Name _____ Period _____ Date _____

UNIT 10
STUDENT PACKET

Math Links
GRADE 6

THE NUMBER LINE AND THE COORDINATE PLANE

Parent (or Guardian) signature _____

MY WORD BANK

Explain the mathematical meaning of each word or phrase, using pictures and examples when possible. See **Student Resources** for mathematical vocabulary.

absolute value	coordinate plane (origin, quadrant, *x*-axis, *y*-axis, ordered pair, *x*-coordinate, *y*-coordinate)
integers	
opposite of a number	reflection

OPENING PROBLEM: EXTREME TEMPERATURES

[6.NS.6c; SMP 5]

1. What is the hottest temperature you remember experiencing?

   Where was this?

2. What is the coldest temperature you remember experiencing?

   Where was this?

3. What is the difference between the highest and lowest temperatures you experienced in your lifetime?

4. Ask an artificial intelligence device for the coldest and hottest temperatures recorded on earth. Find the difference between them.

5. What was notable about the temperatures in International Falls, Minnesota and Key West Florida on January 2, 2014?

EXTENDING THE NUMBER LINE

We will extend the positive number line to represent all integers. We will learn to interpret and evaluate the opposite and absolute value of a number using realistic contexts like temperature and elevation.

[6.NS.5, 6.NS.6ac, 6.NS.7abcd; SMP1, 2, 3, 6, 7]

GETTING STARTED

Fill in the table with appropriate words.

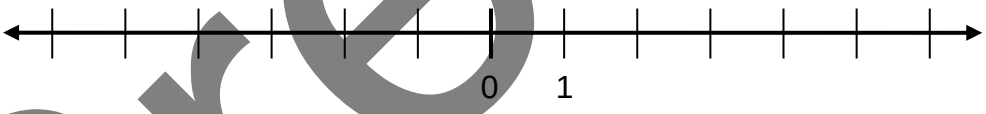
The opposite of … is ...	The opposite of … is ...
1. left	4. frown
2. down	5. night
3. inside	6. negative

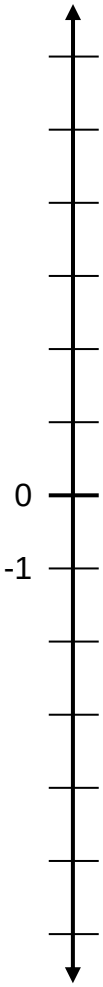
7. Record the meaning of integers in **My Word Bank**.

8. Which numbers are greater on a horizontal number line, the numbers further to the right or the numbers further to the left?

9. Which numbers are greater on a vertical number line, the numbers higher on the line or lower on the line?

10. Write the correct integers for each tick mark on the two number lines.





11. Where are positive numbers located on the number lines?

12. Where are negative numbers located on the number line?

OPPOSITES

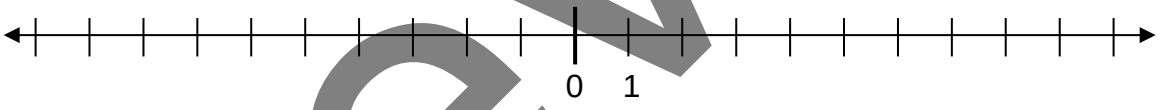
Follow your teacher's directions for (1) – (12).

Situation		Opposite of the Situation	
Words	**Number**	**Words**	**Number**
(1) Fall _____ feet			
(2) Find $_____			
(3) Gain _____ yards			
(4) Owe $_____			

(5) A bird falls _____ feet and then rises _____ feet.

(6) You find $_____ and then lose $_____.

(7) Label and graph:



Write complete sentences:
(8)

(9)

(10)

(11)

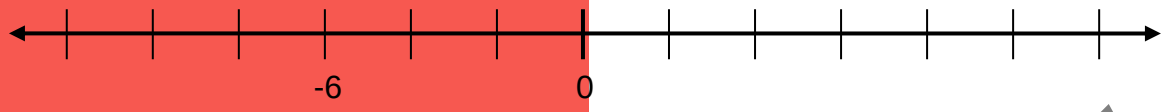
(12)

13. Record the meaning of opposite of a number in **My Word Bank**.

PRACTICE 1

Write the correct integers below each tick mark on these horizontal number lines.

1.



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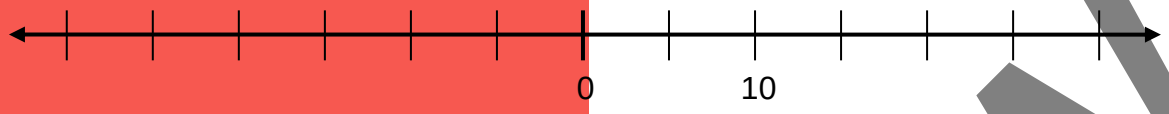
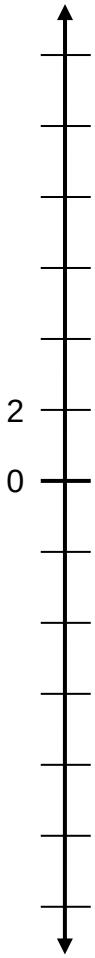


Write the result of each action in words.

3. From the line of scrimmage (starting point), a football player gains 8 yards and then loses 8 yards.

4. From a starting point, Frida takes 6 steps backward and then 6 steps forward.

Label, graph, and answer questions as indicated, using the vertical number line to the right as directed or as needed.



5. On the number line, label and graph 3 and its opposite.

6. On the number line, label and graph -12 and its opposite.

7. The number 9 is 9 units from 0 on the number line. How far from 0 is the opposite of 9?

8. Write two numbers that are 18 units away from 0 on the number line.

9. Jorge thinks that $-12 > 3$ is a true statement. What mistake is he making?

Write an equation to answer each question.

10. What is the opposite of 0?

11. What is the opposite of the opposite of 21?

12. What is the opposite of the opposite of -3?

COMPARING TEMPERATURES

Follow your teacher's directions for (1) – (3).

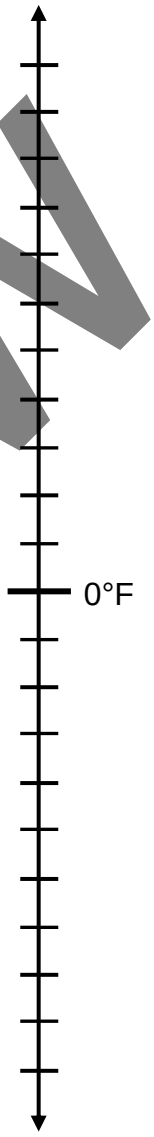
(1)

Point *N*: North Pole at ____° Point *E*: Cairo, Egypt at ____°

Point *T*: Ankara, Turkey at ____° Point *R*: Siberia, Russia at ____°

Point *S*: South Pole at ____° Point *X*: _____ at ____°
(your location)

(2)



(3)

	Word Statement	Number Statement
a.	The temperature in _____ is _____ the temperature in _____.	
b.	The temperature in _____ is _____ the temperature in _____.	
c.	The temperature in _____ is _____ the temperature in _____.	
d.	The temperature in _____ is _____ the temperature in _____.	

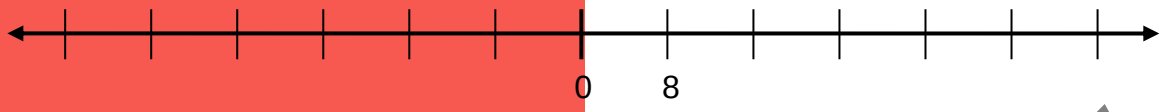
4. Complete the table with word and number statements. Use the number line as needed.

a.	Twenty is greater than negative ten.	20 ☐ -10
b.	Thirty is _____ .	30 ☐ -40
c.	_____ .	-80 ☐ -60

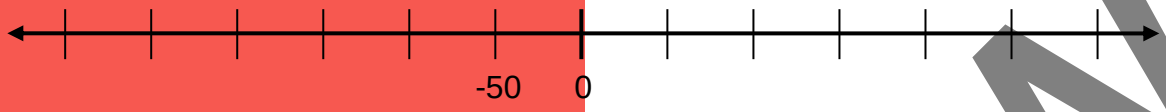
PRACTICE 2

Write the correct integers for each tick mark on the horizontal number lines.

1.

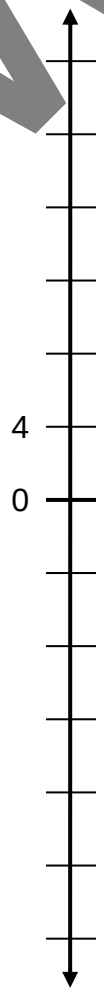


2.



3. Label and graph these numbers on the vertical number line to the right.

a. 16 and its opposite	b. -12 and its opposite



4. Write >, <, or = in the blanks to make each statement true.

a. 20 _____ -8	b. -20 _____ 8	c. -20 _____ -8
d. 6 _____ -6	e. -(-6) _____ 6	f. -(-6) _____ -6

Patricio has a checking account and he monitors the balance (amount) every week. He notices that when money is added to the account, it's recorded as a positive number called a credit. He also notices that when money is taken from the account, it's recorded as a negative number called a debit.

