Table of Contents

Chapter 3: Extending the Number Line (4 weeks)

Utah Core Standard(s):

- Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. (6.NS.5)
- 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. (6.NS.6)
  a) Recognize opposites 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.
- Understand ordering and absolute value of rational numbers. (6.NS.7)
  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 $-3\,°C > -7\,°C$ to express the fact that $-3\,°C$ 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 $|-30| = 30$ to describe the size of 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.*
- 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.NS.8)

Academic Vocabulary: number line, whole number, positive number, negative number, integer, rational number, line symmetry, opposites, scale, quadrant, origin, *x*-axis, *y*-axis, absolute value, greater than, less than, deposit, withdrawal, debit, credit, ascend, descend, profit, loss

Chapter Overview:

In this chapter, students extend their knowledge of the number system to the set of all rational numbers, which includes negative rational numbers. Using string and a straightedge, students construct a ray that extends from zero to the right and they show the location of the counting numbers. Then, they partition their string to show the location of various positive rational numbers on the line. Using a similar process, students construct a ray that extends left of zero. They use the length they have defined as one unit to mark off the opposites of the counting numbers, realizing the set of numbers known as integers. Then, they partition their string to show the location of negative rational numbers, realizing the set of numbers known as rational numbers.

This activity surfaces several ideas for students, including the fact that all rational numbers can be represented by a point on the number line and that there are real-world and mathematical problems that have required us to expand the number system over time. For example, the need for negative numbers arose to describe shortages in shipments. Mathematically, the need for negative numbers arose to address problems such as $3 - 4$. Additionally, students discover the symmetry of the number line. They learn that every rational number has an opposite – a number that is equidistant from zero but located on the opposite side of zero. The opposite of a number can be found by reflecting the point across the vertical line passing through zero on a horizontal number line (a horizontal line passing through zero on a vertical number line).

Understanding the structure of the number line plays a leading role for the remainder of the chapter. Students use ideas about symmetry to find and position rational numbers on number lines (and pairs of rational numbers on coordinate planes), to compare and order rational numbers, and to find the distance between two points on the same horizontal or vertical line. Students learn what absolute value is and distinguish between the value of a number relative to zero and the magnitude of a number. In the last section, students synthesize and apply these concepts as they investigate negative numbers in context.

Connections to Content:

Prior Knowledge: In elementary grades, students worked with the representation of numbers on the number line. In Grade 2 they learned how to put counting numbers at equally spaced intervals as tick marks on a straightedge. Then in Grade 3 students learned to represent a fraction $\frac{a}{b}$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts, recognizing that each part has size $\frac{1}{b}$ and that the endpoint of the part based at 0 locates the number $\frac{1}{b}$ on the number line. They also learned to represent a fraction $\frac{a}{b}$ on a number line diagram by marking off a lengths of $\frac{1}{b}$ from 0, recognizing that the resulting interval has size $\frac{a}{b}$ and that its endpoint locates the number $\frac{a}{b}$ on the number line. Throughout elementary grades, students have compared and ordered positive rational numbers. In Grade 5, students graphed ordered pairs in the first quadrant.

Future Knowledge: In Grade 7, students will learn to operate with positive and negative rational numbers. In Grade 8, the number system is expanded to include irrational numbers. Students come to understand that irrational numbers are points on the real number line even though they cannot be represented with an exact decimal value. Students will use rational approximations of irrational numbers to compare the size of irrational numbers and to estimate the value of expressions that contain irrational numbers. Lastly, students will rely on their knowledge of the coordinate plane when they study functions.

MATHEMATICAL PRACTICE STANDARDS

	Make sense of problems and persevere in solving them.	In this problem, you will order the *opposites* of the numbers from the previous problem, also from least to greatest. $$-0.45, -\frac{7}{8}, -\frac{5}{9}, -\frac{1}{10}, -0.9, -\frac{5}{8}, -\frac{2}{5}, -0.09, -\frac{1}{5}, -0.75$$ *Being asked to order several numbers can be overwhelming for students. The text provides scaffolding to make this problem more approachable. First, students are asked to order the opposites of the numbers shown above. The opposites of the numbers above are all positive rational numbers. At this point, students are likely more comfortable working with positive rational numbers. To order the list of positive rational numbers, students are encouraged to first categorize the numbers as closer to 0, closer to $\frac{1}{2}$, or closer to 1 and organize the information in a graphic organizer. Now, the students are tasked with ordering three subsets of the original set of numbers. Now, we turn back to the original problem above. If students have successfully ordered the opposites of the numbers shown above, they can use ideas about symmetry on the number line to order the negative numbers. Numbers that are bigger when positive become smaller when reflected over the vertical line passing through zero; therefore, the order of the negative numbers is the reverse of the positive numbers.*
	Reason abstractly and quantitatively.	Select all statements that are true based on the number line shown. ☐ $-(D) = B$ ☐ $-(A) = -(E)$ ☐ $-(-(E)) = A$ ☐ $-(C) = C$ ☐ $B = -3\frac{1}{2}$ *Throughout the chapter, students use number line models to interpret abstract statements as shown in the example above. Students start the chapter by physically constructing a number line to show positive and negative rational numbers. Following the physical construction of a number line, students create and use models of number lines to investigate abstract concepts.*

	Construct viable arguments and critique the reasoning of others.	Ms. Tucker tells her class that *a* and *b* are rational numbers and $a < b$. Describe what would have to be true about the values of *a* and *b* for the following statements to be true. Justify your answers.
		
		   a. The absolute value of *a* is larger than the absolute value of *b*.
		
		   b. The absolute value of *a* is smaller than the absolute value of *b*.
		
		   c. *a* is farther away from zero than *b*.
		
		This problem requires students to apply what they know about the difference between the relative value of a number and the number's magnitude or distance from zero. Some students may create models to investigate the claims and use their models to justify their conclusions and communicate them to others. Others may test values for a and b to explore the problem and justify their claims.

	Model with mathematics.	The biggest temperature changes to occur in the same day occurred in Spearfish, South Dakota on January 22, 1943. The table below shows the temperature at different times during the day. Use this information to answer the questions below.
		
		Time / Temperature in Degrees Fahrenheit table below.
		
		   a. What was the change in temperature from 7:30 am to 7:32 am?
		   b. What was the change in temperature from 7:32 am to 9:00 am?
		   c. What was the change in temperature from 9:00 am to 9:27 am?
		   d. What was the warmest time of the day?
		   e. What was the coldest time of the day?
		
		Section three of this chapter provides the opportunity for students to explore various real-world problems that necessitate the use of positive and negative numbers to represent quantities. While exploring these problems, students will likely create models such as number lines, and apply the skills learned previously in the chapter such as graphing, comparing, finding the distance between two points on the same horizontal or vertical line, etc.

