5. Graph and label these locations on a coordinate plane.

Location	Coordinate
Home	(0, -3)
School	(-2, -3)
Library	(-1, 3)
Park	(2, -3)

Use words to describe the location of **home**: _____ units _____, _____ units _____.

Use words to describe the location of **park**: _____ units _____, _____ units _____.

6. What is the distance between school and the park?

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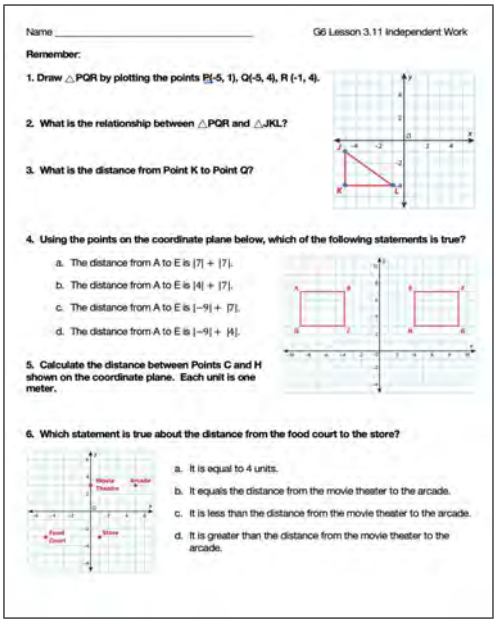
On your Own:

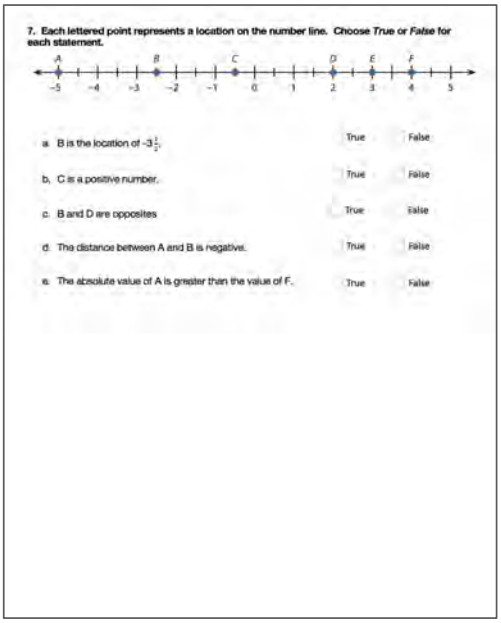
Now it's time to try on your own.



Name _____ G6 Lesson 3.11 Independent Work

Remember:

1. **Draw △PQR by plotting the points P(-5, 1), Q(-5, 4), R (-1, 4).**
2. **What is the relationship between △PQR and △JKL?**
3. **What is the distance from Point K to Point Q?**
4. **Using the points on the coordinate plane below, which of the following statements is true?**
   a. The distance from A to E is |7| + |7|.
   b. The distance from A to E is |4| + |7|.
   c. The distance from A to E is |−9| + |7|.
   d. The distance from A to E is |−9| + |4|.
5. **Calculate the distance between Points C and H shown on the coordinate plane. Each unit is one meter.**
6. **Which statement is true about the distance from the food court to the store?**
   a. It is equal to 4 units.
   b. It equals the distance from the movie theater to the arcade.
   c. It is less than the distance from the movie theater to the arcade.
   d. It is greater than the distance from the movie theater to the arcade.



7. **Each lettered point represents a location on the number line. Choose *True* or *False* for each statement.**

a. B is the location of $-3\frac{1}{2}$. True False

b. C is a positive number. True False

c. B and D are opposites True False

d. The distance between A and B is negative. True False

e. The absolute value of A is greater than the value of F. True False

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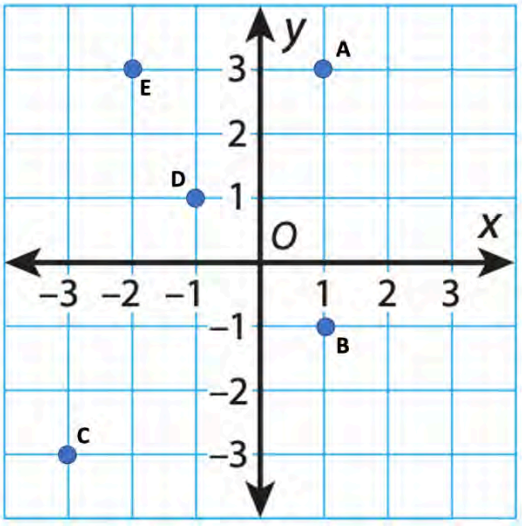
Name: _____ G6 U6 Lesson 4 - Let's Try It

Let's use what we just learned about graphing points on the coordinate plane to solve these problems.



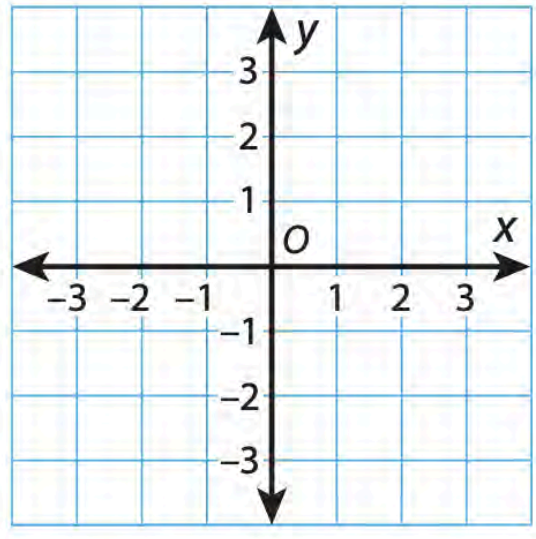
1. **The ordered pair for Point C is _____.**

2. **The ordered pair for Point A is _____.**

3. **Plot a point at (3, -2) and label it as F.**

4. **Which point is at (1, -1)?**
   a. Point A
   b. Point B
   c. Point C
   d. Point D

5. Graph and label these locations on a coordinate plane.



Location	Coordinate
Home	(0, -3)
School	(-2, -3)
Library	(-1, 3)
Park	(2, -3)

Use words to describe the location of **home**: _____ units _____, _____ units _____

Use words to describe the location of **park**: _____ units _____, _____ units _____

6. What is the distance between school and the park?

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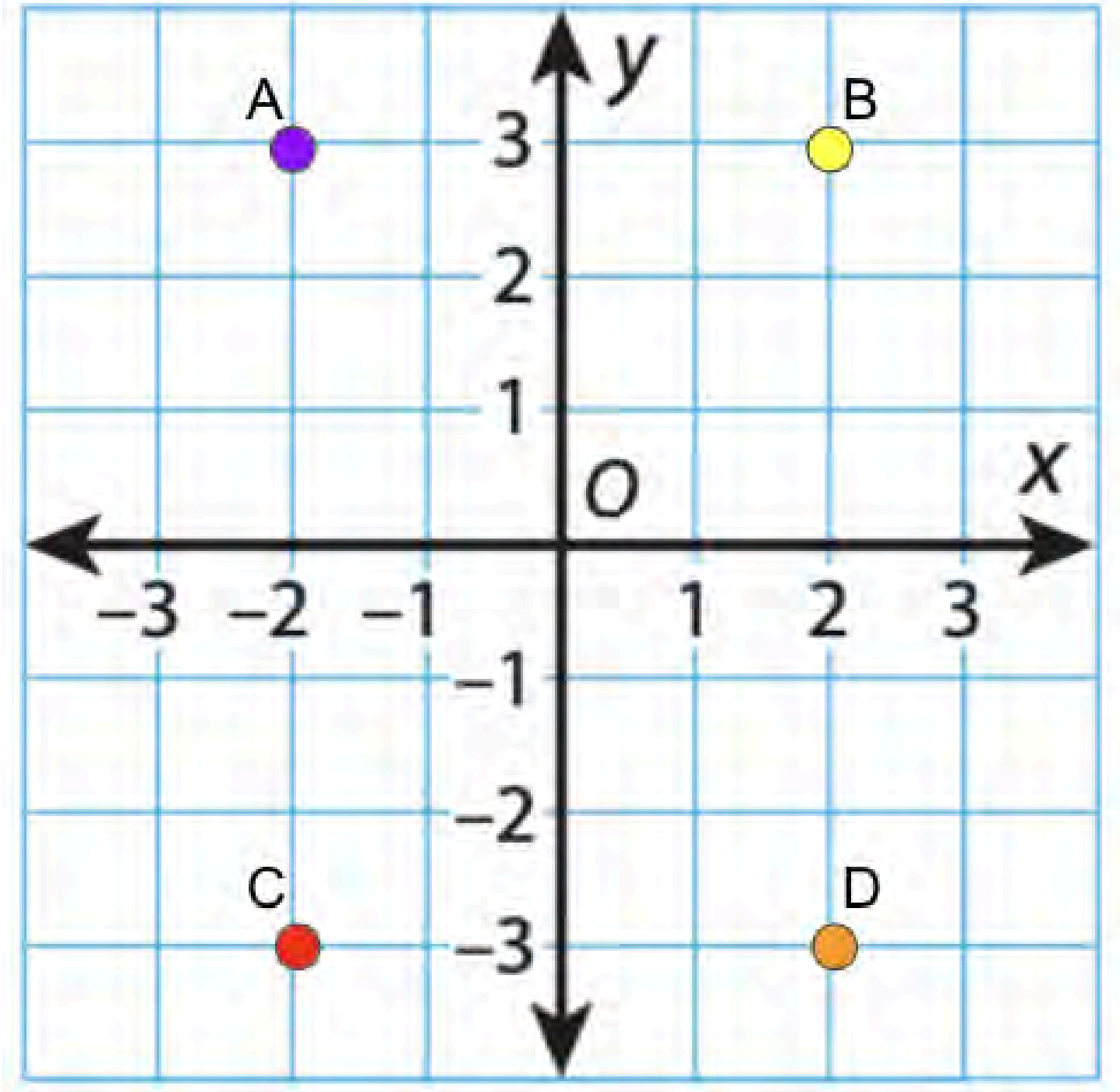