5. What does it mean when Patricio's account has a total balance of $500?

6. What does it mean if Patricio has a zero balance in his account?

7. What does it mean when Patricio's account has a total balance of -$100?

8. Write a debit of $25 as a number. _____

9. Write the opposite of a credit of $75 as a number. _____

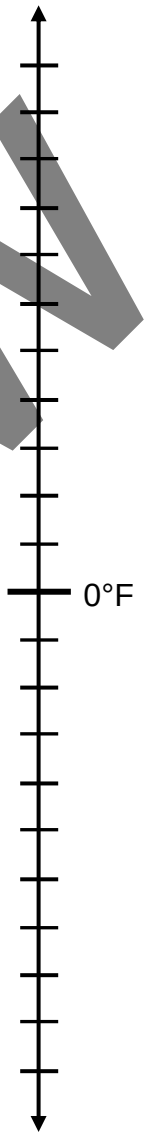
10. If Patricio has a balance of -$50, how can he get it to a balance of $0?

DISTANCE AND ABSOLUTE VALUE

Follow your teacher's directions for (1) – (4).

What	(1) **Location relative to sea level**	(3) **Distance from zero** (sea level)	(4) **Absolute value equation for the distance from sea level**
P:			
D:			
G:			
F:			
W:			
S:			

(2)



5. Record the meaning of absolute value of a number in **My Word Bank**.

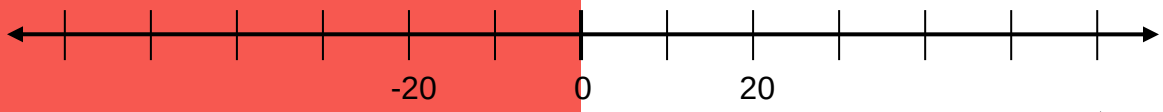
6. Distance and absolute value are always greater than or equal to ____.

7. On the number line, find the pigeon and the whale.
   a. Which one is at a higher elevation relative to sea level?
   b. Which one is farther from 0 on the number line?
   c. Write >, <, or = in the blank to make the statement true. $|20|$ _____ $|-65|$

8. On the number line, find the pigeon and the dolphin.
   a. Which one is at a higher elevation relative to sea level?
   b. Which one is farther from 0 on the number line?
   c. Write >, <, or = in the blank to make the statement true. $|20|$ _____ $|-20|$

PRACTICE 3

1. Write the correct integers for each tick mark on the number line.



Simplify the absolute value expressions.

2. $|30|$ 3. $|-30|$ 4. $|0|$ 5. $-|50|$ 6. $-|-10|$

7. Circle the greater number:

a. -17 or -46	b. 23 or -59

8. Circle the number with the greater absolute value:

a. -17 or -46	b. 23 or -59

9. On the number line to the right, graph each of these numbers and their opposites:

0, 4, 8, -1, -6

10. On a vertical number line, how do you get from a positive number to its opposite?

11. On a horizontal number line, how do you get from a negative number to its opposite?

Write >, <, or = in the blanks to make each statement true.

12. $|-11|$ _____ 11 13. $|-11|$ _____ -11 14. $-|-11|$ _____ -11

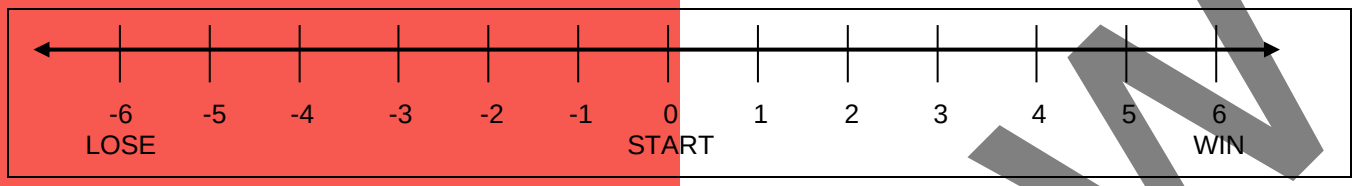
15. Ted thinks that the opposite of a number and the absolute value of a number are the same thing. Is he correct? Use examples or counterexamples to support your answer.

BACK AND FORTH

This is a game for two players.

Preparation:

- Cut up the **Back and Forth Cards**
- Find two objects (e.g., coin, paperclip) for game pieces
- Create a number line game board on a blank strip of paper



Directions

- Shuffle the cards and place the pile face down
- Place each player's game piece on 0
- Player 1 draws a card and determines the number represented. If it is a positive value, move to the right; if it is a negative value, move to the left
- Player 2 confirms the move before drawing a card and playing a turn
- Continue alternating turns until the game has ended

You win if:

- Rule A: You land on or pass the "WIN" space
- Rule B: Your opponent lands on or passes the "LOSE" space
- Rule C: All the cards have been used, and you are the closest player to "WIN"
- Rule D: Your teacher calls "time" and you are the closest player to "WIN"

1. Play the game one or more times with a partner. Who won?

2. Sort all the cards into two piles: those with positive values and those with negative values.

   a. What is the sum of all the cards with positive values?

   b. Find the absolute value of each card with a negative value. What is the sum of these values?

3. There were four different ways to win (Rules A, B, C, D above). Poll the class. How many people won based on:

   Rule A: _____ Rule B: _____ Rule C: _____ Rule D: _____

4. Were some ways to win more likely than others? _____ Why do you think that happened?

BETWEEN THE INTEGERS

We will extend our work with integers, opposites, and absolute value to fractions and decimals. We will graph solutions to equations and inequalities on the number line.

[6.NS.5, 6.NS.6ac, 6.NS.7abcd, 6.EE.5, 6.EE.8; SMP1, 2, 3, 7]

GETTING STARTED

1. Write the correct fractional values for each tick mark on the number line.

2. Write the correct decimal values for each tick mark on the number line.

3. Stephanie thinks that $\frac{5}{10}$ is greater than $\frac{3}{4}$ because 5 and 10 are greater than 3 and 4. What is Stephanie confused about?

4. Branwen thinks that 4.50 is greater than 4.5. What is Branwen confused about?

OPPOSITES AND ABSOLUTE VALUE REVISITED

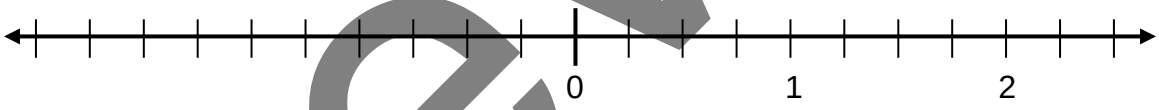
Follow your teacher's directions.

Situation		Opposite of the Situation	
Words	**Number**	**Words**	**Number**
(1) Fall _____ feet			
(2) Find $_____			
(3) Owe $_____			

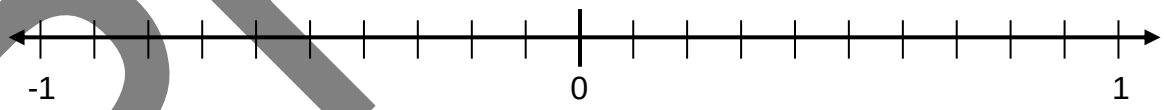
(4) A bug rises _____ feet and then falls _____ feet.

(5) You spend $_____ and then earn $_____.

(6)



(7)



(8)

(9)

a.	b.	c.
d.	e.	f.

PRACTICE 4

A bird is $10\frac{1}{2}$ feet above sea level. A fish is $10\frac{1}{2}$ feet below sea level.

1. Write a number that represents the elevation of each as it relates to sea level.

   bird: _____ fish: _____ sea level: _____

2. Which animal is closer to sea level?

3. Write a number that represents the distance of each to sea level.

   bird: _____ fish: _____ sea level: _____

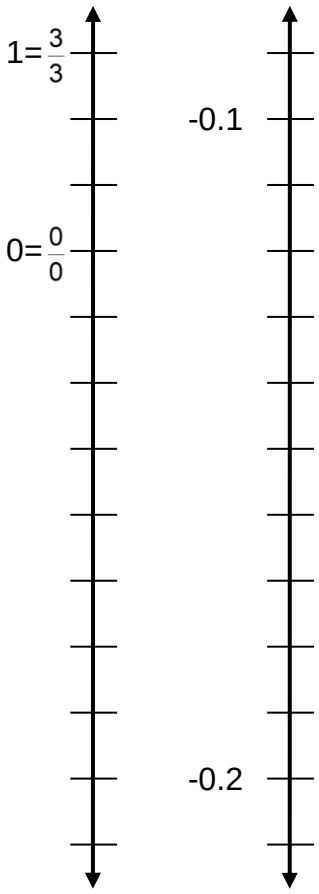
4. Write the absolute value of each number.

   $\left|10\frac{1}{2}\right| \rightarrow$ _____ $\left|-10\frac{1}{2}\right| \rightarrow$ _____ $|0| \rightarrow$ _____

Label tick marks on number lines to the right. Then graph each number listed.

5.	$-\frac{1}{3}$	$-\frac{2}{3}$	$-1\frac{2}{3}$	$-2\frac{2}{3}$
6.	-0.11	-0.09	-0.16	-0.19

5. 6.



7. What is the opposite of the opposite of $-6\frac{3}{5}$? _____

8. What is the opposite of the opposite of 5.26? _____

Write >, <, or = in the blanks to make each statement true.