Time	Temperature in Degrees Fahrenheit
7:30 am	−4°
7:32 am	45°
9:00 am	54°
9:27 am	−4°

	Use appropriate tools strategically.	*The tool used repeatedly in this chapter is a number line model. Students apply their understanding of the structure of the number line to identify and locate points on a number line, compare and order numbers, find the distance between two points on the same horizontal or vertical line, and represent real world quantities.*
	Attend to precision.	Graph the following sets of points and then find the distance between the two points.$(-2, -4)$ and $(4, -4)$ *Graphing points in the coordinate plane requires students to attend to precision. What does the first number in an ordered pair represent? The second number? If the first number is negative, do I move to the right or the left? Where do I start when I graph points? Once students have correctly graphed the points above, the next step is to find the distance between the two points. This task also requires precision. What are we counting to find the distance between the two points? Does it matter which point we start from? What do we know about our answer?*
	Look for and make use of structure.	*This chapter starts with students acquiring an understanding of the structure of the number line, specifically that the number line extends in both directions from zero and that we can create the left side of the number line (negative numbers) by reflecting the right side of the number line over the vertical line that passes through zero. Each point on the right side of the number line has a corresponding point on the left side of the number line, that is equidistant from zero but opposite in sign. The understanding of this structure plays an integral role throughout the chapter as students identify and locate rational numbers on the number line, compare and order rational numbers, and find distances between points. This structure also facilitates understanding of the coordinate plane as the intersection of a horizontal and vertical number line at the origin.*
	Look for and express regularity in repeated reasoning.	Give the values of *K*, *L*, *M*, and *N* on the graph below if each tick mark represents… a. 1 unit b. 6 units c. 12 units d. $\frac{1}{2}$ of a unit e. $\frac{1}{3}$ of a unit f. $\frac{1}{6}$ of a unit *Students use repeated reasoning throughout the chapter when they scale graphs. In the problem above, each set of numbers is a multiple of another set of numbers. Students see that graphing 4 is like graphing $\frac{4}{3}$ because both numbers are 4 units to the right of zero on the number line but for the number 4 each interval has a length of 1 whereas for $\frac{4}{3}$ each interval has a length of $\frac{1}{3}$. This work ties back to 3.NF.2b: "Represent a fraction a/b on a number line diagram by marking off a lengths $1/b$ from 0. Recognize that the resulting interval has size a/b and its endpoint locates the number a/b on the number line."*

6WB3 - 6

3.0 Anchor Problem:

⬡⬤⬔⬚⬛⊞

There is a 136-mile long mountain bike ride where cyclists ride from Badwater Basin in Death Valley to Whitney Portal, a trailhead leading to Mount Whitney. Badwater Basin is the lowest place in North America with an elevation of 279 feet below sea level. Whitney Portal is 8,374 feet above sea level.

The riders start at Badwater Basin and pass through the places shown in the table in the order they appear in the table. The ride ends at Whitney Portal. Use this information to answer the questions that follow.

Places	Elevation (to the nearest foot)
Badwater Basin (start)	279 feet below sea level
Furnace Creek	190 feet below sea level
Beatty Junction	187 feet below sea level
Stovepipe Wells	10 feet above sea level
Panamint Springs	1,926 feet above sea level
Lone Pine	3,727 feet above sea level
Whitney Portal (end)	8,374 feet above sea level

a. Create a model to represent the elevations of the locations shown in the table.

b. Order the elevations from least to greatest.

c. Order the elevations from farthest from sea level to closest to sea level.

d. What is the change in elevation from Badwater Basin to Furnace Creek?

e. What is the change in elevation from Badwater Basin to Stovepipe Wells?

f. What is the change in elevation from Stovepipe Wells to Panamint Springs?

g. What is the change in elevation from the start of the ride (Badwater Basin) to the end of the ride (Whitney Portal)?

h. Whitney Portal is a trailhead that leads to Mount Whitney, the highest peak in the contiguous United States. Mount Whitney has an elevation of 14,505 feet. Following the bike ride, a rider decides to take the trail from Whitney Portal to the top of Mount Whitney. What is the change in elevation from Whitney Portal to the top of Mount Whitney?

i. What is the change in elevation from Badwater Basin to the top of Mount Whitney?

Section 3.1: The Symmetry of the Number Line

Section Overview:
Up to this point, students have worked with positive rational numbers. This section opens with a mathematical problem that serves as motivation for extending the number line to the left of zero, thus extending the number system to include all rational numbers. Students construct a number line, starting first with the portion of the number line to the right of zero and then, using a similar process, they extend the number line to the left of zero. Students discover that the number line is symmetric about the vertical line passing through zero and that every rational number has an opposite that is equidistant from zero but located on the opposite side of zero. Understanding of this structure will serve as a valuable tool throughout the chapter. As the section progresses, students write and interpret symbolic statements about opposites. Next, students explore scales of graphs. The ability to read and interpret the scale of a graph and to determine an appropriate scale to graph a given set of points or ordered pairs is a critical skill for students as they progress in mathematics. Next, students determine the value of rational numbers plotted on a number line and they represent rational numbers on a number line. Lastly, students see that we can intersect a horizontal and vertical number line at the origin to create a coordinate plane. They study the structure of the coordinate plane and find and position pairs of rational numbers on the coordinate plane.

Concepts and Skills to Master:
By the end of this section, students should be able to:
1. Understand a rational number as a point on the number line.
2. Construct a number line to show negative numbers using ideas about symmetry. Recognize opposite signs of numbers as indicating locations on opposite sides of zero on the number line.
3. Write and interpret symbolic statements about opposites (e.g., $-(-3)$ is read "the opposite of negative three" and can be simplified to 3).
4. Determine the value of rational numbers represented on a horizontal and vertical number line.
5. Represent rational numbers on horizontal and vertical number lines.
6. Represent pairs of rational numbers on the coordinate plane.

3.1a Class Activity: Constructing a Number Line

Activity 1: Left of Zero

Step 1: Using a ruler, draw a horizontal line on the graph paper shown below.

Step 2: Mark a tick in the middle of the line and label it 0.

Step 3: Mark and label the numbers 1 – 10.

Step 4: Use your number line to show the location of $6 + 2$.

Step 5: Use your number line to show the location of $3 + 4$.

Step 6: Use your number line to show the location of $6 - 2$.

Step 7: Use your number line to show the location of $3 - 4$.

Step 8: Use your number line to show the location of $3 - 5$.

Step 9: Create your own problem that would show the location of -3.

How did you use the Practice Standard "Use appropriate tools strategically?"

Activity 2: Constructing the Number Line

Spiral Review

1. Partition the segment from zero to one to show the fractional parts. The first one has been done for you.

Partition the Number Line to Show…	Number Line	Number of Cuts Between 0 and 1
Halves	0 — ½ — 1	1
Thirds	0 — 1	
Fourths	0 — 1	
Fifths	0 — 1	
Sixths	0 — 1	
Eighths	0 — 1	
Ninths	0 — 1	
Tenths	0 — 1	

2. If you make 11 cuts between zero and one, how many segments will you create? What is the length of each segment?

3. How many cuts would you need to make between zero and one to create twentieths?

4. How many cuts would you need to make to create hundredths? Explain a process you can use to create hundredths.

3.1a Homework: Constructing a Number Line

1. In the space below, construct a number line showing the integers from -5 to 5.

2. Explain the process you used to create your number line. What steps did you take? What tools did you use?

3. How many points are 3 units away from 0 on your number line? Explain.

4. Explain a method for showing the location of $\frac{1}{3}$ on your number line.

5. Explain a method for showing the location of $-\frac{1}{3}$ on your number line.

6. Explain a method for showing the location of $\frac{4}{3}$ on your number line. Mark $\frac{4}{3}$ on your number line.