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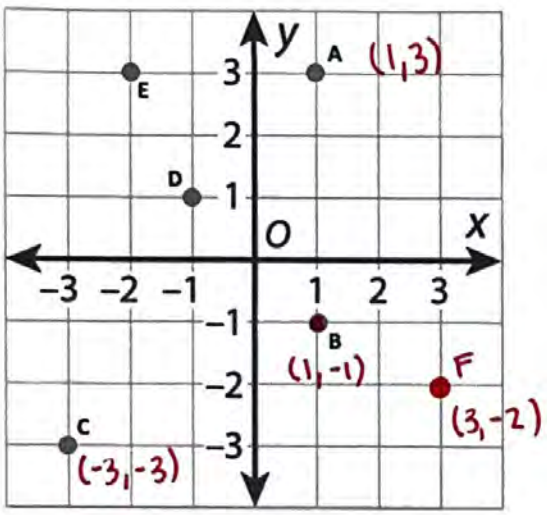
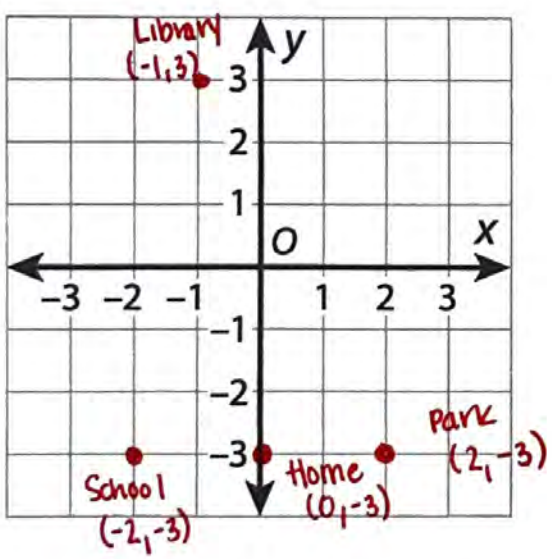
Name: ANSWER KEY

Let's use what we just learned about graphing points on the coordinate plane to solve these problems.



1. **The ordered pair for Point C is** (-3, -3).
2. **The ordered pair for Point A is** (1, 3).
3. **Plot a point at (3, -2) and label it as F.** ✓
4. **Which point is at (1, -1)?**
   a. Point A
   (b.) Point B
   c. Point C
   d. Point D

5. Graph and label these locations on a coordinate plane.



Location	Coordinate
Home	(0, -3) ✓
School	(-2, -3) ✓
Library	(-1, 3) ✓
Park	(2, -3) ✓

Use words to describe the location of **home:** 0 units left or right, 3 units down

Use words to describe the location of **park:** 2 units right, 3 units down

6. What is the distance between school and the park? 4 units

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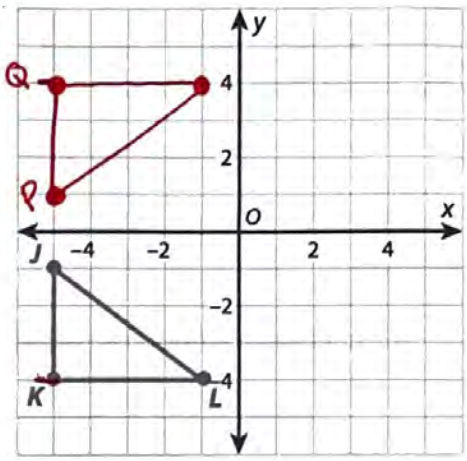
Name: ANSWER KEY

G6 U6 Lesson 4 - Independent Work

1. Draw △PQR by plotting the points P(-5, 1), Q(-5, 4), R (-1, 4).



2. What is the relationship between △PQR and △JKL?

It's the same but flipped over!

3. What is the distance from Point K to Point Q?

8

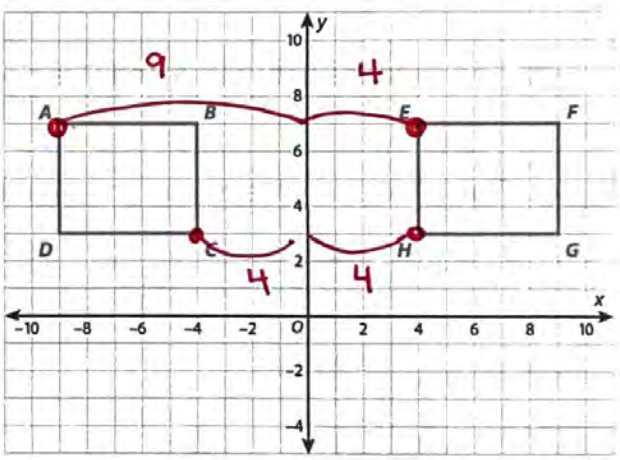
4. Using the points on the coordinate plane below, which of the following statements is true?

a. The distance from A to E is |7| + |7|. = 14

b. The distance from A to E is |4| + |7|. = 11

c. The distance from A to E is |− 9| + |7|. = 16 (9+7)

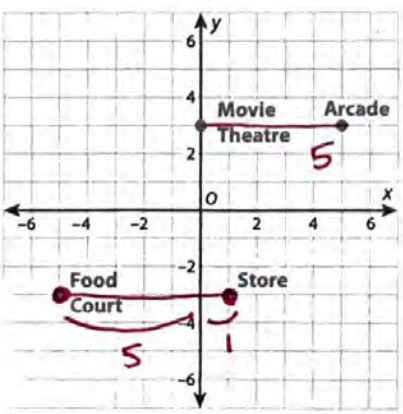
(d.) The distance from A to E is |− 9| + |4|. = 13 (9+4)



5. Calculate the distance between Points C and H shown on the coordinate plane. Each unit is one meter.

4 m + 4m = 8 m

6. Which statement is true about the distance from the food court to the store?



~~a.~~ It is equal to 4 units.

~~b.~~ It equals the distance from the movie theater to the arcade.

~~c.~~ It is less than the distance from the movie theater to the arcade.

✓ d. It is greater than the distance from the movie theater to the arcade. 6 > 5

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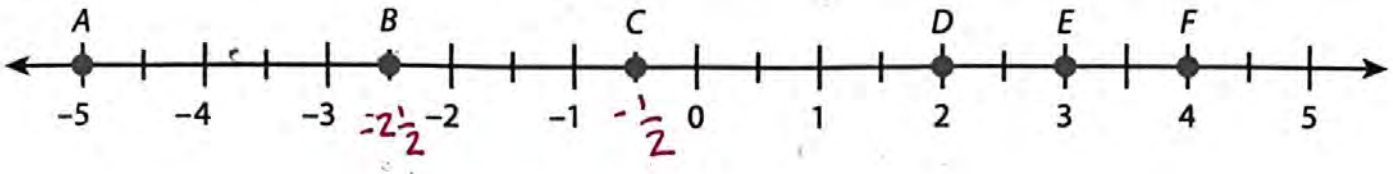
7. Each lettered point represents a location on the number line. Choose *True* or *False* for each statement.



a. B is the location of -3 $\frac{1}{2}$. ☐ True ☒ False

b. C is a positive number. ☐ True ☒ False

c. B and D are opposites ☐ True ☒ False

d. The distance between A and B is negative. ☐ True ☒ False

e. The absolute value of A is greater than the value of F. ☑ True ☐ False

$|-5| > 4$

$\downarrow$

$5 > 4$

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G6 U6 Lesson 5

Use coordinates to find distances and reflections on the coordinate plane

G6 U6 Lesson 5 - We will use coordinates to find distances and reflections on the coordinate plane

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): Today we will use coordinates to find distances and reflections on the coordinate plane. We will take the information we already know about coordinate planes and coordinate pairs to help us access today's lesson.

Let's Talk (Slide 3): Before we start today's lesson, **let's review what we know about the coordinate plane.** Possible Answer Answers, Key Points:

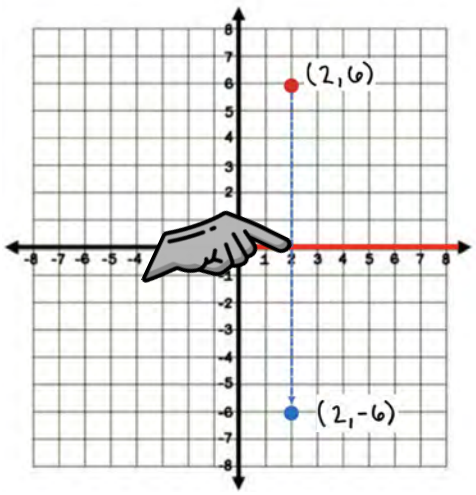
- The coordinate plane is a grid with horizontal and vertical lines intersecting at the origin (0,0)
- We use ordered pairs (x, y) to represent points on the coordinate plane.

That is correct! The coordinate plane is a grid with horizontal and vertical lines intersecting at the origin (0,0) We use ordered pairs (x, y) to represent points on the coordinate plane. You all have a good understanding of the coordinate plane. **What do you think of when you hear the word reflection?** Possible Answer Answers, Key Points:

- A reflection is like looking in a mirror.
- When you see a reflection it is flipped or inverted like when you take a selfie

That is correct! A reflection is like looking in a mirror. Let me show you what a reflection is on the coordinate plane.