9. -3.6 _____ -5.88

10. -17.56 _____ 1.08

11. $-4\frac{1}{7}$ _____ $-11\frac{8}{9}$

12. -6.5 _____ $-6\frac{1}{4}$

13. $|-1.91|$ _____ 1.91

14. $|-3.7|$ _____ -0.41

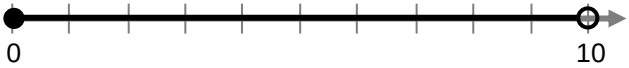
15. $-\left|1\frac{1}{2}\right|$ _____ $-\left(-1\frac{1}{2}\right)$

16. $\left|-5\frac{1}{4}\right|$ _____ $-\left(-\frac{2}{3}\right)$

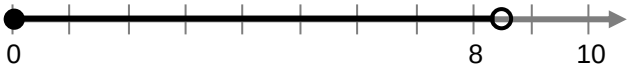
GRAPHING INEQUALITIES

Follow your teacher's directions for (1) – (8).

	Equation or inequality	Written description of all solutions	Graph of all solutions
(1)			
(2)			
(3)			
(4)			
(5)			
(6)			

(7)		
(8)		

Describe a situation that could be represented by each graph below.

9.		
10.		

PRACTICE 5

Fill in the table for each inequality.

	Inequality	Written description of all solutions	Graph of all solutions
1.	$v > -3$		
2.	$w < 1$		

3. Circle all numbers below that are solutions to the inequality $x > -5$.

-7 -4.9999 5 -5.0000001 $-936\frac{2}{5}$ 0 -5

4. List four integers that are less than -2. _____ _____ _____ _____

5. List four non-integer numbers that are less than -2. _____ _____ _____ _____

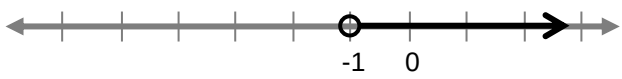
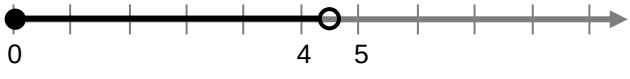
6. How many numbers exist that are less than -2? _____

7. Why is -2 not a solution to the inequality $x < -2$? _____

Write an inequality for each situation below. Label and scale each graph appropriately.

	Situation	Inequality	Graph
8.	You must be taller than 48 inches to ride the rollercoaster.	(let h = height)	
9.	You must weigh less than 275 pounds to ride the rollercoaster.	(let w = weight)	
10.	To ride the rollercoaster, wait time is more than 16 minutes.	(let t = time)	

Write your own situation for the graphs below.

11.		
12.		

GRAPHING IN THE COORDINATE PLANE

We will graph ordered pairs of numbers on the coordinate plane. We will scale axes of the coordinate plane appropriately for graphing.

[6.NS.6abc, 6.NS.7c; SMP2, 6, 7, 8]

GETTING STARTED

Graph each ordered pair and connect the points with line segments in the order listed. If graphed correctly, you will meet our friend Buddy.

1. Graph and connect:
   (0, 0)
   (4, 0)
   (4, 4)
   (0, 4)
   (0, 0)

2. Lift your pencil, then graph and connect:
   (0, 4)
   $\left(\frac{1}{2}, 5\right)$
   (1, 4)

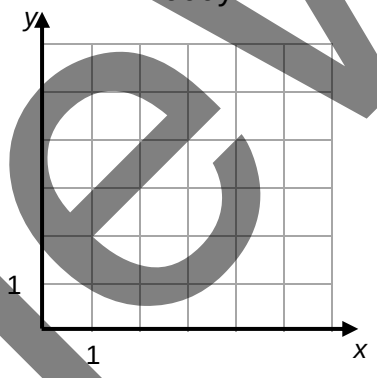
3. Lift your pencil, then graph and connect:
   (3, 4)
   $\left(3\frac{1}{2}, 5\right)$
   (4, 4)

4. Lift your pencil, then graph and connect:
   $\left(1, 1\frac{1}{2}\right)$
   (1, 1)
   (3, 1)
   $\left(3, 1\frac{1}{2}\right)$

5. Lift your pencil, then graph: $\left(1\frac{1}{2}, 2\frac{1}{2}\right)$.

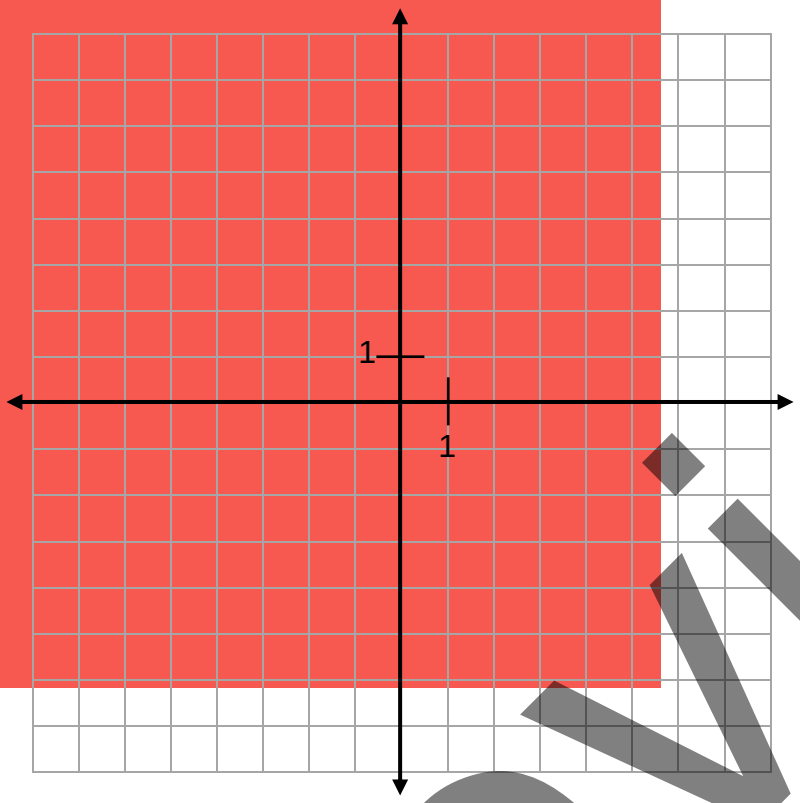
6. Lift your pencil, then graph: $\left(2\frac{1}{2}, 2\frac{1}{2}\right)$.

Buddy



GRAPHING IN FOUR QUADRANTS

Follow your teacher's directions for problems (1) – (3).
(1) – (3)



4. Graph and label each ordered pair.

A (2, 2)	*B* (0, 3)	*C* (-2, 1)
D (-2, -2)	*E* (0, -4)	*F* (2, -3)
G (-4, -4)	*H* (6, -2)	*I* (6, 1)
J (4, 3)	*L* (3, 4)	*P* (5, 6)
M (2, 5)	*N* (2, 4)	

5. Connect the points:
   - Connect points *A* through *J* in order, and then connect *J* back to *A*.
   - Connect points *A* to *L* to *P*.
   - Connect points *L* to *M* to *N*, and then back to *L*.

6. What is the picture? It is Buddy's favorite fruit.

7. In the table below, name the location of each point by the quadrant number it is in (I, II, III, or IV) or the axis it is on (*x*-axis, *y*-axis).

Point	*A*	*B*	*C*	*D*	*E*	*F*	*J*	*H*
Location								

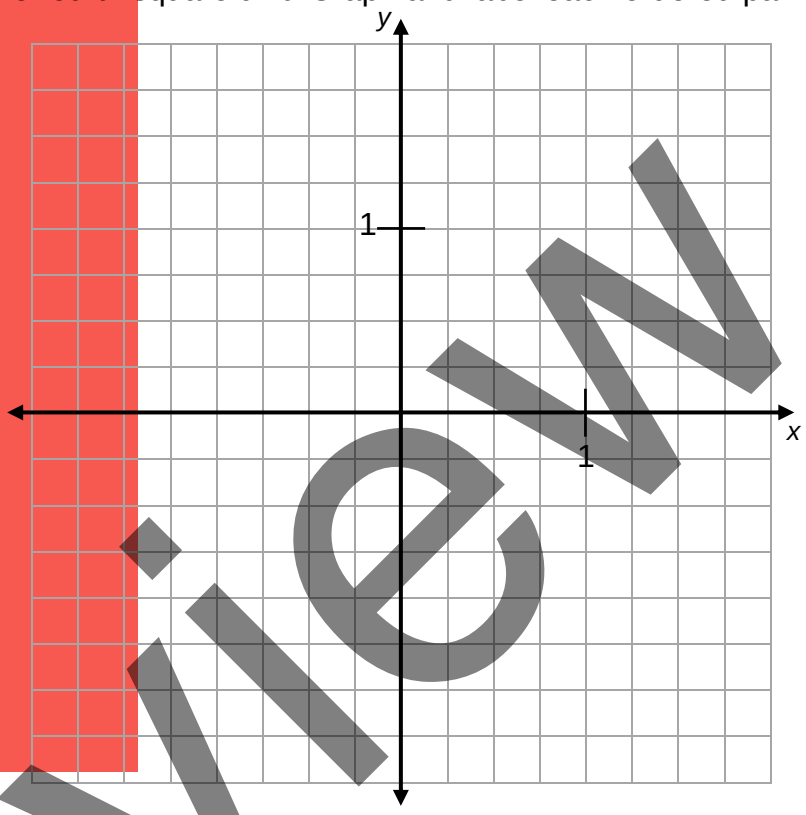
8. Without graphing it, how can you tell if a point is in Quadrant IV?