7. Explain a method for showing the location of $-\frac{4}{3}$ on your number line. Mark $-\frac{4}{3}$ on your number line.

3.1b Class Activity: Symmetry on a Number Line

Activity 1:

Spiral Review

1. Complete each statement to show the equivalent fractions.

a. $\frac{1}{2} = \frac{}{12}$	b. $\frac{1}{3} = \frac{}{12}$	c. $\frac{1}{6} = \frac{}{12}$
d. $\frac{2}{3} = \frac{}{12}$	e. $\frac{3}{4} = \frac{}{12}$	f. $\frac{5}{6} = \frac{}{12}$
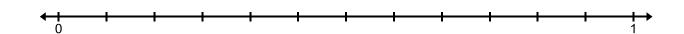
2. Use the number line below to complete this activity.

   a. Label the tick marks to show the scale of the graph.

   b. Graph and label the following points on the number line:

   $A: \frac{1}{2}$ $B: \frac{1}{3}$ $C: \frac{1}{6}$ $D: \frac{2}{3}$ $E: \frac{3}{4}$ $F: \frac{5}{6}$
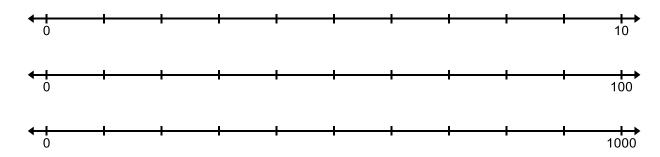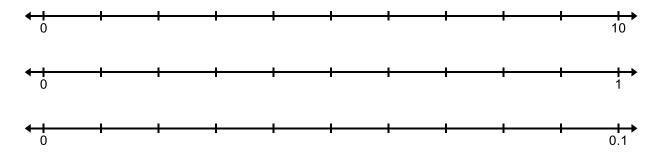
3. Complete the scale on the number lines below:

4. Complete the scale on the number lines below:
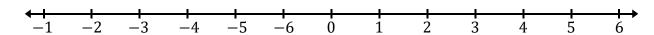
3.1b Homework: Symmetry on a Number Line
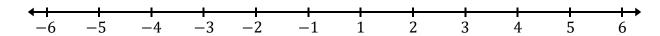
1. Mrs. Henderson asked her students to create a number line to represent the integers from -6 to 6. The work of five different students is shown below. Circle the names of the students who created a correct number line. For the number lines that are incorrect, explain the error.

   Emma's Number Line:
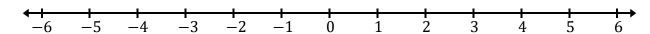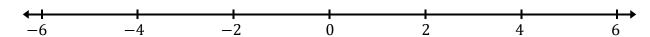
   Sam's Number Line:
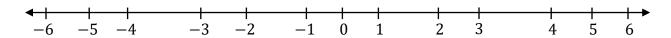
   Tyson's Number Line:

   Amy's Number Line:

   Dom's Number Line:

2. Select all the statements that are true about the number -5 on a horizontal number line.

   ☐ It is 5 units away from zero.

   ☐ It is -5 units away from zero.

   ☐ It is located to the left of zero.

   ☐ It is 10 units away from its opposite.
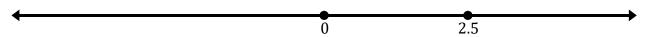
   ☐ It is 1 unit to the right of -4.

3. What is the relationship between 7 and -7 on the number line?

4. Which set or sets of points are opposites on the number line shown below? Justify your answer.

```
         A   B              C       D              E     F
    <----•---•--------------•---•---•--------------•-----•---->
                                0
```

5. Use the number line below to complete this question.

```
    <-----------------------•---------------•-------------->
                            0              2.5
```

   a. The number line below shows the location of 2.5. Explain a method for representing -2.5 on the number line.

   b. Represent -2.5 on the number line.

6. Use the number line below to complete this question.

```
             A                                        B
    <--------•----------------------------------------•-------->
```

   a. Show the location of zero on the graph if points *A* and *B* are opposites.

   b. Explain the method you used to show the location of zero.

7. Two points R and S are graphed on the number line below.

Select all statements that you know are true about the *opposite* of R.

☐ It is a negative number.

☐ It is the same distance from zero as R.

☐ It is located to the right of S.

☐ It is a whole number.

Write your own statement that is true about the *opposite* of R.

8. How many numbers are $2\frac{1}{2}$ units away from 0 on a number line? Justify your answer.

9. For each statement below, answer either:

A: $\frac{1}{4}$ B: $-\frac{1}{4}$ C: $\frac{1}{4}$ and $-\frac{1}{4}$
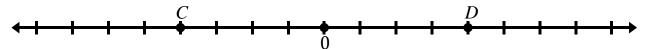
a. Represents the number or numbers $\frac{1}{4}$ of a unit to the left of 0.

b. Represents the distance from 0 to $-\frac{1}{4}$.

c. Represents the number or numbers $\frac{1}{4}$ of a unit away from zero.

10. What number is equal to its opposite? Explain.

3.1c Class Activity: Exploring Scales of Graphs

Activity 1:
Mrs. Potter put the following number line on the board and asked the students to give the values of C and D.

$$C \qquad\qquad\qquad\qquad\qquad\qquad D$$

$$0$$

Here are the responses she got from six different students:

Shaun
$C = -4$ and $D = 4$

Nadia
$C = -8$ and $D = 8$

Daniella
$C = -200$ and $D = 200$

Gloria
$C = -1$ and $D = 1$

Jesse
$C = -\dfrac{4}{3}$ and $D = \dfrac{4}{3}$
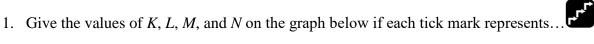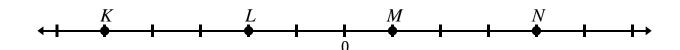
Tabitha
$C = -\dfrac{2}{3}$ and $D = \dfrac{2}{3}$

a. Mrs. Potter told the class that all six students have given a correct answer. Shaun thought to himself, "How can we all have different answers and all be correct?" Help Shaun by explaining how all six students can be correct.

b. Give another possible set of values for C and D. Explain.

1. Give the values of *K*, *L*, *M*, and *N* on the graph below if each tick mark represents…

a. 1 unit

K: *L*:   *M*:   *N*:

b. 6 units

K: *L*:   *M*:   *N*:

c. 12 units

K: *L*:   *M*:   *N*:

d. $\frac{1}{2}$ of a unit

K: *L*:   *M*:   *N*:

e. $\frac{1}{3}$ of a unit

K: *L*:   *M*:   *N*:
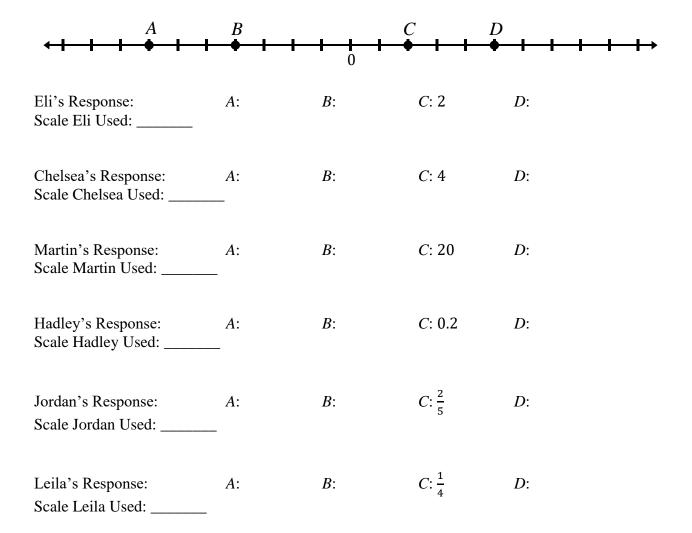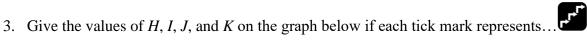
f. $\frac{1}{6}$ of a unit