Let's Think (Slide 4): On the coordinate plane we can reflect points over the x-axis (*trace with finger*) or over the y-axis (*trace with finger*). When we're reflecting a point over the access, it means we're basically taking it and flipping it over the given axis. There's a pattern that we might notice for reflecting over the two axes, let's see if we can figure it out.



Let's start by plotting Point P(2,6). We start on the x-axis, go to over 2 to the right and then up 6 (*plot point*). Let's label it with its coordinates..(2, 6).

Now it says to reflect Point P over the x-axis. That means that I want to reflect this point over this line (*trace x-axis with highlighter*). Point P is 6 spaces away from the x-axis (*count*) so when we reflect it over the x-axis it has to be 6 spaces away from the x-axis in the opposite quadrant (*count down 6 spaces*). The x coordinate isn't changing, it's like I'm walking in a straight line, crossing this big street which is the x-axis then traveling the same distance).

So, Point P reflected over the x-axis is (2, -6). How did our coordinates change when we reflected Point P over the x-axis? Possible Student Answers, Key Points:

- The x coordinate stayed the same but the y-coordinate changed to negative, or the opposite.
- They're in a straight line up and down
- It crossed over the x-axis right at 2.

And, to find the distance between the two points, just like we were working on yesterday, we can count the spaces (*point and count*). The distance is 12 units. But, we can also write an equation, we could say the distance from -6 to zero PLUS the distance from 0 to 6. This is where the idea of absolute value comes in! We can write $|-6| + 6 = 12$ to show how to find the distance.

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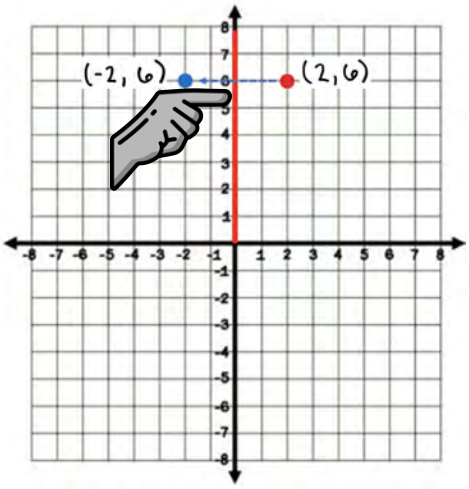
Guess what? We can also reflect points over the y-axis. Let's explore what happens when we reflect points over the y-axis (*trace with finger*).



Just like when we reflect over the x-axis, we can imagine that we're walking in a straight line and cross a big street, the y-axis. We need to travel the same distance on each side of the street.

So, in order to get from Point P to the y-axis, there were 2 spaces. That means that we need to travel 2 spaces on the other side of the y-axis as well.

There, we walked in a straight line from Point P and crossed the y-axis. We made sure that the distance between the y-axis and the reflected point were the same as the original point.

Now, let's label our new point, we're at -2 on the x-axis and we're still at 6 on the y-axis!

What do you notice happened to our coordinate points when we reflected Point P over the y-axis? Possible Student Answers, Key Points:

- It has the same numbers 2 and 6 but the x coordinate changed from positive to negative
- It's at the same point on the y-axis but the x-axis coordinates changed.

That's right, those are really good reflections! Everybody, plot a different point on your coordinate plane.

- Now, reflect it over the x-axis. What happened?
- Now, reflect it over the y-axis. What happened?
-

Those are interesting! You notice that when you reflect over the x-axis, the x-coordinate stays the same but the y-coordinate changes to the opposite (either positive or negative). And the opposite is true when you reflect over the y-axis. You notice that the y-coordinate stays the same but the x-coordinate changes to the opposite. Don't forget…

- **Reflecting over the x-axis:** If you have a point (x, y), its reflection over the x-axis will be (x, -y). The x-coordinate remains the same, but the y-coordinate changes to its opposite.
- **Reflecting over the y-axis:** If you have a point (x, y), its reflection over the y-axis will be (-x, y). The y-coordinate remains the same, but the x-coordinate changes to its opposite.

Let's Try it (Slides 6-7): In today's lesson, we explored how we can reflect points over either the x- or y-axis. Remember, if you have a point (x, y), its reflection over the x-axis will be (x, -y). The x-coordinate remains the same, but the y-coordinate changes to its opposite. And, if you have a point (x, y), its reflection over the y-axis will be (-x, y). The y-coordinate remains the same, but the x-coordinate changes to its opposite.

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WARM WELCOME

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We will use coordinates to find distances and reflections on the coordinate plane.

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Let's review what we know about the coordinate plane

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What do you think of when you hear the word reflection?

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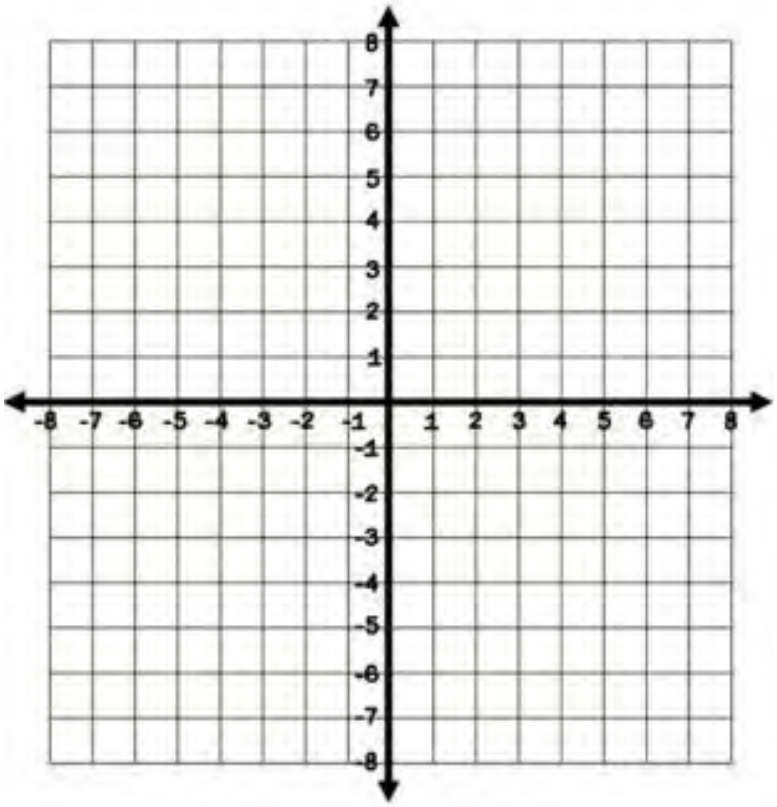
Let's Think:

Plot Point P(2,6)

Reflect P over the x-axis.

Reflect P over the y-axis.



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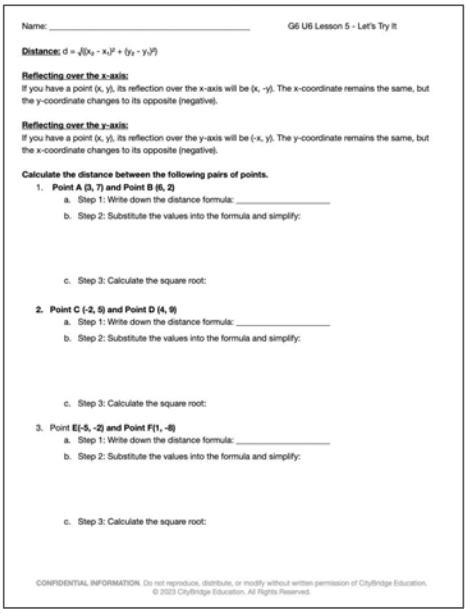
Let's Try It:

Let's practice together.



Name: _____ G6 U6 Lesson 5 - Let's Try It

Distance: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Reflecting over the x-axis:
If you have a point (x, y), its reflection over the x-axis will be (x, -y). The x-coordinate remains the same, but the y-coordinate changes to its opposite (negative).

Reflecting over the y-axis:
If you have a point (x, y), its reflection over the y-axis will be (-x, y). The y-coordinate remains the same, but the x-coordinate changes to its opposite (negative).

Calculate the distance between the following pairs of points.

1. **Point A (3, 7) and Point B (6, 2)**
   a. Step 1: Write down the distance formula: _____
   b. Step 2: Substitute the values into the formula and simplify:
   c. Step 3: Calculate the square root:
2. **Point C (-2, 5) and Point D (4, 9)**
   a. Step 1: Write down the distance formula: _____
   b. Step 2: Substitute the values into the formula and simplify:
   c. Step 3: Calculate the square root:
3. Point **E(-5, -2) and Point F(1, -8)**
   a. Step 1: Write down the distance formula: _____
   b. Step 2: Substitute the values into the formula and simplify:
   c. Step 3: Calculate the square root:

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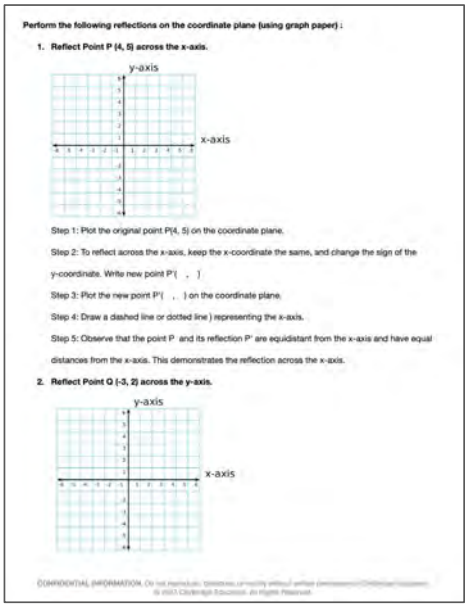

Perform the following reflections on the coordinate plane (using graph paper) :

1. **Reflect Point P (4, 5) across the x-axis.**

y-axis

x-axis

Step 1: Plot the original point P(4, 5) on the coordinate plane.