9. Without graphing it, how can you tell if a point is on the *y*-axis?

10. Record coordinate plane and its related vocabulary in **My Word Bank**.

GRAPHING ORDERED PAIRS WITH FRACTIONS AND DECIMALS

1. Each small square on the grid is one-fourth square unit. Graph and label each ordered pair.



$A\left(\frac{1}{2}, 1\frac{1}{2}\right)$ B (0, 1)

C (-0.5, 0.5) D (-1, 0)

$E\left(-1\frac{1}{2}, -\frac{1}{2}\right)$ F (-0.75, -1.25)

G (0, -0.5) H (0.75, 0.25)

I (1.25, 0.75) $J\left(1\frac{1}{2}, 1\right)$

$K\left(\frac{3}{4}, 1\frac{3}{4}\right)$ $L\left(-1\frac{1}{2}, -1\frac{1}{4}\right)$

2. Connect the points:
   - Connect points *A* through *K* in order, and then connect *K* back to *A*.
   - Connect point *E* to *L* to *F*.
   - Connect points *A* to *I*.

3. What is the picture? It is something Buddy brings to math class every day.

4. In the table below, name the location of each ordered pair by the quadrant number it is in (I, II, III, or IV) or the axis it is on (*x*-axis, *y*-axis).

Point	*A*	*B*	*C*	*D*	*E*	*G*	*J*	*H*
Location								

5. Without graphing it, how can you tell if a point is in Quadrant III by looking at its coordinates?

6. Without graphing it, how can you tell if a point is on the *x*-axis by looking at its coordinates?

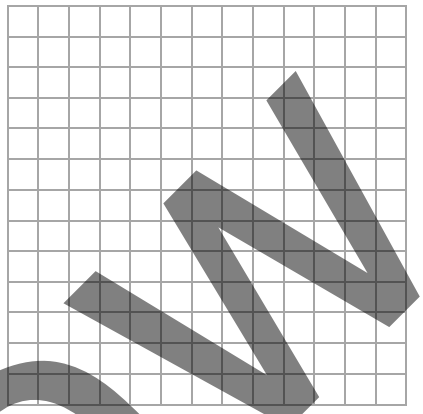
SCALING GRAPHS

Follow your teacher's directions for (1) – (3).

(1)

(2)

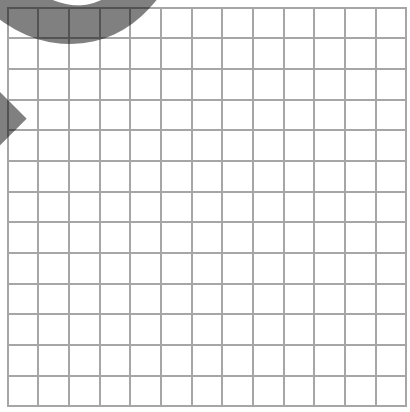
(3)



For each set of coordinates below, describe how you will determine the scale and graph them.

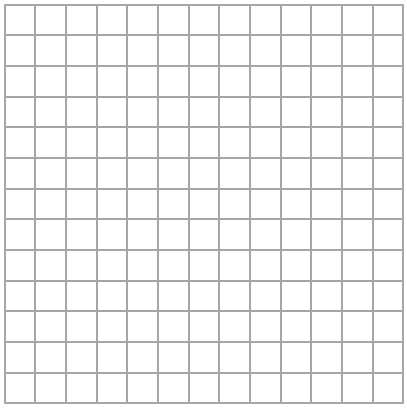
4.

D (-12, -250), *E* (-30, 0), *F* (-55, -180), *G* (0, -60)



5.

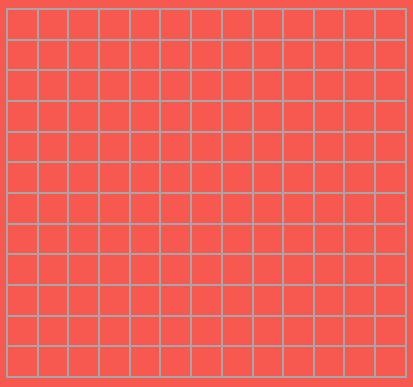
$J\left(\frac{1}{8}, \frac{3}{8}\right)$, $K\left(1\frac{1}{4}, \frac{1}{4}\right)$, $L\left(-\frac{1}{8}, 1\frac{1}{2}\right)$, $M\left(\frac{1}{2}, 0\right)$



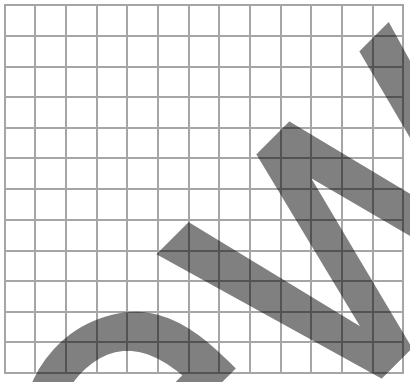
PRACTICE 6

For each set of ordered pairs, determine an appropriate scale, draw and label the axes, and graph all points.

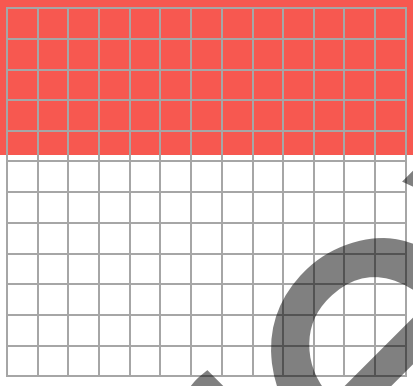
1. (60, -50), (-50, -20), (-20, 0), (30, 50)



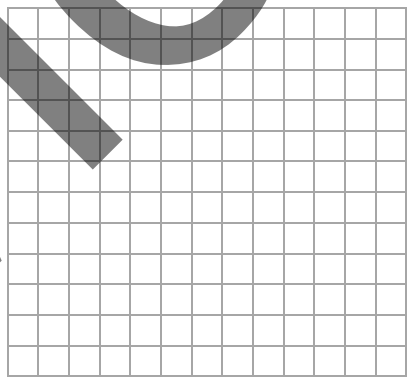
2. (4, 100), (-2, 70), (-3, 10), (0, 30)



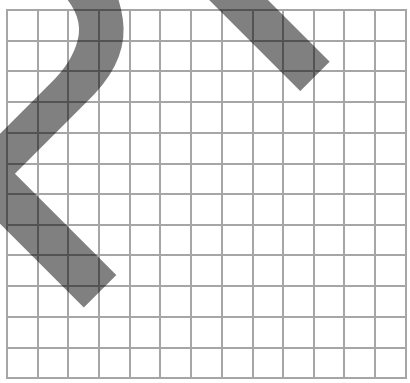
3. (0, -0.5), (-1.5, 2), (-1.5, -1), (-3, 3.5)



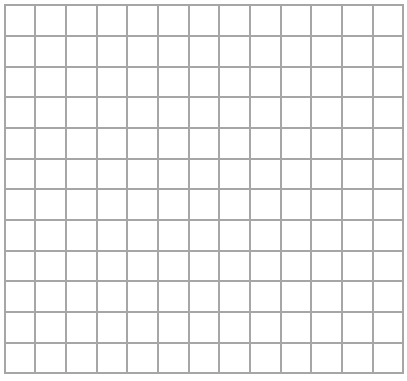
4. (0, 3), (-24, -9), (-6, 0), (-15, -18)



5. (700, -900), (400, -500), (100, -800)



6. $\left(\frac{1}{3}, -1\frac{2}{3}\right)$, $\left(1\frac{2}{3}, -2\frac{1}{3}\right)$, $\left(-1\frac{1}{3}, -1\right)$, $\left(-\frac{2}{3}, -2\right)$

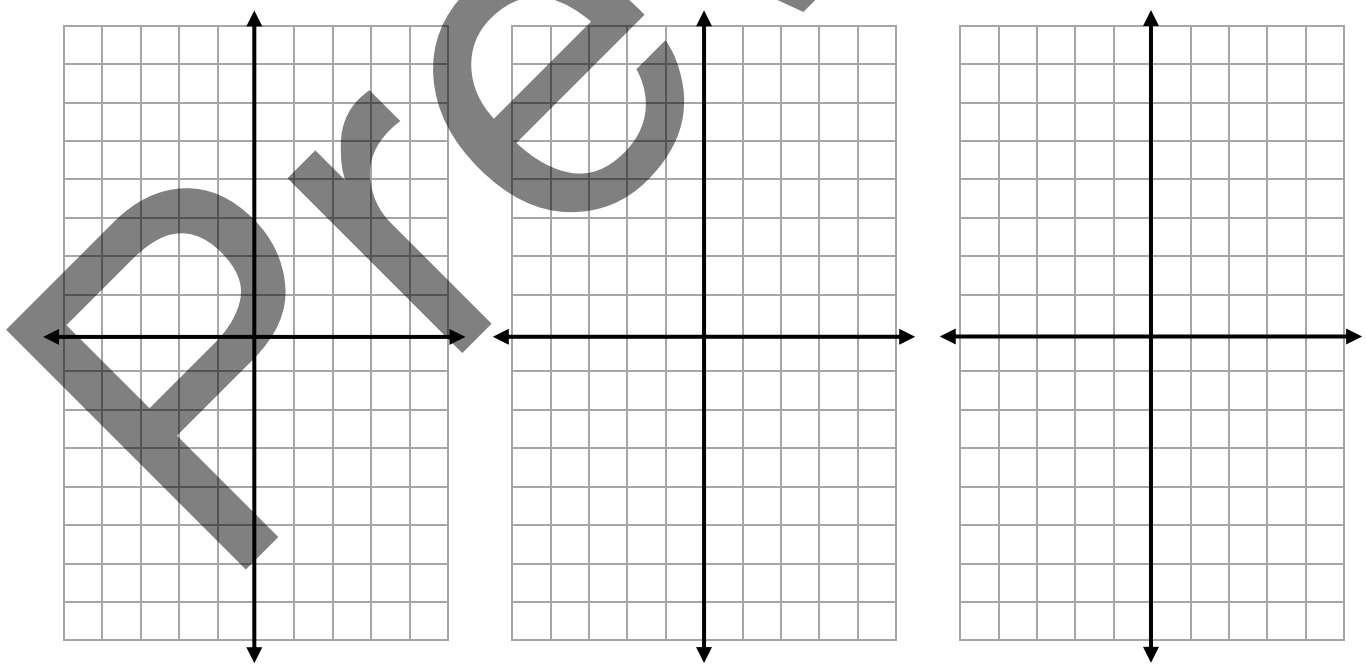


GRAPHING CHALLENGE

Complete the table below using integer coordinates only. Label the axes, then graph all the points on the grids at the bottom of the page. Each square on the grid is one unit by one unit.