K: *L*:   *M*:   *N*:
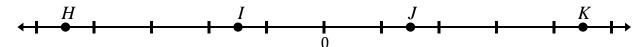
2. Mr. Tanner put the following number line on the board and asked his students to give the value of C. Mr. Tanner did not put a scale on the number line and these are the responses he got from six different students.

    a. Determine the scale that each student used.

    b. Use the same scale as each student to determine the values of A, B and D.

Eli's Response: A: B: C: 2 D:
Scale Eli Used: _____

Chelsea's Response: A: B: C: 4 D:
Scale Chelsea Used: _____

Martin's Response: A: B: C: 20 D:
Scale Martin Used: _____

Hadley's Response: A: B: C: 0.2 D:
Scale Hadley Used: _____

Jordan's Response: A: B: C: $\frac{2}{5}$ D:
Scale Jordan Used: _____

Leila's Response: A: B: C: $\frac{1}{4}$ D:
Scale Leila Used: _____

3. Give the values of *H*, *I*, *J*, and *K* on the graph below if each tick mark represents…

a. 1 unit

H: *I*:   *J*:   *K*:

b. 6 units

H: *I*:   *J*:   *K*:

c. 10 units

H: *I*:   J: *K*:
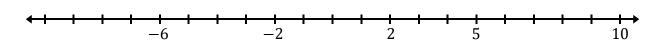
d. 50 units

H: *I*:   J: *K*:
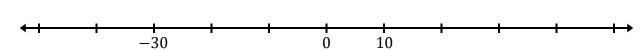
Directions: Complete the scales on the number lines shown below. Use ideas about opposites to help you.

4.

−6   −2   2   5   10

5.

−30   0   10

6.

0   100

7.

0    $\frac{1}{4}$ 1

8.

0   1

9.

0.25
0

10.

15

-15

11.

$\frac{1}{5}$

0

$-\frac{1}{5}$
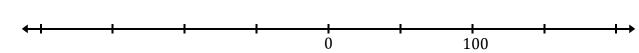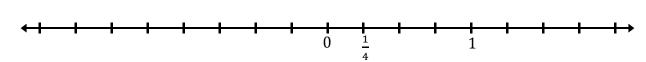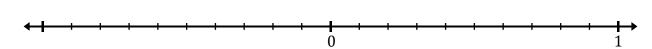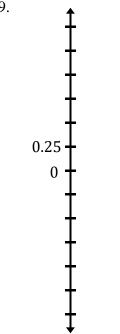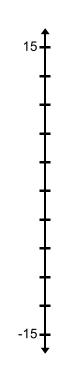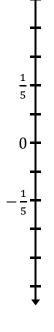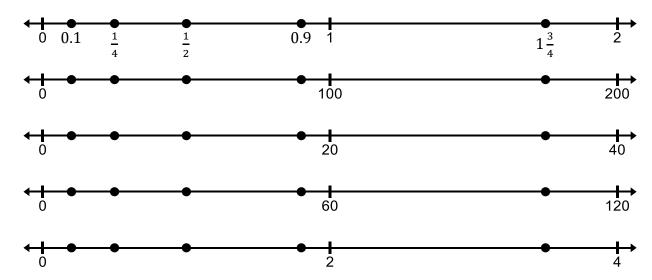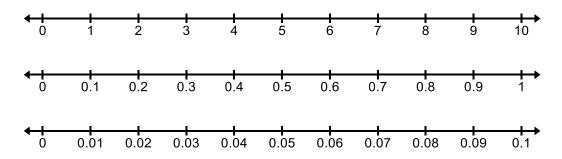
1. Use the first graph to determine the value of the points on the remaining four graphs. In the space below, explain the strategy you used to solve the problem.

2. Use the three number lines below to answer the questions below.

a. What number is half-way between 4 and 5 on the first number line? _____

b. What number is half-way between 0.4 and 0.5 on the second number line? _____

c. What number is half-way between 0.04 and 0.05 on the third number line? _____

d. What number is half-way between 0 and 1 on the first number line? _____

e. What number is half-way between 0 and 0.1 on the second number line? _____

f. What number is half-way between 0 and 0.01 on the third number line? _____

g. Give a number that is between 8 and 9 on the first number line. _____

h. Give a number that is between 0.8 and 0.9 on the second number line. _____

i. Give a number that is between 0.08 and 0.09 on the third number line. _____

3. Change each mixed number to an improper fraction.
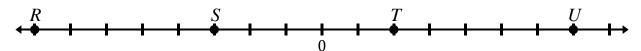
a. $3\frac{1}{2}$	b. $1\frac{2}{3}$	c. $2\frac{4}{5}$
d. $1\frac{3}{4}$	e. $8\frac{3}{10}$	f. $5\frac{3}{8}$

4. Change each improper fraction to a mixed number.

a. $\frac{9}{2}$	b. $\frac{10}{3}$	c. $\frac{15}{4}$
d. $\frac{35}{10}$	e. $\frac{22}{8}$	f. $\frac{32}{5}$

3.1c Homework: Exploring Scales of Graphs

1. Give the values of *R*, *S*, *T*, and *U* on the graph below if each tick mark represents…

R   S   T   U

0

a. 1 unit

R: *S*:   *T*:   *U*:

b. 2 units

R: *S*:   *T*:   *U*:

c. 5 units

R: *S*:   *T*:   *U*:

d. 25 units

R: *S*:   *T*:   *U*:

e. $\frac{1}{4}$ of a unit

R: *S*:   T: *U*:
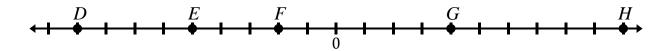
f. $\frac{1}{8}$ of a unit

R: *S:*   *T*:   *U*:

2. Mrs. Potter put the following number line on the board and asked her students to give the value of *D, E, F, G,* and *H*. Mrs. Potter did not put a scale on the number line and these are the responses she got from six different students. Determine the scale that each student used.