Step 2: To reflect across the x-axis, keep the x-coordinate the same, and change the sign of the y-coordinate. Write new point P'(,)

Step 3: Plot the new point P'(,) on the coordinate plane.

Step 4: Draw a dashed line or dotted line) representing the x-axis.

Step 5: Observe that the point P and its reflection P' are equidistant from the x-axis and have equal distances from the x-axis. This demonstrates the reflection across the x-axis.

2. **Reflect Point Q (-3, 2) across the y-axis.**

y-axis

x-axis

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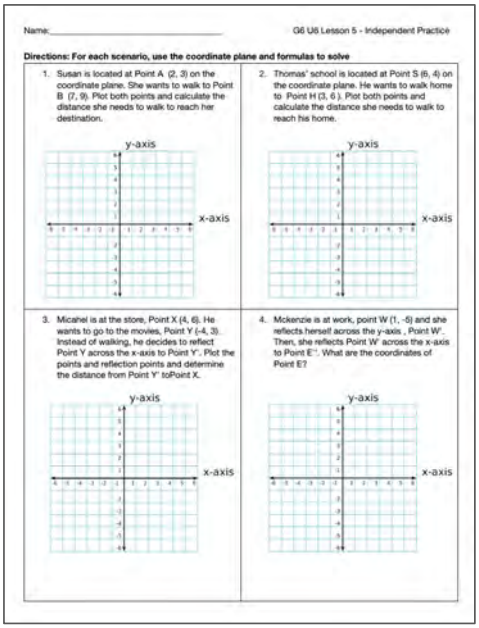
On your Own: Let's try on our own.



Name:_____ G6 U6 Lesson 5 - Independent Practice

Directions: For each scenario, use the coordinate plane and formulas to solve

1. Susan is located at Point A (2, 3) on the coordinate plane. She wants to walk to Point B (7, 9). Plot both points and calculate the distance she needs to walk to reach her destination.

y-axis x-axis

2. Thomas' school is located at Point S (6, 4) on the coordinate plane. He wants to walk home to Point H (3, 6). Plot both points and calculate the distance she needs to walk to reach his home.

y-axis x-axis

3. Micahel is at the store, Point X (4, 6). He wants to go to the movies, Point Y (-4, 3). Instead of walking, he decides to reflect Point Y across the x-axis to Point Y'. Plot the points and reflection points and determine the distance from Point Y' toPoint X.

y-axis x-axis

4. Mckenzie is at work, point W (1, -5) and she reflects herself across the y-axis , Point W'. Then, she reflects Point W' across the x-axis to Point E''. What are the coordinates of Point E?

y-axis x-axis

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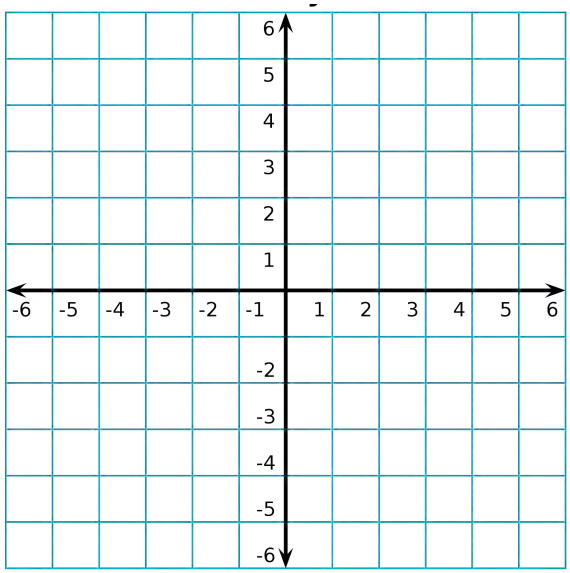
Name: _____ G6 U6 Lesson 5 - Let's Try It

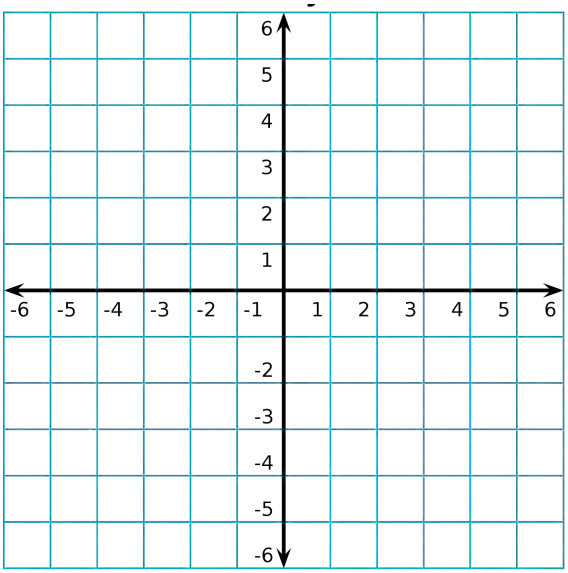
Directions: Perform the following reflections on the coordinate plane (using graph paper):

1. Reflect Point P (4, 5) across the x-axis. Label it as Point Q.



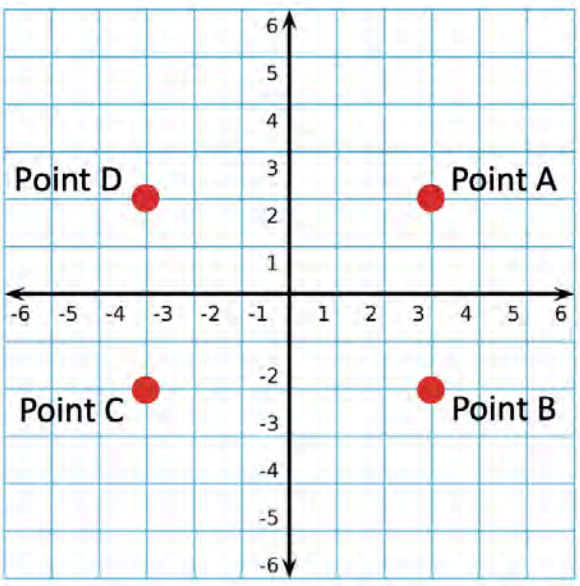
2. What is the distance between Point P and Point Q?

3. Reflect Point R (-3, 2) across the y-axis. Label it as Point S.



4. What is the distance between Point R and Point S?

5. Which point shows (3, 2) reflected over the y-axis?



a. Point A

b. Point B

c. Point C

d. Point D

e. None of the above

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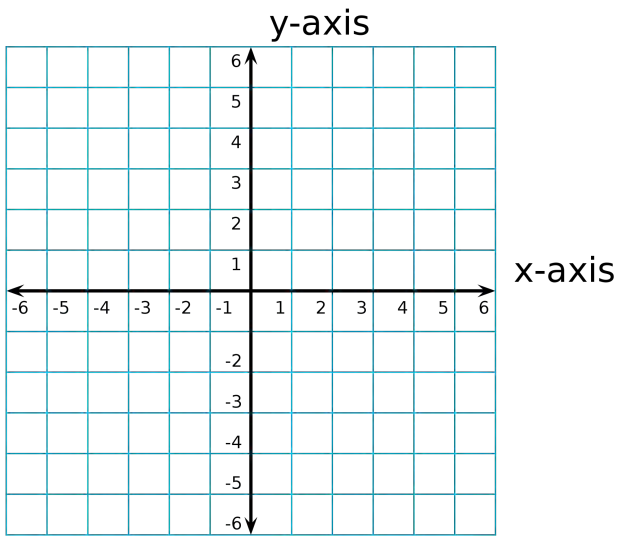
Name:_____ G6 U6 Lesson 5 - Independent Work

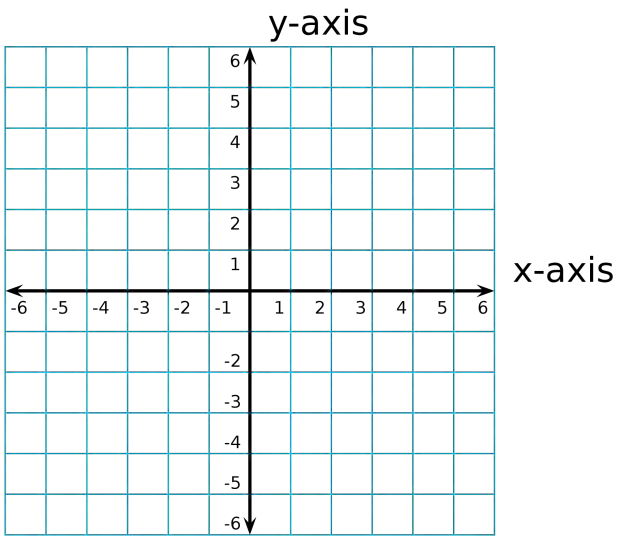
Directions: For each scenario, use the coordinate plane to solve.

1. Reflect Point A (2, 3) over the x-axis. What is the new point? Label it as Point B.



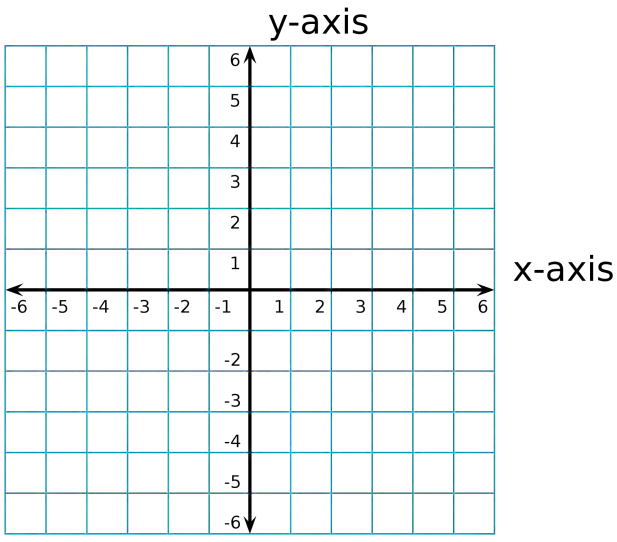
2. What is the distance between Point A and Point B?