Conditions on (*x*, *y*)	**List the ordered pairs that meet the conditions and fit on the grid.**	**Explain why this ordered pair should not appear on the list.**
1. $x \neq 0$ $y < -7$		(1, -7)
2. *x* is even *y* is the opposite of 5		(12, -5)
3. the absolute value of $x = 2$ $y < -5$		(-2, -4)

1. 2. 3.



POLYGONS IN THE COORDINATE PLANE

We will apply our knowledge of coordinates and absolute value to find distances between points and to find lengths of sides of polygons on the plane. We will observe that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.

[6.NS.6bc, 6.NS.7c, 6.NS.8, 6.G.3; SMP1, 2, 3, 4, 5, 6, 7, 8]

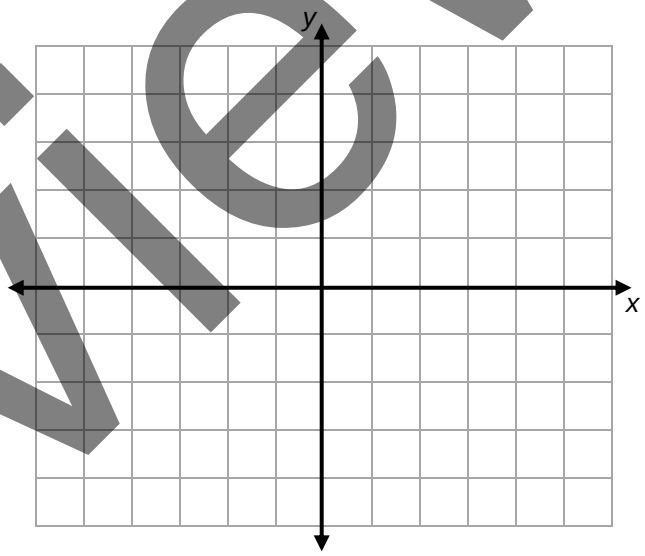
GETTING STARTED

1. A common mathematics-related saying goes, "two points determine a line." What do you think that means?

2. Graph points: *A* (5, 3) *B* (-5, 3) *C* (5, -3)

3. Draw segments to connect points:
   A to *B*; *A* to *C*; *B* to *C*

4. Name of the figure and how you know.



5. Write whether each segment is horizontal, vertical, or neither.

   $\overleftrightarrow{AB}$: _____

   $\overleftrightarrow{AC}$: _____

   $\overleftrightarrow{BC}$: _____

6. Graph any other point *M* that lies along $\overleftrightarrow{AB}$ and write its coordinates: *M* (____, ____)
   What one coordinate do *A*, *B*, and *M* have in common?

7. Graph any other point *N* that lies along $\overleftrightarrow{AC}$ and write its coordinates: *N* (____, ____)
   What one coordinate do *A*, *C*, and *N* have in common?

8. Graph any other point *P* that lies along $\overleftrightarrow{BC}$ and write its coordinates: *P* (____, ____)
   What one coordinate do *B*, *C*, and *P* have in common?

HOUSE PLANS

Follow your teacher's directions.

(1) (2)

(0,0), (6,0), (6,-11), (0,-11), (0,0)
lift your pencil

(0,3), (0,-8), (-9,-8), (-9,3), (0,3)
lift your pencil

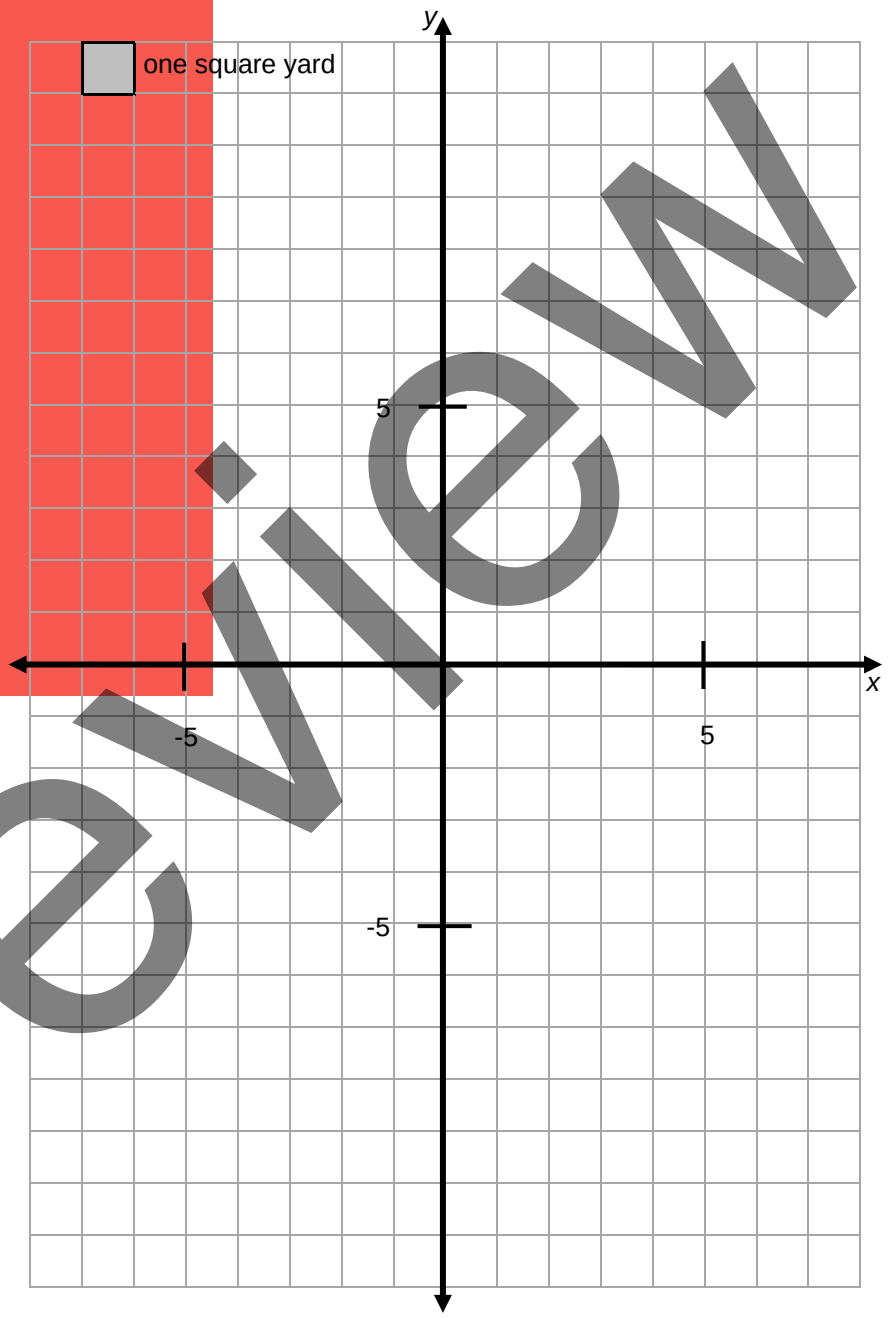
(0,3), (6,9), (6,0)
lift your pencil

(-9,3), (-9,9), (-3,9),(-9,3)
lift your pencil

(-3,9), (6,9)
lift your pencil

(-9,-8), (-9, -11), (0,-11)
lift your pencil

(3) – (5)



PRACTICE 7

1. Refer to your house drawing on the previous page. Name each shape in the house drawing. Then write numerical equations for the horizontal and vertical side lengths. Use the *x*- or *y*-coordinates in your equations. Use absolute value to indicate length.

Section	Shape/ Quadrant(s)	Numerical equation	
		Horizontal sides	Vertical sides
Garage & Driveway			$\lvert -11 \rvert = 11$
House			
Patio			
BBQ Area			
Grass			no vertical side, but there is a height
Front Yard			
Entire Property		$\lvert -9 \rvert + \lvert 6 \rvert = 15$	

2. Find the area of each section. Show formulas, work, and solution.

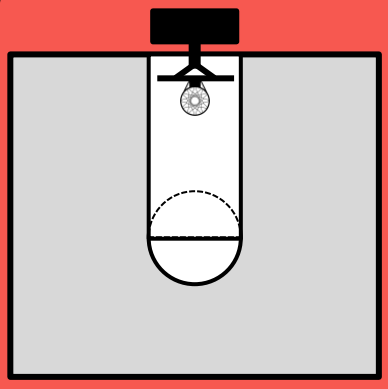
Driveway	House	Patio
BBQ Area	Grass	Front Yard

3. Find the area of entire property as a whole and as a sum of the parts. Do these results agree? Explain.

A BASKETBALL COURT

Follow your teacher's directions for (1) – (6).