Trevor's Response: *D*: −9   *E*: −5   *F*: −2   *G*: 4   *H*: 10
Scale Trevor Used: _____

Kaitlyn's Response: *D*: −27   *E*: −15   *F*: −6   *G*: 12   *H*: 30
Scale Kaitlyn Used: _____

Jake's Response: *D*: −225   *E*: −125   *F*: −50   *G*: 100   *H*: 250
Scale Jake Used: _____

Marla's Response: *D*: −900   *E*: −500   *F*: −200   *G*: 400   *H*: 1,000
Scale Marla Used: _____

Kai's Response: $D: -\frac{9}{4}$ $E: -\frac{5}{4}$ $F: -\frac{1}{2}$ *G*: 1 $H: \frac{5}{2}$
Scale Kai Used: _____

Iya's Response: $D: -\frac{9}{2}$ $E: -\frac{5}{2}$ *F*: −1   *G*: 2   *H*: 5
Scale Iya Used: _____

3. Use the number line below to answer the questions that follow. ⊞

$$\xleftrightarrow{\qquad\quad \overset{A}{\bullet} \qquad\qquad\qquad\qquad\qquad\qquad \overset{B}{\bullet} \qquad\qquad}$$

    a. Show on the graph where 0 would have to be for A and B to be opposites.

    b. Give one possible set of values for A and B.

        A: _____ B: _____
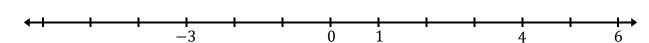
    c. Give a different possible set of values for A and B.

        A: _____ B: _____
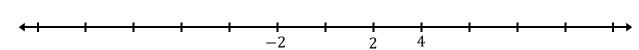
    d. Cynthia's set of values were $A = -3$ and $B = 3$. How did Cynthia scale the graph?

Directions: Complete the scale on the number lines shown below. Use ideas about opposites to help you.

4.

$$\xleftrightarrow{\qquad\quad -3 \qquad\qquad 0 \quad 1 \qquad\qquad 4 \qquad\quad 6 \qquad}$$

5.

$$\xleftrightarrow{\qquad\qquad\qquad -2 \qquad 2 \quad 4 \qquad\qquad\qquad\qquad}$$

6.

$$\xleftrightarrow{\quad -4 \qquad\qquad\qquad\qquad -\frac{1}{2} \quad 0 \qquad\qquad\qquad\qquad}$$

7.

$$\xleftrightarrow{\qquad\qquad\qquad\qquad 0 \qquad\qquad\qquad\qquad 0.8 \quad 1 \qquad}$$

6WB3 - 30

8.

5

-5

9.

25

-25

10.

1

0
$-\dfrac{1}{3}$
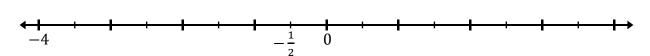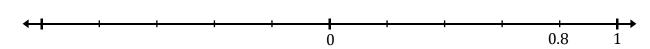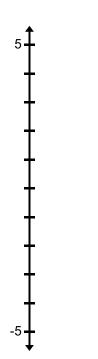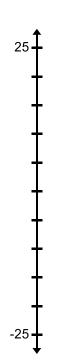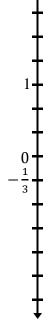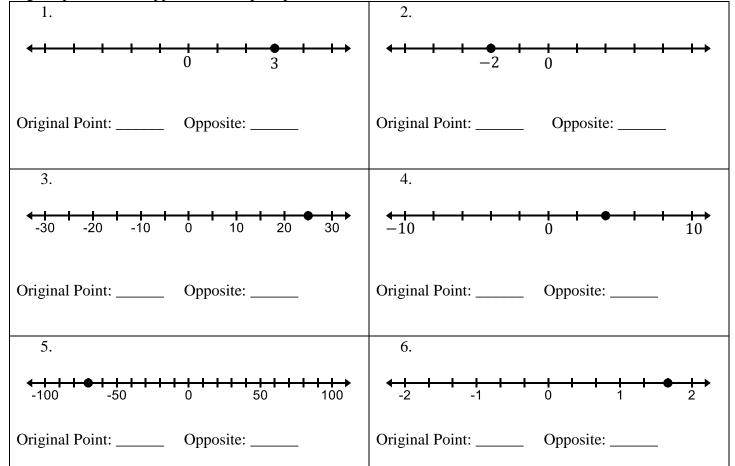
3.1d Class Activity: Opposites

Activity 1: Create a number line showing the integers from -5 to 5.
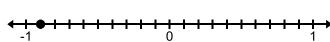

a. Graph 5 and its opposite on the number line you created.

b. Graph -3 and its opposite on the number line you created.

c. Graph $1\frac{1}{2}$ and its opposite on the number line you created.

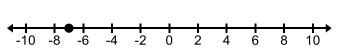**Directions:** In each problem, a point is plotted. Plot the opposite of the point. Then, write the value of the original point and its opposite in the space provided.

1. Original Point: _____ Opposite: _____	2. Original Point: _____ Opposite: _____
3. Original Point: _____ Opposite: _____	4. Original Point: _____ Opposite: _____
5. Original Point: _____ Opposite: _____	6. Original Point: _____ Opposite: _____
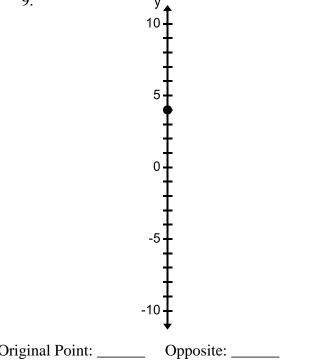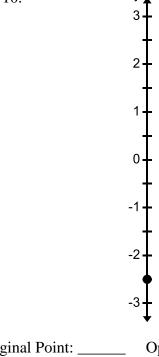
7.	8.
Original Point: _____ Opposite: _____	Original Point: _____ Opposite: _____

9.	10.
Original Point: _____ Opposite: _____	Original Point: _____ Opposite: _____

11. Tell whether the following statements are true or false. Justify your answers.

    a.   The opposite of a number is always a negative number.

    b.   The opposite of 0 is 0.

    c.   The opposite of a positive number is always a negative number.

    d.   The opposite of a number is always smaller than the original number.

Activity 2:

n# ▦
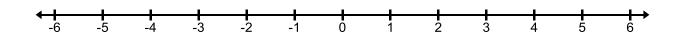
a. What is the opposite of 15?

b. What is the opposite of -15?

c. How do you read the expression $-(4)$? Simplify $-(4)$.

d. How do you read the expression? $-(-2)$. Simplify $-(-2)$.

e. Write "the opposite of -1.3" symbolically (using notation). Then, simplify.

12. How do you read the expression $-(-9)$? Simplify $-(-9)$.

13. How do you read the expression $-(10)$? Simplify $-(10)$.

14. Write "the opposite of $4\frac{1}{2}$" symbolically (using notation). Then, simplify.

15. Write "the opposite of negative 12" symbolically (using notation). Then, simplify.

Activity 3: The Opposite of the Opposite

a. What is the opposite of being happy?

b. What is the opposite of the opposite of being happy?

c. What is the opposite of being on time?

d. What is the opposite of the opposite of being on time?

Directions: Use the number line below to answer the questions that follow.

e. What is the opposite of 2?

f. What is the opposite of the opposite of 2? Describe what is happening geometrically (on the number line).

g. Write "the opposite of the opposite of 2" symbolically. Then, simplify.

h. How do you read the expression $-(-(-2))$? Simplify $-(-(-2))$.

16. How do you read $-(-(-1))$? Simplify $-(-(-1))$.

17. How do you read $-(-(4.5))$? Simplify $-(-(4.5))$.

18. Write "the opposite of the opposite of -150" symbolically (using notation). Then, simplify.

19. Write "the opposite of the opposite of two tenths" symbolically (using notation). Then, simplify.

20. Will said, "The opposite of the opposite of a number is sometimes positive." Is Will's statement true or false? Explain.