3. Reflect Point C (-3, 3) over the y-axis. What is the new point? Label it as Point D.



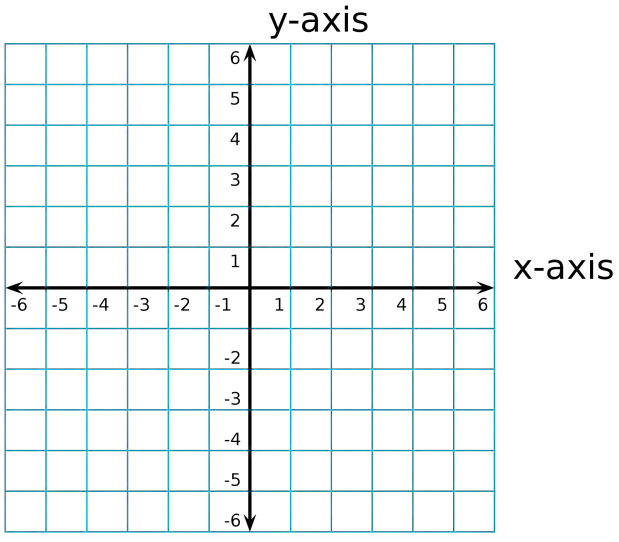
4. What is the distance between Point C and Point D?

5. Reflect Point E (3, -5) over the y-axis. What is the new point? Label it as Point F.



6. What is the distance between Point E and Point F?

7. Reflect Point G (-2, -4) over the x-axis. What is the new point? Label it as Point H.



8. What is the distance between Point G and Point H?

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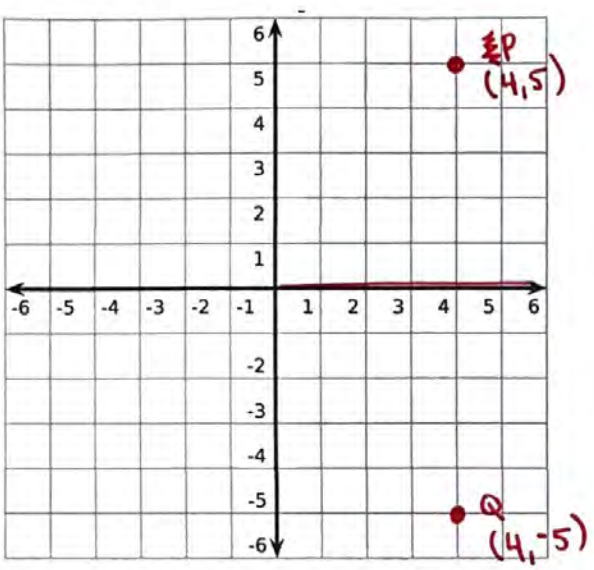
Name: ANSWER KEY

G6 U6 Lesson 5 - Let's Try It

Directions: Perform the following reflections on the coordinate plane (using graph paper):

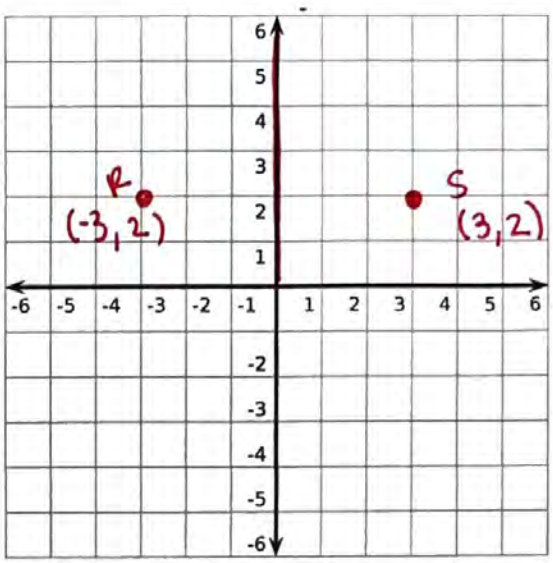
1. **Reflect Point P (4, 5) across the x-axis. Label it as Point Q.**



2. **What is the distance between Point P and Point Q?**

10 units

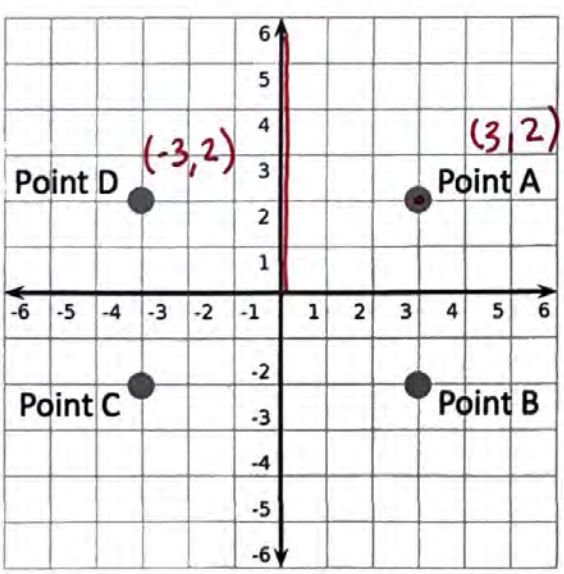
3. **Reflect Point R (-3, 2) across the y-axis. Label it as Point S.**



4. **What is the distance between Point R and Point S?**

6 units

5. **Which point shows (3, 2) reflected over the y-axis?**



a. **Point A**

b. **Point B**

c. **Point C**

d. **Point D**

e. **None of the above**

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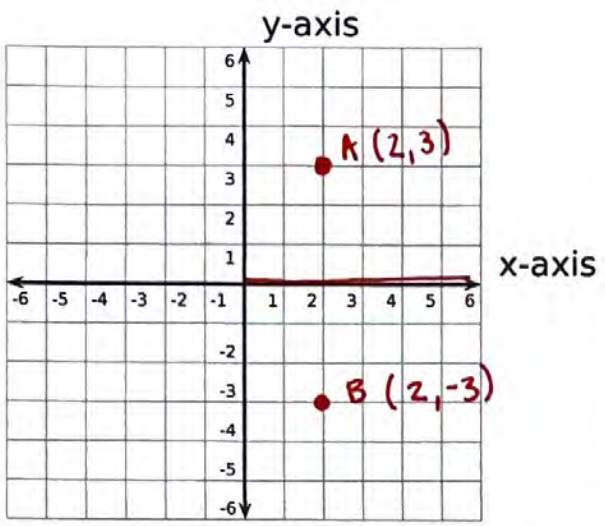
Name: ANSWER KEY

G6 U6 Lesson 5 - Independent Work

Directions: For each scenario, use the coordinate plane to solve.

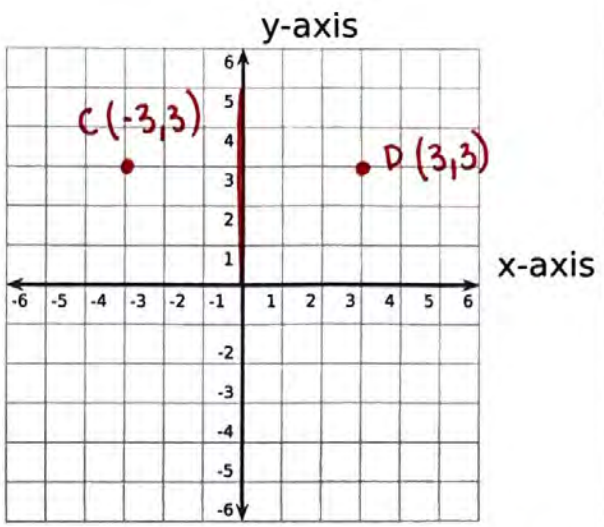
1. Reflect Point A (2, 3) over the x-axis. What is the new point? Label it as Point B.



2. What is the distance between Point A and Point B?

6 units

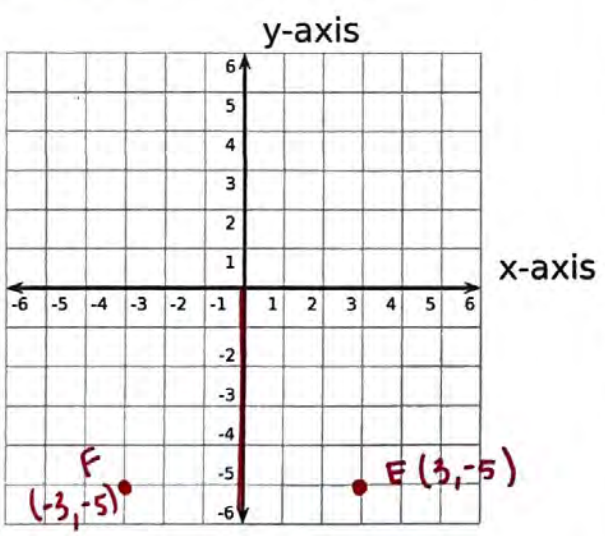
3. Reflect Point C (-3, 3) over the y-axis. What is the new point? Label it as Point D.