(1)



(2)

(3)
(4)

(5)

(6)

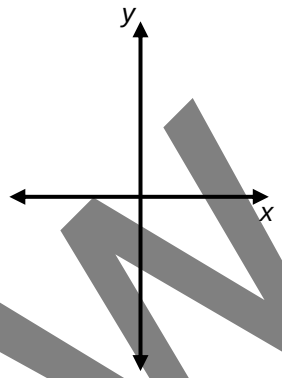
7. Reflect the coordinates of Dylan's Park basketball half-court across the *x*-axis to complete a drawing of a full court. Label all points.

8. Record the meaning of reflection in **My Word Bank**.

PRACTICE 8

Refer to your diagram of **A Basketball Court** on the previous page to complete this page.

1. Write the ordered pairs of the four corner points of the full court on the axes to the right.



2. Which ordered pairs represent a reflection across the *x*-axis? How do you know?

3. Which ordered pairs represent a reflection across the *y*-axis? How do you know?

4. Name two other ordered pairs from the court that represent a reflection across the *x*-axis.

5. Name two other ordered pairs from the court that represent a reflection across the *y*-axis.

6. A reflection across both axes is a reflection across the *x*-axis and then the *y*-axis (or vice-versa). Which ordered pairs represent a reflection across both axes? Explain.

7. Find the distance between the baselines.

8. Find the distance between the foul lines.

REVIEW

BATTLING SHIPS

The Setup:

Each player uses two coordinate grids. Label all axes from -5 to 5. One grid should be labeled "Self" and the other "Opponent." One game setup is provided below.

Each player then decides where to place three rectangular ships: a **B**attleship (5 units × 1 unit), a **C**ruiser (3 units × 1 unit), and a **D**estroyer (2 units × 1 unit) so that edges and corners are on the grid lines. All ships must be placed either horizontally or vertically, and therefore all ordered pairs will have integer coordinates. Two ships may be adjacent to each other, but they cannot overlap. Label the ships B, C, and D.

The Game:

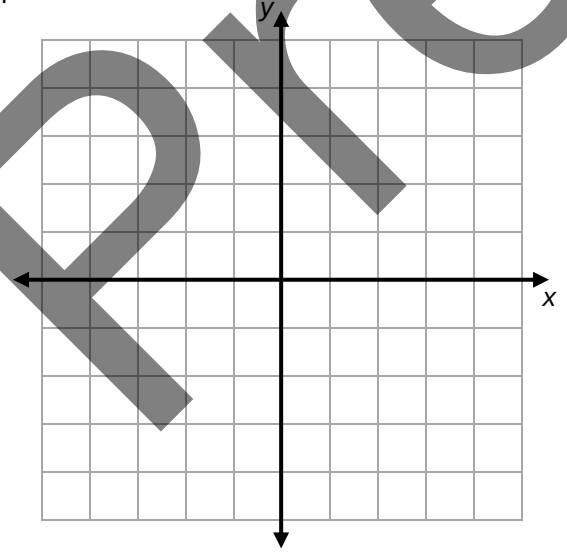
Players take turns calling out one ordered pair of integers at a time. If a player calls an ordered pair where an edge or corner of a ship is located, the opponent says "hit" and the player gets another turn. If no ship is located at the ordered pair, the opponent says "miss," and players change roles.

Players should take care to record their hits and misses on their "Opponent" grid so that they do not call an ordered pair more than once. Players should also mark the "Self" grid with shots taken by their opponent.

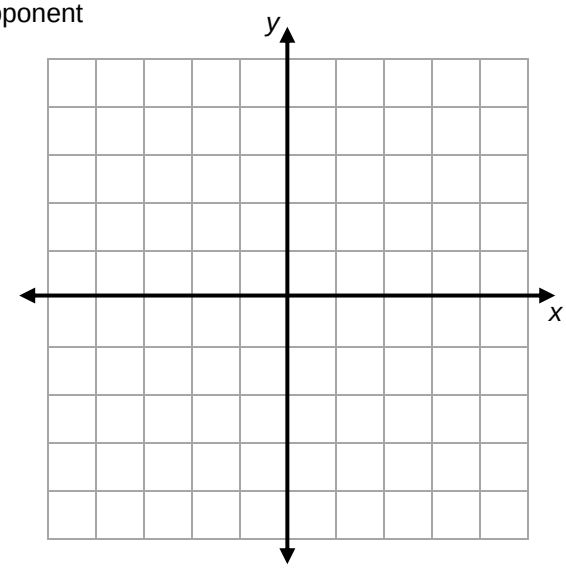
A ship is sunk when all of its corner and edge points have been hit. When this happens, the player whose ship was sunk says, "You sank my (B, C, or D) ship."

You win by sinking all of your opponent's ships. If time is called, the player who has sunk more of the opponent ships wins. If tied, the winner is the one who scored the most hits. Make sure to exchange grids afterwards to check that both players marked coordinates correctly.

Self



Opponent



TRUE-FALSE-EXPLAIN

Your teacher will give pairs or small groups of students either one or two sets of cards. If doing both sets, do them separately. Do not combine cards from sets 1 and 2.

Set 1

1. Sort these cards into a "true" group and a "false" group. Put cards you are unsure about into a third group for now.
2. The true cards are: _____
3. The false cards are: _____
4. For now, I am unsure about these cards: _____
5. Discuss the cards you are unsure about before going on. Then choose one card from Set 1 that is false and explain how you know. Use words and examples as needed.

6. The letters for the false cards form a word. The word is _____.

Set 2

7. Sort these cards into a "true" group and a "false" group. Put cards you are unsure about into a third group for now.
8. The true cards are: _____
9. The false cards are: _____
10. For now, I am unsure about these cards: _____
11. Discuss cards you are unsure about before going on. Then choose one card from Set 2 that is false and explain how you know. Use words and examples as needed.

12. The letters for the false cards form a word. The word is _____.

POSTER PROBLEMS: THE NUMBER LINE AND THE COORDINATE PLANE

Part 1: Your teacher will divide you into groups.

- Identify members of your group as A, B, C, or D.
- Each group will start at a numbered poster. Our group start poster is _____.
- Each group will have a different colored marker. Our group marker is _____.

Part 2: Do the problems on the posters by following your teacher's directions.

Poster 1 (or 5)	Poster 2 (or 6)	Poster 3 (or 7)	Poster 4 (or 8)
Triangle *ABC*:	Triangle *ABC*:	Triangle *ABC*:	Triangle *ABC*:
A (1, 2)	*A* (-2, 0)	*A* (-1, -4)	*A* (1, -2)
B (5, 2)	*B* (-2, 5)	*B* (-5, -1)	*B* (1, -5)
C (5, 4)	*C* (-3, 5)	*C* (-5, -4)	*C* (4, -5)

A. Copy the ordered pairs and graph the "original triangle," *ABC*.

B. Graph and label the reflection of the original triangle over the *y*-axis and record corresponding ordered pairs for points *D*, *E*, and *F*.

C. Graph and label the reflection of the original triangle over the *x*-axis and record corresponding ordered pairs for points *G*, *H*, and *K*.

D. Explain or show how to use coordinates to find the length of the vertical side and the horizontal side of the original triangle. Then find the area of the shape.

Part 3: Return to your seats. Work with your group and show all work.

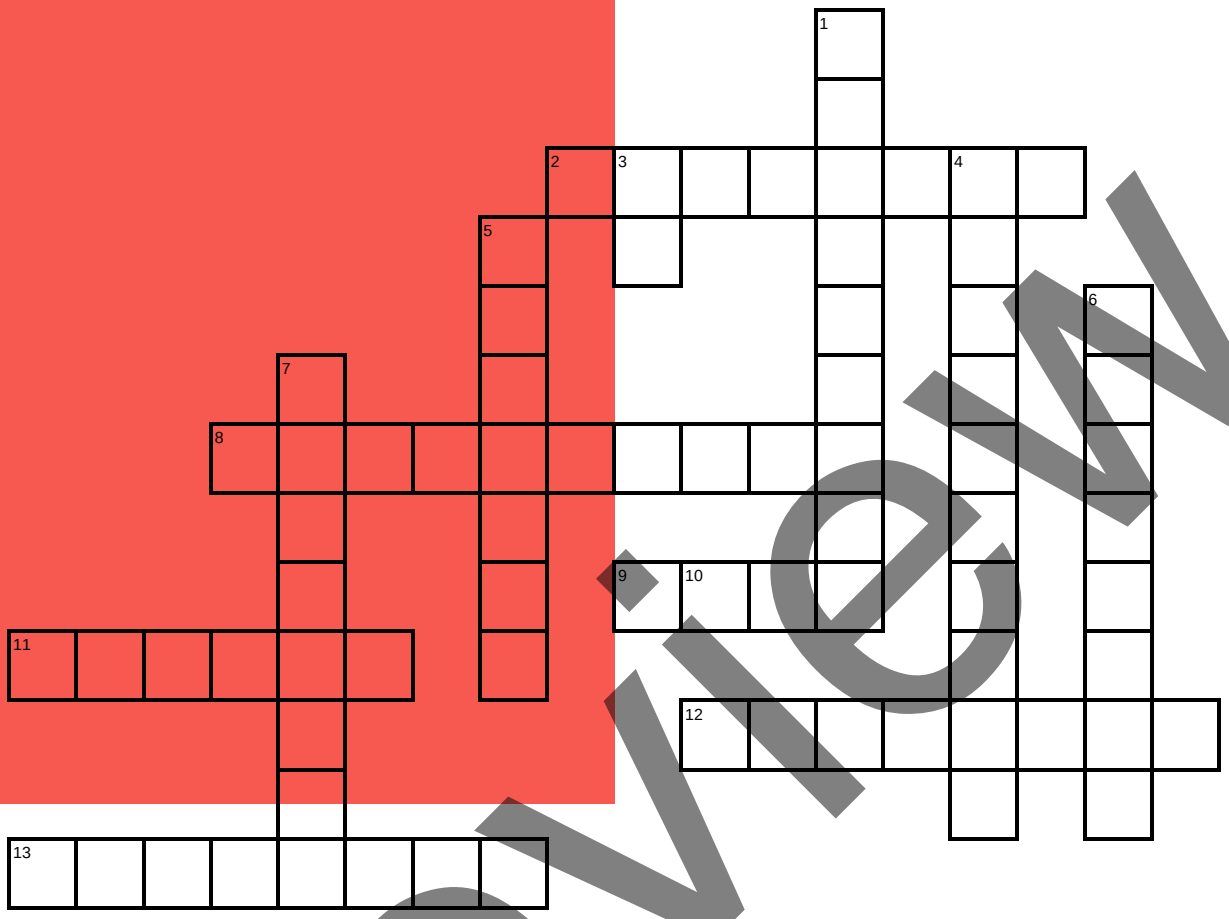
Explain how coordinates compare for figures…