Spiral Review

1. Tell whether these fractions are closer to $0, \frac{1}{2}$, or 1.

a. $\frac{9}{10}$	b. $\frac{5}{8}$	c. $\frac{2}{9}$
d. $\frac{9}{12}$	e. $\frac{5}{11}$	f. $\frac{3}{5}$

2. Tell whether the fractions below are bigger than $\frac{1}{2}$ or smaller than $\frac{1}{2}$.

a. $\frac{3}{8}$	b. $\frac{11}{20}$	c. $\frac{5}{9}$
d. $\frac{5}{11}$	e. $\frac{5}{12}$	f. $\frac{3}{5}$

3. Tell whether these decimals are closer to $0, \frac{1}{2}$, or 1.

a. 0.5	b. 0.05	c. 0.19
d. 0.087	e. 0.45	f. 0.8

4. Compare the fractions using $>, <,$ or $=$.

a. $\frac{3}{4}$ ——— $\frac{3}{8}$	b. $\frac{1}{8}$ ——— $\frac{1}{7}$	c. $\frac{3}{8}$ ——— $\frac{3}{7}$
d. $\frac{5}{11}$ ——— $\frac{11}{20}$	e. $\frac{7}{8}$ ——— $\frac{8}{9}$	f. $\frac{1}{3}$ ——— $\frac{6}{18}$

3.1d Homework: Opposites

Directions: In each problem, a point is plotted. Plot the opposite. Then, write the value of the original point and its opposite in the space provided.

1. Number line with point plotted at 1, labels 0 and 1. Original Point: _____ Opposite: _____	2. Number line with point plotted at −5, labels −5 and 0. Original Point: _____ Opposite: _____
3. Number line with point plotted. Original Point: _____ Opposite: _____	4. Number line with labels -2, 0, 2 and point plotted. Original Point: _____ Opposite: _____
5. Number line with labels -3, -2, -1, 0, 1, 2, 3 and point plotted near -1.5. Original Point: _____ Opposite: _____	6. Number line with labels -100 -80 -60 -40 -20 0 20 40 60 80 100 and point plotted near 30. Original Point: _____ Opposite: _____
7. Vertical number line with labels 10, 5, 0, -5, -10 and point plotted near -8. Original Point: _____ Opposite: _____	8. Vertical number line with labels 1, 0.5, 0, -0.5, -1 and point plotted near -0.6. Original Point: _____ Opposite: _____

9. How do you read the expression $-(-12)$? Simplify $-(-12)$.

10. How do you read the expression $-(12)$? Simplify $-(12)$.

11. How do you read the expression $-(-(-12))$? Simplify $-(-(-12))$.

12. How do you read the expression $-(-(12))$? Simplify $-(-(12))$.

13. Write "the opposite of 4" symbolically (using notation). Then, simplify.

14. Write "the opposite of the opposite of -1.25" symbolically (using notation). Then, simplify.

15. Simplify $-(-(7))$.

16. Simplify $-(0)$.

17. Simplify $-(-\frac{4}{3})$.

18. Tell whether the following statements are true or false. Justify your answer.
     a. $-(10) = -10$

     b. $-(-(4)) = -4$

     c. $-(-3) = 3$

     d. $-(-(-20)) = -20$

19. Select all statements that are true based on the number line shown.
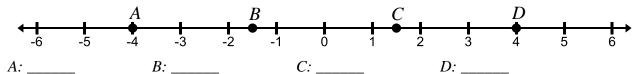
☐ $-(D) = B$

☐ $-(A) = -(E)$

☐ $-(-(E)) = A$

☐ $-(C) = C$

☐ $B = -3\frac{1}{2}$

20. Make up your own statement that is true based on the number line in the previous problem.
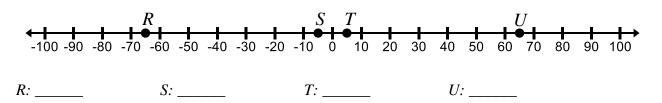
3.1e Class Activity: Identifying Rational Numbers on the Number Line

Activity 1:
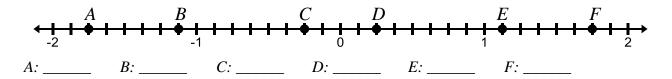
a. Determine the values of *A*, *B*, *C*, and *D* on the number line shown below.

A: _____   B: _____   C: _____   D: _____
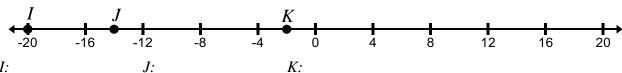
b. Determine the values of *R*, *S*, *T*, and *U* on the number line shown below.

R: _____   S: _____   T: _____   U: _____
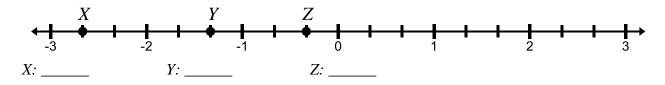
c. Determine the values of *A*, *B*, *C*, *D*, *E*, and *F* on the number line shown below.

A: _____   B: _____   C: _____   D: _____   E: _____   F: _____
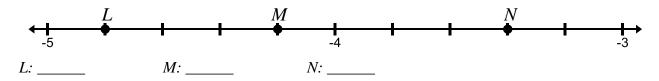
d. Determine the values of *I*, *J*, and *K* on the number line shown below.

I: _____   J: _____   K: _____
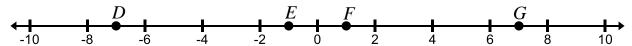
e. Determine the values of *X*, *Y*, and *Z* on the number line shown below.

X: _____   Y: _____   Z: _____
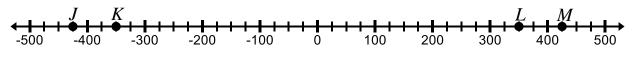
f. Determine the values of *L*, *M*, and *N* on the number line shown below.

L: _____   M: _____   N: _____
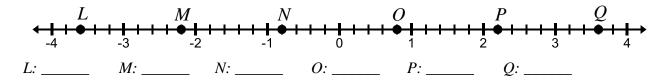
1. Determine the values of *D*, *E*, *F*, and *G* on the number line shown below.
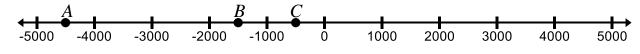
D: _____ E: _____ F: _____ G: _____

2. Determine the values of *J*, *K*, *L*, and *M* on the number line shown below.
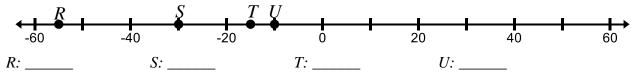
J: _____ K: _____ L: _____ M: _____

3. Determine the values of *L*, *M*, *N*, *O*, *P*, and *Q* on the number line shown below.

L: _____ M: _____ N: _____ O: _____ P: _____ Q: _____
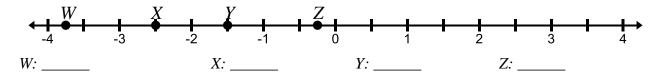
4. Determine the values of *A*, *B*, and *C* on the number line shown below.
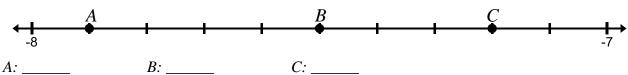
A: _____ B: _____ C: _____

5. Determine the values of *R*, *S*, *T*, and *U* on the number line shown below.
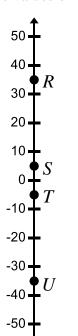
R: _____ S: _____ T: _____ U: _____

6. Determine the values of *W*, *X*, *Y*, and *Z* on the number line shown below.

W: _____ X: _____ Y: _____ Z: _____

7. Determine the values of *A*, *B*, and *C*.

A: _____ B: _____ C: _____
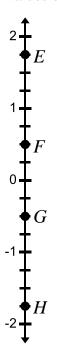
8. Determine the values of R, S, T, and U.