4. What is the distance between Point C and Point D?

6 units

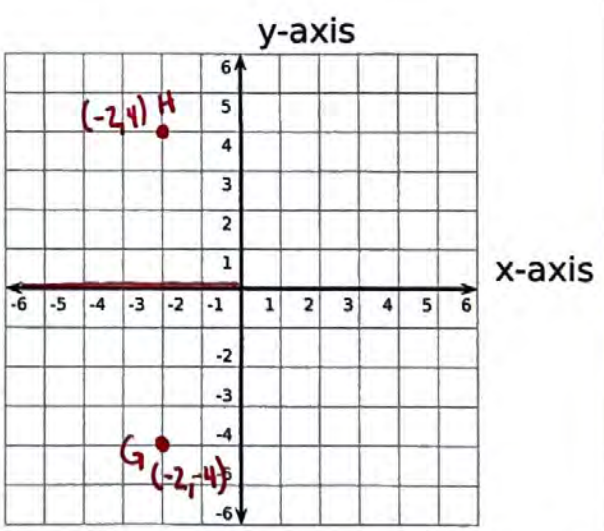
5. Reflect Point E (3, -5) over the y-axis. What is the new point? Label it as Point F.



6. What is the distance between Point E and Point F?

6 units

7. Reflect Point G (-2, -4) over the x-axis. What is the new point? Label it as Point H.



8. What is the distance between Point G and Point H?

8 units

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G6 U6 Lesson 6

Plot points on the coordinate plane to make polygons, and solve problems about vertical and horizontal distance between points

G6 U6 Lesson 6 - Plot points on the coordinate plane to make polygons, and solve problems about vertical and horizontal distance between points.

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): Today, we will continue our exploration of the coordinate plane. By the end of this lesson, you will be able to plot points to create polygons.

Let's Talk (Slide 3): Before we begin, let's quickly review what we've learned so far about the coordinate plane. **Who can tell me what the x-coordinate and y-coordinate represent?** Possible Answer Answers, Key Points:

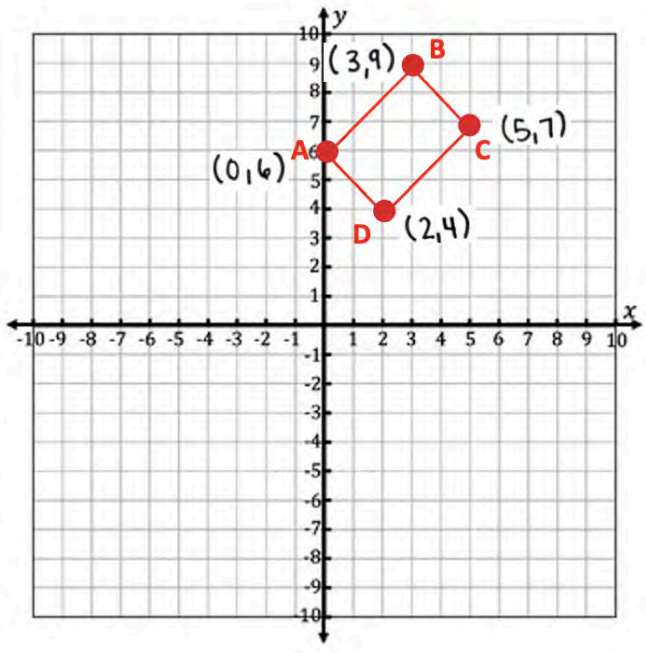
- The coordinate plane is a grid with horizontal and vertical lines intersecting at the origin (0,0)
- We use ordered pairs (x, y) to represent points on the coordinate plane.

That is correct. The coordinate plane is a grid with horizontal and vertical lines intersecting at the origin (0,0) We use ordered pairs (x, y) to represent points on the coordinate plane. **Now what do you know about polygons?** Possible Answer Answers, Key Points:

- A polygon is a two-dimensional shape made up of straight lines and closed sides.
- A shape formed by connecting multiple points called vertices with line segments called sides.
- The sides do not intersect, and the shape is fully enclosed, meaning it forms a closed figure.
- Polygons come in various shapes and sizes, and they can have different numbers of sides.
- Some examples of polygons are triangles, rectangles, and squares.

That is correct. A polygon is a two-dimensional shape made up of straight lines and closed sides. Some examples are triangles, rectangles, and squares.

Let's Think (Slide 4): Today, we will take our understanding of the coordinate plane further by plotting points to form polygons. Let's start by thinking about how to create or make polygons. In order to create a polygon on the coordinate plane, we need to plot a series of points and connect them with straight lines. The order in which we plot the points matters, as it determines the shape of the polygon.



Let's explore that. This says to plot the following points: A (0, 6), B (3, 9), C (5, 7), and D (2, 4).

Let's start with A, x is o and 7 is 6 (*plot and label point*).

Now, B…x is 3 and y is 9 (*plot and label point*).

And, C…x is 5 and y is 7 (*plot and label point*).

And finally D…X is 2 and y is 4 (*plot and label point*).

Okay, now that we've plotted our points, let's use straight lines to connect the points in order…A to B, B to C, C to D and D back to A.

Look at that…we made a polygon! **What kind of polygon is this? How do you know?** It's a rectangle because it has 4 right angles and 2 sets of parallel sides!

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Let's Try it (Slides 6-7): Today, we learned how to plot points on the coordinate plane to create polygons on the coordinate plane. Remember when plotting points, go over and then up. Also, use a rule or straight edge to connect dots if you need to!

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WARM WELCOME

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We will plot points on the coordinate plane to make polygons, and solve problems about vertical and horizontal distance between points.

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Let's Review:

What do you already know about the coordinate plane and coordinate pairs?

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Let's Talk:

What do you know about polygons?

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Let's Think:

Let's plot points to create polygons.

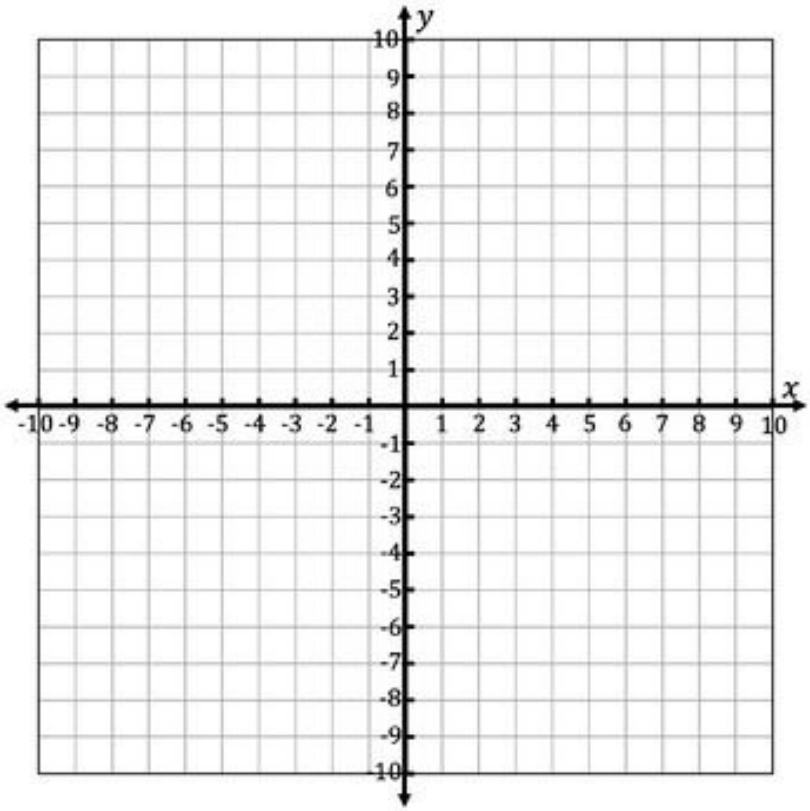
A **(0, 6)**

B **(3, 9)**

C **(5, 7)**

D **(2, 4)**

What shape did we make?



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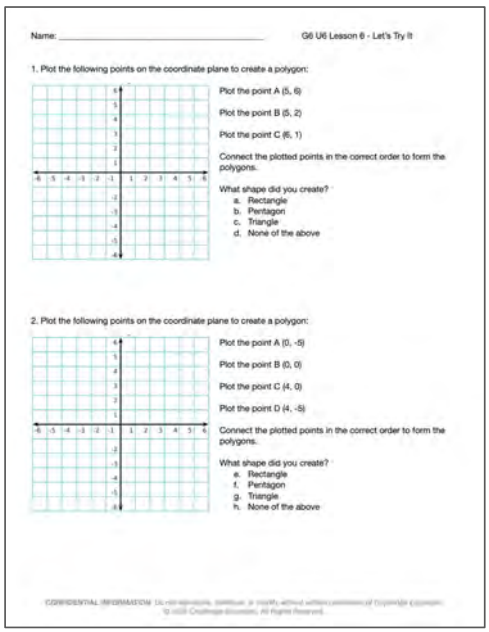
Let's Try It:

Let's practice creating polygons on a coordinate plane



Name: _____ G6 U6 Lesson 6 - Let's Try It

1. Plot the following points on the coordinate plane to create a polygon:

Plot the point A (5, 6)

Plot the point B (5, 2)

Plot the point C (6, 1)

Connect the plotted points in the correct order to form the polygons.

What shape did you create?

a. Rectangle
b. Pentagon
c. Triangle
d. None of the above

2. Plot the following points on the coordinate plane to create a polygon:

Plot the point A (0, -5)

Plot the point B (0, 0)

Plot the point C (4, 0)

Plot the point D (4, -5)

Connect the plotted points in the correct order to form the polygons.