1. Reflected across the *y*-axis:

2. Reflected across the *x*-axis:

3. Reflected across both axes:

VOCABULARY REVIEW



Across

2 length

8 the point (4, -3) is a _____ over the *x*-axis of the point (4, 3)

9 coordinates such as (0, 5) and (-2, 0) are located on _____

11 the name of (0, 0)

12 the opposite of a positive number

13 the _____ value of a number is its distance from 0 on the number line

Down

1 the four regions of a coordinate plane

3 the quadrant in which the *x*-value is negative and *y*-value is positive

4 the *x*-axis and *y*-axis intersect to form the _____ plane

5 (-4, 3) is an example of a(n) _____ pair

6 values to the right of 0 on the number line

7 the orientation of the *y*-axis

10 The horizontal axis is the ___ -axis.

SPIRAL REVIEW

1. **Computational Fluency Challenge**: This paper and pencil exercise will help you gain fluency with multiplication and division. Try to complete this challenge without any errors. No calculators!

   a. Start with 13. Multiply by 5. Multiply the result by 2.5. Multiply the result by 8. Multiply the result by 72. Now you have a "big number."

   My big number is _____.

   b. Start with your big number. Divide it by 5.2 Divide the result by 40. Divide the result by 25. Divide the result by 18.

   What is the final result? _____

2. Evaluate each expression below if $y = 8$.

a. $8 \bullet y \div 4$	b. $8 \div y \bullet 4$	c. $3y^2$

3. Complete the table below.

Fraction	Decimal	Percent	Percent of $400
$\frac{1}{20}$			
		99%	
			$1000

4. How many sandwiches that are $\frac{3}{4}$ foot each can be cut from a 6-foot-long sandwich?

SPIRAL REVIEW
Continued

5. Solve each equation.

a. $5g = 85$	b. $h + 27 = 49$	c. $102 = 2x$
d. $\frac{x}{5} = 8$	e. $34 - w = 22$	f. $42 = 84y$

6. Rishi and Rohan were walking to school together. It is $\frac{2}{3}$ mile from their house to school.

   a. Rishi walked $\frac{2}{5}$ of the way to school and realized he forgot his backpack. About how far did he walk before he had to turn around? Round to the nearest quarter mile.

   b. Rohan walked $\frac{5}{6}$ of the way to school before stopping to wait for Rishi to return. How far away from school was he? Write your answer in yards. (5280 feet = 1 mile)

7. Lorena bought 2 gallons of lemonade for a family reunion. If Lorena pours 7 ounces of lemonade into each of 15 glasses, how much lemonade will she have left?

SPIRAL REVIEW
Continued

8. Gianna owns an ice cream shop and sells different sizes to her customers. One cup of ice cream costs $4.50, one pint of ice cream costs $8.50, and one gallon of ice cream costs $56.

   a. Convert each ice cream size to cups: 1 pint = _____cups 1 gallon = _____ cups

   b. Find the unit price per cup for each ice cream option.

   c. Which ice cream is the best deal? Explain.

   d. Lily wanted to sell Gianna sprinkles to add to the ice cream. She created a chart to show Gianna the costs. Find the missing information in the chart.

Amount (Oz)	8	4	1			7	
Cost ($)	$4			$10	$3		$12.50

   e. Gianna only wanted to pay $0.40 per ounce for sprinkles. Would she buy the sprinkles from Lily? Explain.

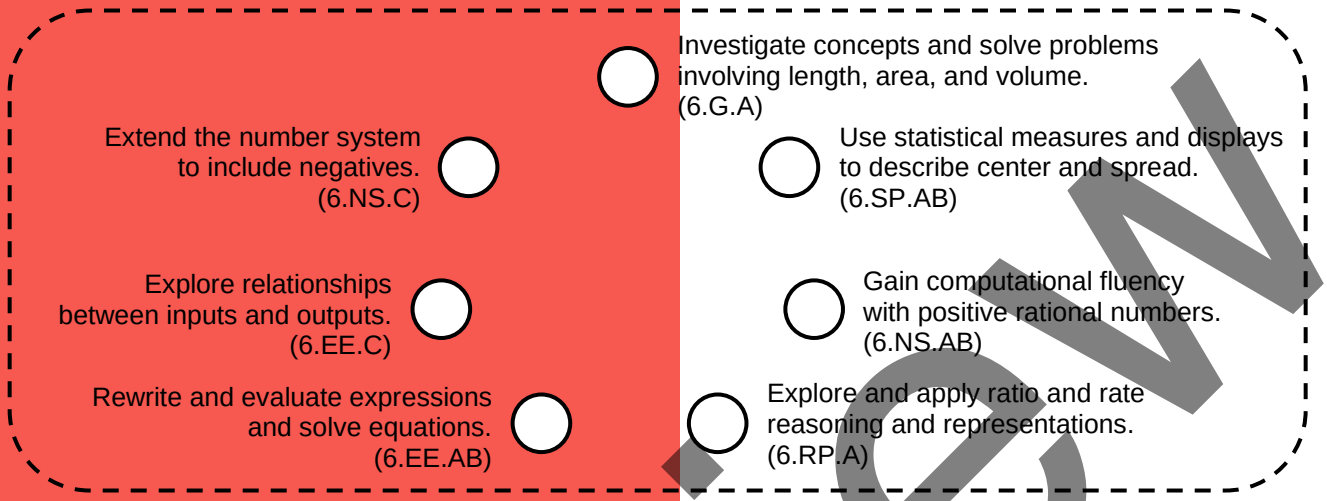
   f. Gianna went to the grocery store to buy chocolate syrup. Eight ounces cost $5 and she needed a quart. How much did she pay for chocolate syrup?

9. Circle all the inequalities below that have a solution of 10.

   $5x^2 > 500$ $8 + x < 18$ $70 > 6x$ $40 + x > 40$ $60 < 7x$

REFLECTION

1. **Big Ideas**. Shade all circles that describe big ideas in this packet. Draw lines to show connections that you noticed.



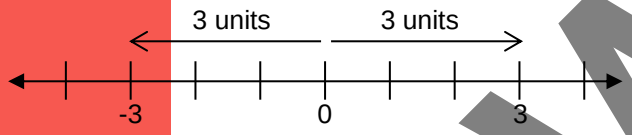
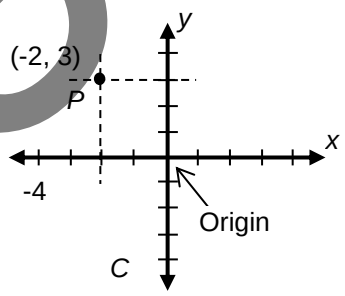
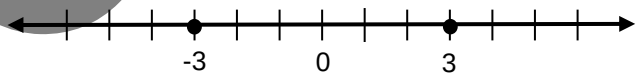
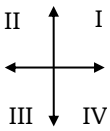
Give an example from this packet of one of the connections above.

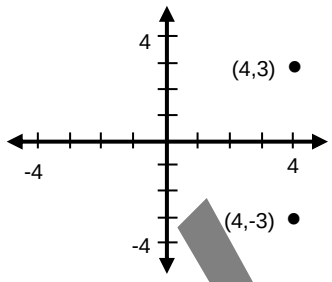
2. **Packet Progress.** Go back to **Monitor Your Progress** on the cover and complete or update your responses. Explain something you understand better now than before or something you would still like to work on.

3. **Mathematical Practice.** How are absolute value (a mathematical symbol) and distance (a geometric idea) related [SMP3]? Then circle one more SMP on the back of this packet that you think was addressed in this unit and be prepared to share an example.

4. **Making Connections.** What are some ways that coordinates can be helpful when describing a shape or location?