9. Determine the values of E, F, G and H.

R: _____   S: _____

T: _____   U: _____

E: _____   F: _____

G: _____   H: _____

Spiral Review

1. Compare the decimals using $>$, $<$, or $=$.

a. 0.9 _____ 0.09	b. 0.49 _____ 0.5	c. 0.61 _____ 0.6
d. 0.1 _____ 0.11	e. 0.08 _____ 0.1	f. 0.30 _____ 0.3

2. Compare using $>$, $<$, or $=$.

a. $\frac{2}{3}$ _____ 0.5	b. $\frac{3}{10}$ _____ 0.35	c. $\frac{1}{4}$ _____ 0.25
d. $\frac{7}{4}$ _____ 1.25	e. 1.3 _____ $1\frac{3}{100}$	f. $\frac{1}{10}$ _____ 0.09

3. Compare using $>$, $<$, or $=$.
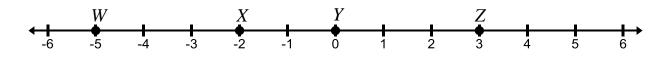
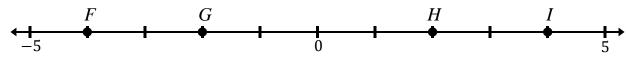|		
a. $\frac{2}{15}$ ____ $\frac{1}{8}$	b. $\frac{7}{22}$ ____ $\frac{1}{3}$	c. $\frac{5}{12}$ ____ $\frac{1}{2}$
d. $\frac{11}{4}$ ____ $2\frac{5}{8}$	e. $\frac{3}{16}$ ____ $\frac{1}{4}$	f. $\frac{1}{5}$ ____ $\frac{5}{20}$

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

a. $\frac{7}{12}, 0.5, \frac{9}{20}$	b. $\frac{1}{4}, \frac{5}{16}, \frac{5}{12}$
c. $\frac{7}{4}, 1.8, 1\frac{79}{100}$	d. $\frac{1}{5}, \frac{1}{10}, \frac{1}{4}$

6WB3 - 43

3.1e Homework: Identifying Rational Numbers on the Number Line

1. Determine the values of *W*, *X*, *Y*, and *Z* on the number line shown below.
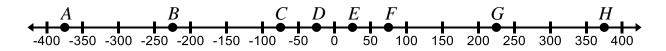
W: _____   X: _____   Y: _____   Z: _____

2. Determine the values of *F*, *G*, *H*, and *I* on the number line shown below.

F: _____   G: _____   H: _____   I: _____
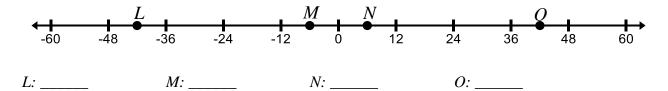
3. Determine the values of *A*, *B*, *C*, *D*, *E*, *F*, *G*, and *H* on the number line shown below.
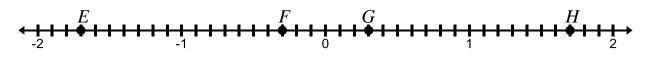
A: _____   B: _____   C: _____   D: _____

E: _____   F: _____   G: _____   H: _____

4. Determine the values of *L*, *M*, *N*, and *O* on the number line shown below.

L: _____   M: _____   N: _____   O: _____
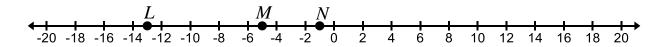
5. Determine the values of *E*, *F*, *G*, and *H* on the number line shown below.

E: _____   F: _____   G: _____   H: _____

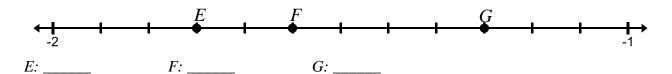6. Determine the values of *L*, *M*, and *N* on the number line shown below.
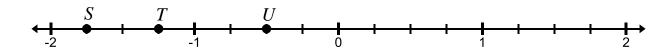
L: _____   M: _____   N: _____

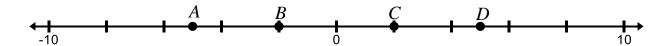7. Determine the values of *S*, *T*, and *U* on the number line shown below.

S: _____   T: _____   U: _____

8. Determine the values of *E*, *F*, and *G* on the number line shown below.

E: _____   F: _____   G: _____

9. **Find, Fix, and Justify:** Henry was asked to give the values of *A*, *B*, *C*, and *D*.

Henry's Answers:

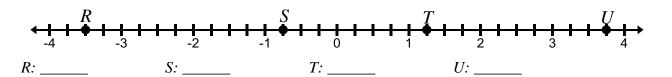A: $-2\frac{1}{2}$ B: -1 C: 1 D: $2\frac{1}{2}$

His teacher told him his answers are not correct. What common error did Henry make? What are the correct values of *A*, *B*, *C*, and *D*?
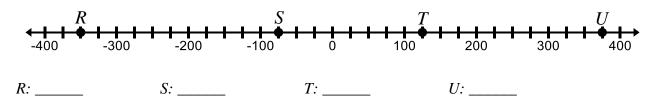
A: _____   B: _____   C: _____   D: _____

10. Determine the values of *R*, *S*, *T*, and *U* on the number line shown below.

R: _____   S: _____   T: _____   U: _____

11. Determine the values of *R*, *S*, *T*, and *U* on the number line shown below.

R: _____   S: _____   T: _____   U: _____

12. Compare problems #10 and #11. How are they similar? How are they different?

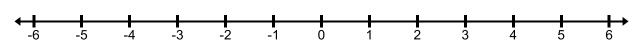## 3.1f Class Activity: Representing Rational Numbers on a Number Line – Scale Given

Activity 1: Graph and label the following points on the number lines provided. Use ideas about opposites to help you.

a. $A: 2$ $B: -2$ $C: 4\frac{1}{2}$ $D: -4\frac{1}{2}$
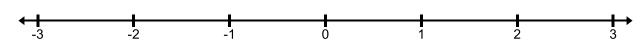

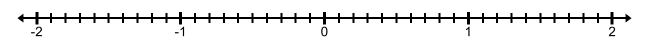b. $J: 2\frac{1}{4}$ $K: -2\frac{1}{4}$ $L: 1.75$ $M: -1.75$
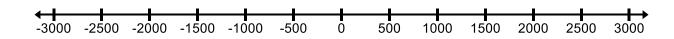

c. $R: -1.8$ $S: -1\frac{3}{5}$ $T: -0.3$ $U: -\frac{1}{2}$

d. $E: 100$ $F: -100$ $G: -1,750$ $H: 1,750$ $I: -2,400$
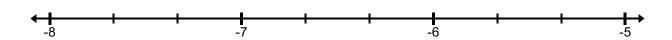

e. $O: -7\frac{1}{3}$ $P: -6\frac{1}{6}$ $Q: -5\frac{2}{3}$

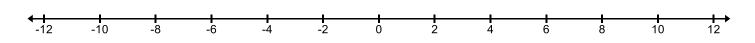**Directions:** Graph and label the following points on the number lines provided. Use ideas about opposites to help you.