What shape did you create?

e. Rectangle
f. Pentagon
g. Triangle
h. None of the above

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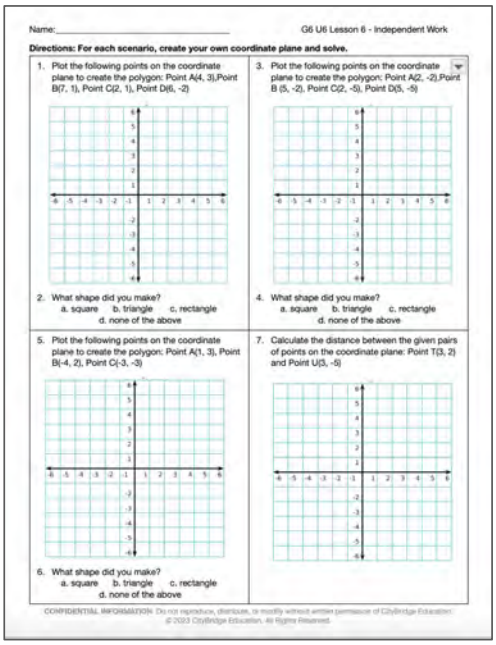
On your Own:

Now try creating polygons on a coordinate plane on your own



Name:_____ G6 U6 Lesson 6 - Independent Work

Directions: For each scenario, create your own coordinate plane and solve.

1. Plot the following points on the coordinate plane to create the polygon: Point A(4, 3),Point B(7, 1), Point C(2, 1), Point D(6, -2)

2. What shape did you make?
a. square b. triangle c. rectangle
d. none of the above

3. Plot the following points on the coordinate plane to create the polygon: Point A(2, -2),Point B (5, -2), Point C(2, -5), Point D(5, -5)

4. What shape did you make?
a. square b. triangle c. rectangle
d. none of the above

5. Plot the following points on the coordinate plane to create the polygon: Point A(1, 3), Point B(-4, 2), Point C(-3, -3)

6. What shape did you make?
a. square b. triangle c. rectangle
d. none of the above

7. Calculate the distance between the given pairs of points on the coordinate plane: Point T(3, 2) and Point U(3, -5)

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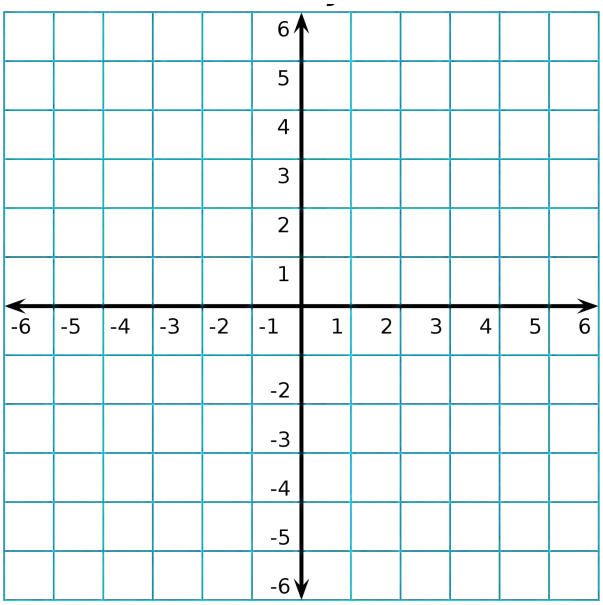
Name: _____ G6 U6 Lesson 6 - Let's Try It

1. Plot the following points on the coordinate plane to create a polygon:



Plot the point A (5, 6)

Plot the point B (5, 2)

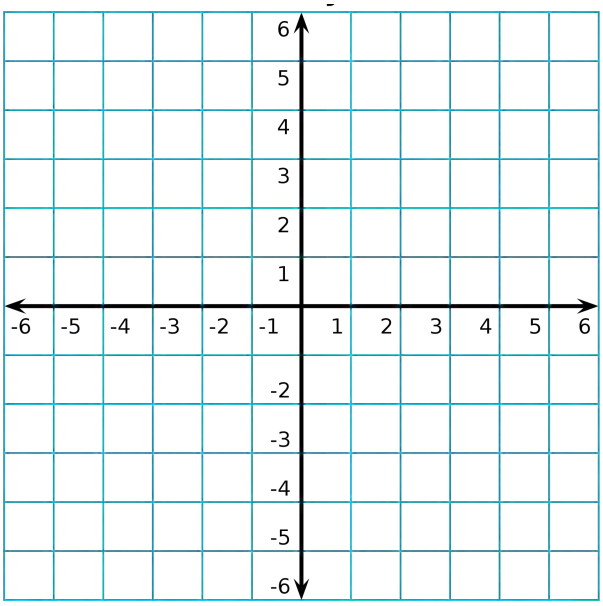
Plot the point C (6, 1)

Connect the plotted points in the correct order to form the polygons.

What shape did you create?

a. Rectangle
b. Pentagon
c. Triangle
d. None of the above

2. Plot the following points on the coordinate plane to create a polygon:



Plot the point A (0, -5)

Plot the point B (0, 0)

Plot the point C (4, 0)

Plot the point D (4, -5)

Connect the plotted points in the correct order to form the polygons.

What shape did you create?

e. Rectangle
f. Pentagon
g. Triangle
h. None of the above

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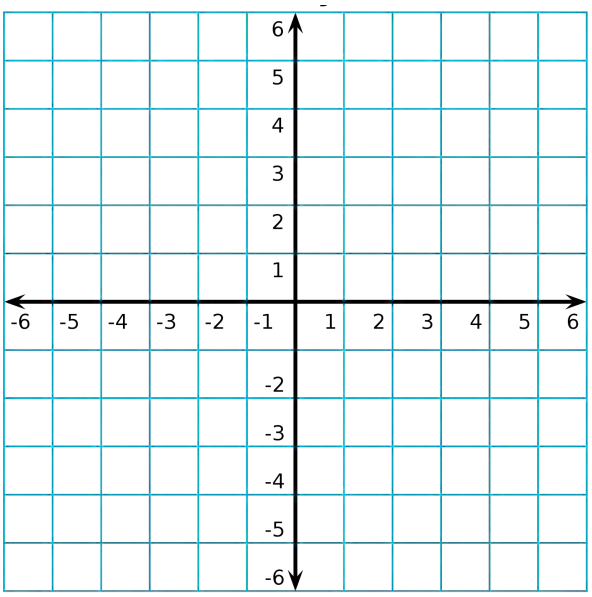
Name:_____ G6 U6 Lesson 6 - Independent Work

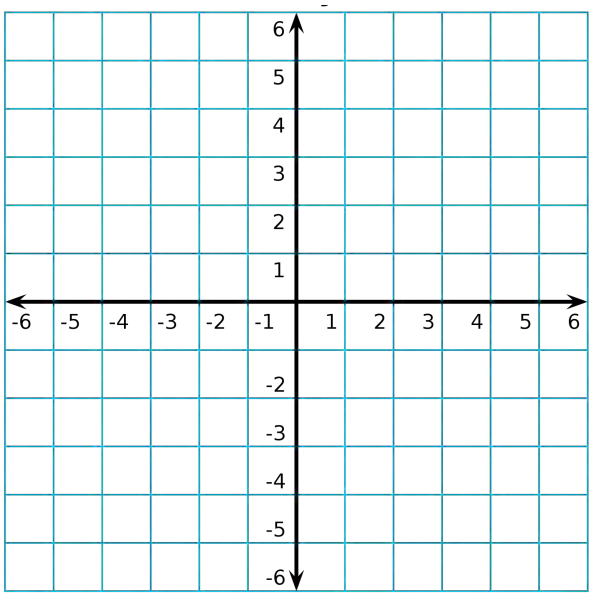
Directions: For each scenario, create your own coordinate plane and solve.

1. Plot the following points on the coordinate plane to create the polygon: Point A(4, 3),Point B(6, 1), Point C(2, 1), Point D(6, -2)



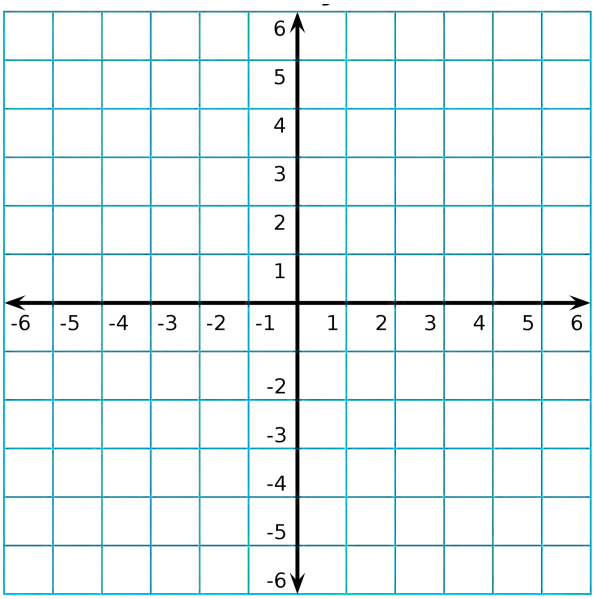
2. What shape did you make?
   a. square b. triangle c. rectangle
   d. none of the above

3. Plot the following points on the coordinate plane to create the polygon: Point A(2, -2),Point B (5, -2), Point C(2, -5), Point D(5, -5)



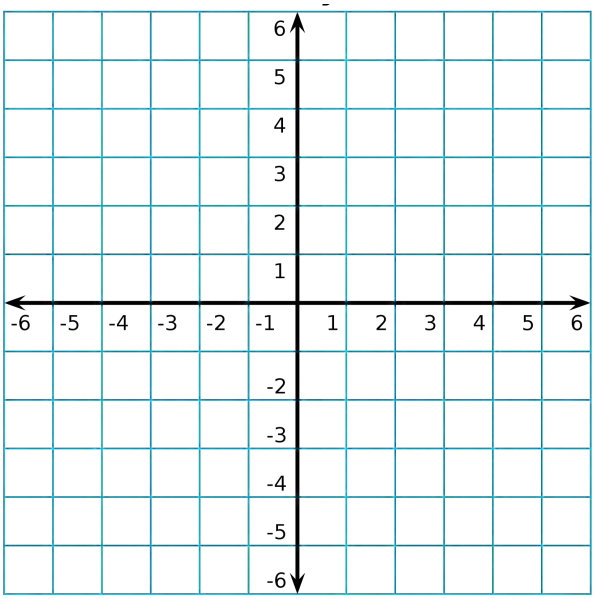
4. What shape did you make?
   a. square b. triangle c. rectangle
   d. none of the above