STUDENT RESOURCES

Word or Phrase	Definition
absolute value	The absolute value $\lvert x \rvert$ of a number x is the distance from x to 0 on the number line. $\lvert 3 \rvert = 3$ and $\lvert -3 \rvert = 3$, because both 3 and -3 are 3 units from 0 on the number line. 
coordinate plane	A coordinate plane is a plane with two perpendicular number lines (coordinate axes) meeting at a point (the origin). Each point P of the coordinate plane corresponds to an ordered pair (a, b) of numbers, called the coordinates of P. The point P may be denoted $P(a, b)$. The coordinate axes are often referred to as the x-axis and the y-axis respectively. The origin has coordinates (0, 0). The x-coordinate of P is -2, and the y-coordinate of P is 3. Point P (-2, 3) is an ordered pair. 
integers	The integers are the whole numbers and their opposites. They are the numbers 0, 1, 2, 3, … and -1, -2, -3, … .
opposite of a number	The opposite of a number n, written $-n$, is its additive inverse. Algebraically, the sum of a number and its opposite is zero. Geometrically, the opposite of a number is the number on the other side of zero at the same distance from zero.  The opposite of 3 is -3, because $3 + (-3) = -3 + 3 = 0$. The opposite of -3 is $-(-3) = 3$. Thus, the opposite of a number does not have to be negative.
quadrants	The coordinate axes of a coordinate plane separate the plane into four regions, called quadrants. The quadrants are labeled I – IV starting from the upper right region and going counterclockwise. 

Word or Phrase	Definition
reflection	The reflection of a plane through a line refers to the transformation that takes a point on one side of the line to its mirror image on the other side of the line. When the plane is reflected through the *x*-axis, the point (4,3) is taken to the point (4,-3). 

Integers on the Number Line

Integers (whole numbers and their opposites) may be represented on a horizontal or vertical number line.

On the number line above, points are graphed at -4 and 1. While 0 is labeled, it is not graphed.

Two Uses of the Minus Sign

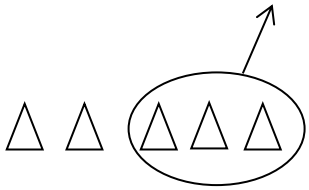
Here are two ways to interpret the minus sign, along with some examples.

When the minus sign is between two expressions, it means "subtract the second expression from the first."

Example: 5 – 3

The phrase "5 minus 3" can be read:

- 5 take away 3
- The difference between 5 and 3
- Subtract 3 from 5



In front of a number, a minus sign can mean "negative" or "opposite."

-3 is 3 units less than zero on the number line.

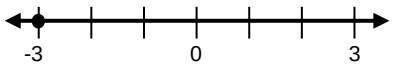
-3 is also the opposite of 3.

"Minus" can be thought of as a reflection or mirror image. In this case, we are reflecting the number line through zero.

Example: -3

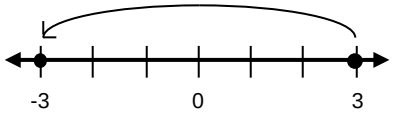
The phrase "minus 3" can be read:

- Negative 3



Pictorially, this is a location on the number line that is 3 units left of zero.

- Opposite of 3



This is the value you get by first locating 3 on the number line, and then locating that same distance on the opposite side of zero. Geometrically, minus can be thought of as a reflection or mirror image. In this case, the reflection of 3 through zero is -3.

Distance and Absolute Value

The absolute value of a number is its distance from zero on the number line.

A distance 25 units in the positive direction from zero is written $|+25| = 25$.

A distance 25 units in the negative direction from zero is written $|-25| = 25$.

The absolute value of a positive number is equal to the number itself. The absolute value of a negative number is the opposite of the number. The absolute value of zero is simply zero.

Distance is always greater than or equal to zero.

Elevation relative to sea level is measured vertically from sea level. Sea level is typically represented as elevation = 0. Therefore, elevation may be positive, negative, or zero.

The vertical number line below represents some people and animals at elevations from 25 meters below sea level (-25 m) to 25 meters above sea level (+25 m).

What	Elevation	Distance from zero (sea level)	Absolute value equation for Distance from sea level
crow	+25 m	25 m	$\|25\| = 25$
gull	+15 m	15 m	$\|15\| = 15$
swimmer	0 m	0 m	$\|0\| = 0$
dolphin	-25 m	25 m	$\|-25\| = 25$

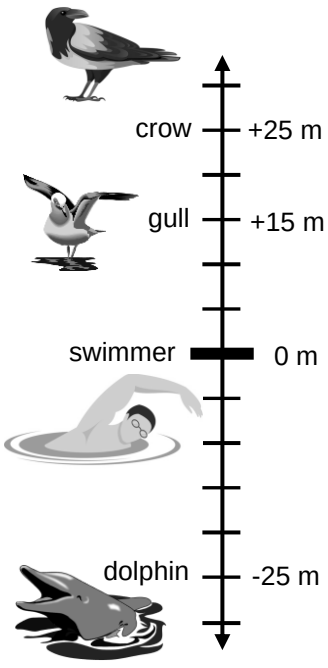
Here are some true statements about elevation:

- The gull is at a higher elevation than the dolphin: $15 > -25$
- The swimmer is at a lower elevation than the crow: $0 < 25$

Here are some true statements about absolute value:

- The dolphin and the crow are the same distance from 0: $|-25| = |25|$
- The dolphin and the crow are both 25 meters from sea level: $|-25| = |25|$

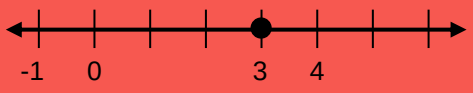
The dolphin is farther from sea level than the gull: $|-25| > |15|$



Graphing Inequalities on the Number Line

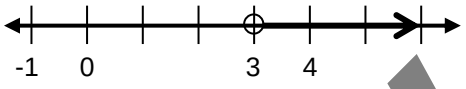
Here are some ways to represent solutions to inequalities on a number line.

Values on the number line that satisfy the equation $x = 3$.



The dots represents that a number is graphed.

Values on the number line that satisfy the inequality $x > 3$.



The "open dot" indicates that $x = 3$ is not included in the solution set. That is, it is not a solution to the inequality $x > 3$. The arrow indicates that all numbers to the right on the number line are solutions.

The Coordinate Plane

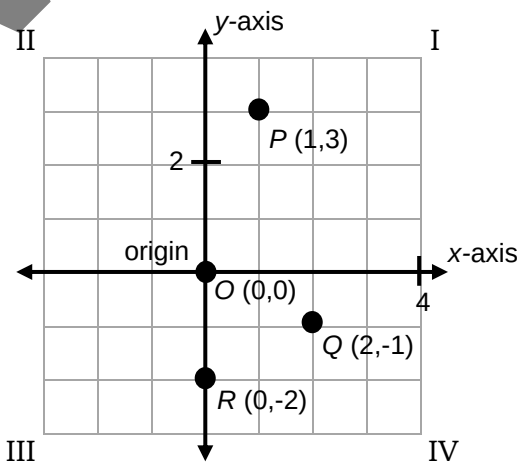
A coordinate plane is determined by a horizontal number line (the *x*-axis) and a vertical number line (the *y*-axis) intersecting at the zero on each line. The point of intersection (0, 0) of the two lines is called the origin.

Points are located using ordered pairs (*x*, *y*).

- The first number (*x*-coordinate) indicates how far the point is to the right or left of the *y*-axis.
- The second number (*y*-coordinate) indicates how far the point is above or below the *x*-axis.

The axes (plural of axis) divide the plane into four regions, called quadrants. By convention, we number the quadrants using Roman numerals I-IV, starting with the upper right quadrant (first quadrant) and moving counterclockwise to the lower right quadrant (fourth quadrant). The axes may be considered as boundary lines and are not part of any quadrant.

Point and Coordinates	Interpretation	Location
O (0, 0)	At the intersection of the axes.	origin
P (1, 3)	Start at the origin, move 1 unit right, then 3 units up.	Quadrant I
Q (2, -1)	Start at the origin, move 2 units right, then 1 unit down.	Quadrant IV
R (0, -2)	Start at the origin, move 0 units right or left, then 2 units down.	*y*-axis



COMMON CORE STATE STANDARDS

STANDARDS FOR MATHEMATICAL CONTENT	
6.NS.C	**Apply and extend previous understandings of numbers to the system of rational numbers.**
6.NS.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation
6.NS.6	Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates:
a.	Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., -(-3) = 3, and that 0 is its own opposite.
b.	Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
c.	Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
6.NS.7	Understand ordering and absolute value of rational numbers.
a.	Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret -3 > -7 as a statement that -3 is located to the right of -7 on a number line oriented from left to right.*
b.	Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write -3°C is warmer than -7°C.*
c.	Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of -30 dollars, write $\lvert -30 \rvert = 30$ to describe the debt in dollars.*
d.	Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.*
6.NS.8	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.
6.G.A	**Solve real-world and mathematical problems involving area, surface area, and volume.**
6.G.3	Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.
6.EE.B	Reason about and solve one-variable equations and inequalities.
6.EE.5	Understand solving an ~~equation or~~ inequality as a process of answering a question: which values from a specified set, if any, make the ~~equation or~~ inequality true? Use substitution to determine whether a given number in a specified set makes an ~~equation or~~ inequality true.
6.EE.8	Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

STANDARDS FOR MATHEMATICAL PRACTICE	
SMP1	Make sense of problems and persevere in solving them.
SMP2	Reason abstractly and quantitatively.
SMP3	Construct viable arguments and critique the reasoning of others.
SMP4	Model with mathematics.
SMP5	Use appropriate tools strategically.
SMP6	Attend to precision.
SMP7	Look for and make use of structure.
SMP8	Look for and express regularity in repeated reasoning.

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