5. Plot the following points on the coordinate plane to create the polygon: Point A(1, 3), Point B(-4, 2), Point C(-3, -3)



6. What shape did you make?
   a. square b. triangle c. rectangle
   d. none of the above

7. Calculate the distance between the given pairs of points on the coordinate plane: Point T(3, 2) and Point U(3, -5)



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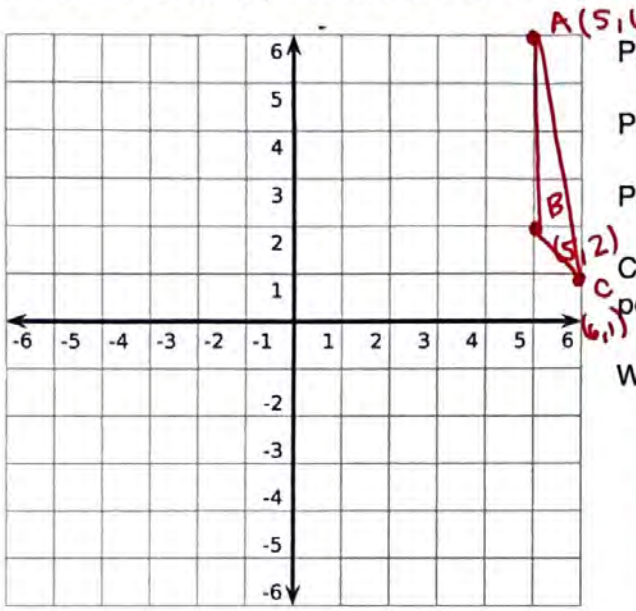
Name: ANSWER KEY

G6 U6 Lesson 6 - Let's Try It

1. Plot the following points on the coordinate plane to create a polygon:



Plot the point A (5, 6) ✓

Plot the point B (5, 2) ✓

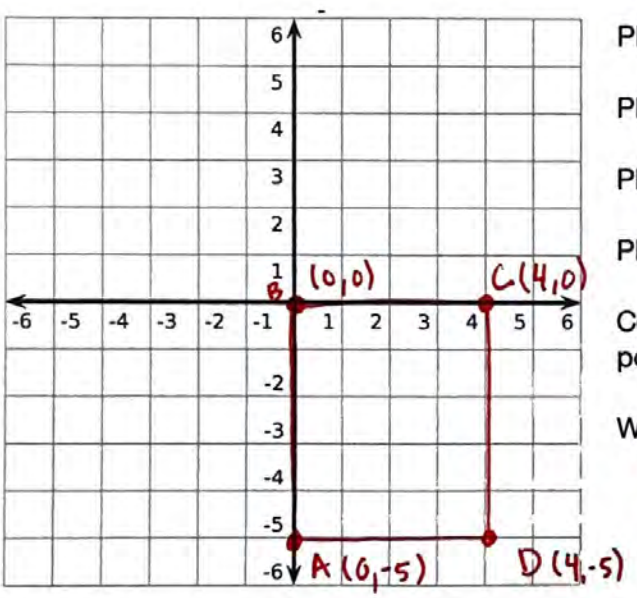
Plot the point C (6, 1) ✓

Connect the plotted points in the correct order to form the polygons. ✓

What shape did you create?

a. Rectangle
b. Pentagon
c. Triangle
d. None of the above

2. Plot the following points on the coordinate plane to create a polygon:



Plot the point A (0, -5) ✓

Plot the point B (0, 0) ✓

Plot the point C (4, 0) ✓

Plot the point D (4, -5)

Connect the plotted points in the correct order to form the polygons. ✓

What shape did you create?

e. Rectangle
f. Pentagon
g. Triangle
h. None of the above

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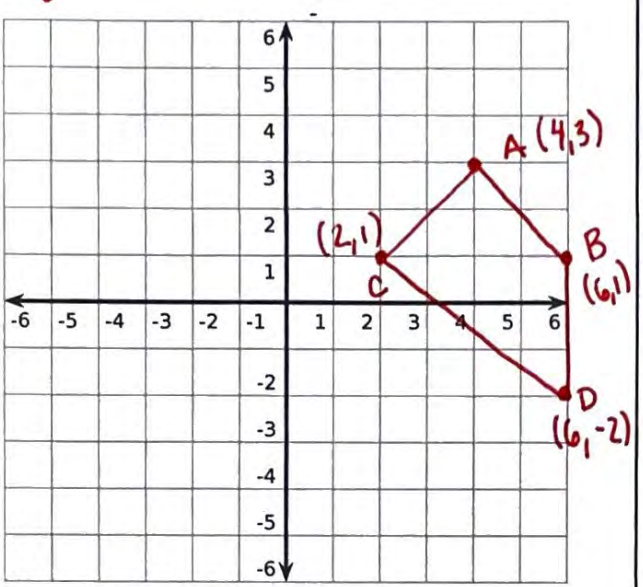
Name: ANSWER KEY

G6 U6 Lesson 6 - Independent Work

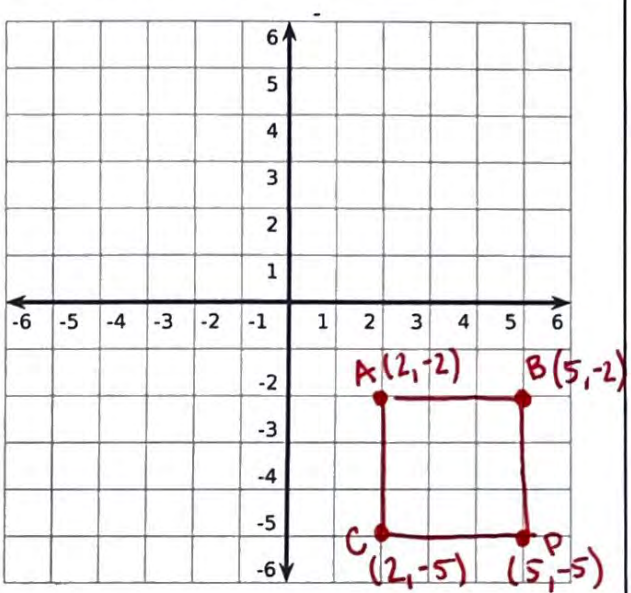
Directions: For each scenario, create your own coordinate plane and solve.

1. Plot the following points on the coordinate plane to create the polygon: Point A(4, 3),Point B(~~X~~ 6, 1), Point C(2, 1), Point D(6, -2)



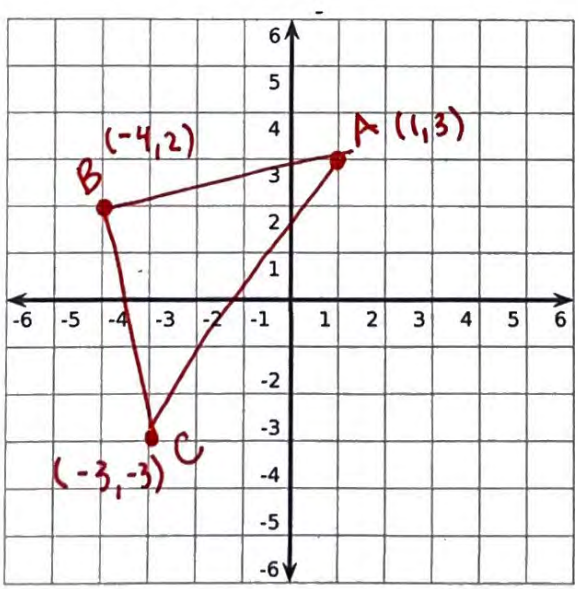
2. What shape did you make?
   a. square b. triangle c. rectangle
   (d.) none of the above

3. Plot the following points on the coordinate plane to create the polygon: Point A(2, -2),Point B (5, -2), Point C(2, -5), Point D(5, -5)



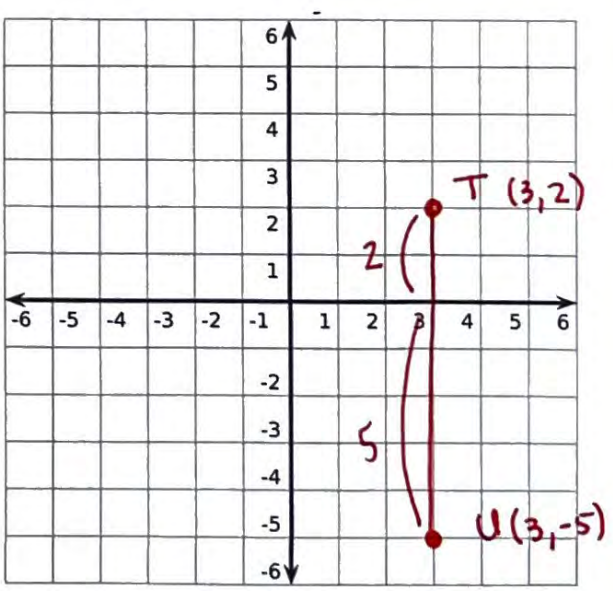
4. What shape did you make?
   (a.) square b. triangle c. rectangle
   d. none of the above

5. Plot the following points on the coordinate plane to create the polygon: Point A(1, 3), Point B(-4, 2), Point C(-3, -3)



6. What shape did you make?
   a. square (b.) triangle c. rectangle
   d. none of the above

7. Calculate the distance between the given pairs of points on the coordinate plane: Point T(3, 2) and Point U(3, -5)



7 units

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