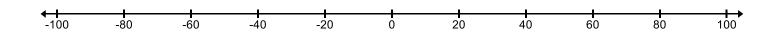1. $L: 11$ $M: -11$ $N: -3$ $O: 3$
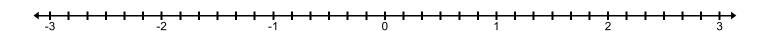

2. $A: 50$ $B: -50$ $C: -90$ $D: 90$ $E: -5$
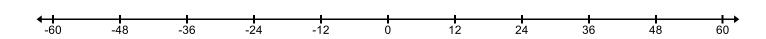
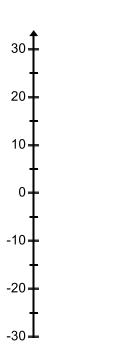3. $L: -\frac{1}{2}$ $M: -1\frac{2}{3}$ $N: -2\frac{5}{6}$ $O: -2\frac{1}{3}$

4. $R: 6$ $S: -24$ $T: -3$ $U: 42$

5. $L: -10$ $M: -25$ $N: 15$ 6. $E: -0.4$ $F: -1\frac{3}{10}$ $G: -1\frac{3}{5}$
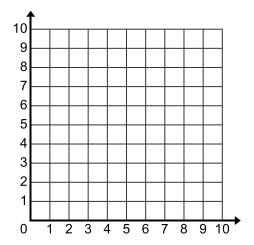
Spiral Review

1. A bakery uses two cups of cherries to make a cherry pie. Complete the table to show the relationship between number of pies and cups of cherries needed.

Number of Pies	Cups of Cherries
1	
2	
3	
8	

2. Create a graph to represent the relationship between number of pies and cups of cherries needed. Use Number of Pies as the independent variable and Cups of Cherries as the dependent variable.

3. Write an equation to show the relationship between number of pies p and cups of cherries c.

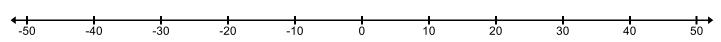4. If the bakery needs to make 25 pies for the county fair, how many cups of cherries will the bakery need?

3.1f Homework: Representing Rational Numbers on a Number Line – Scale Given

Directions: Graph and label the following points on the number lines provided. Use ideas about opposites to help you.
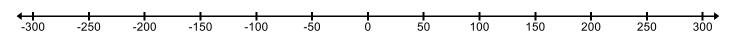
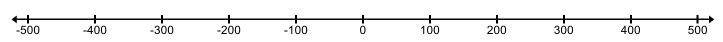1. $Q: 10$ $\qquad$ $R: -10$ $\qquad$ $S: 25$ $\qquad$ $T: -35$
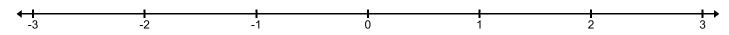
```
◄─┼─────┼─────┼─────┼─────┼─────┼─────┼─────┼─────┼─────┼─►
 -50   -40   -30   -20   -10    0    10    20    30    40    50
```

2. $L: 275$ $\qquad$ $M: -275$ $\qquad$ $N: 125$ $\qquad$ $O: -125$

```
◄─┼─────┼─────┼─────┼─────┼─────┼─────┼─────┼─────┼─────┼─────┼─►
-300  -250  -200  -150  -100   -50    0    50   100   150   200   250   300
```

3. $G: -150$ $\qquad$ $H: -225$ $\qquad$ $I: -475$ $\qquad$ $J: 425$

```
◄─┼─────┼─────┼─────┼─────┼─────┼─────┼─────┼─────┼─────┼─►
-500  -400  -300  -200  -100    0    100   200   300   400   500
```

4. $L: \dfrac{2}{3}$ $\qquad$ $M: -\dfrac{2}{3}$ $\qquad$ $N: 2\dfrac{1}{3}$ $\qquad$ $O: -2\dfrac{1}{3}$

```
◄─┼───────────┼───────────┼───────────┼───────────┼───────────┼─►
 -3          -2          -1           0           1           2           3
```

5. $W: \dfrac{3}{8}$ $\qquad$ $X: -\dfrac{3}{8}$ $\qquad$ $Y: \dfrac{1}{4}$ $\qquad$ $Z: -\dfrac{1}{4}$

```
◄─┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──►
 -1                             0                              1
```

6. $J: -0.25$ $\qquad$ $K: -\dfrac{5}{4}$ $\qquad$ $L: -1.75$ $\qquad$ $M: -\dfrac{3}{2}$

```
◄─┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──►
 -2             -1              0              1              2
```

7. $R: 32$ $\qquad$ $S: -32$ $\qquad$ $T: -4$ $\qquad$ $U: 4$

```
◄─┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──►
 -48                            0                            48
```

8. $E: -9.8$ $\qquad$ $F: -8.4$ $\qquad$ $G: -8\dfrac{3}{4}$ $\qquad$ $H: -9.5$

```
◄─┼───────┼───────┼───────┼───────┼───────┼───────┼───────┼─►
 -10                            -9                            -8
```
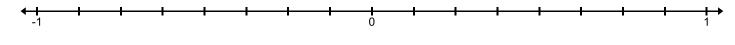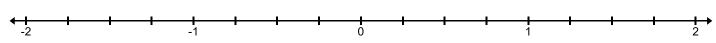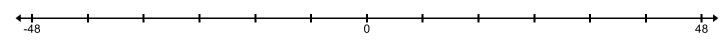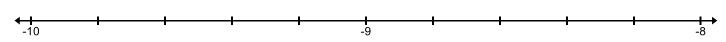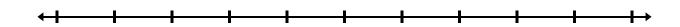
3.1g Class Activity: Representing Rational Numbers on a Number Line – Choosing a Scale

Activity 1: Mr. Frankel's class was asked to create a graph showing the location of the following numbers on the number line below:
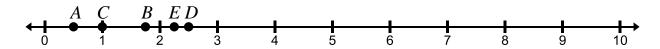
$A: \frac{1}{2}$ $\qquad$ $B: 1\frac{3}{4}$ $\qquad$ $C: 1$ $\qquad$ $D: 2\frac{1}{2}$ $\qquad$ $E: \frac{9}{4}$
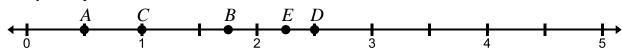

The following three graphs were created by the students.
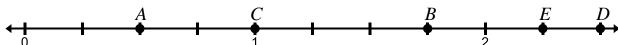
Kevin's Graph

Destiny's Graph

Malia's Graph
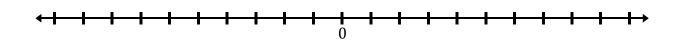
a. Which student(s) created a correct graph?

b. Compare the graphs. Is one better than the others? Explain.
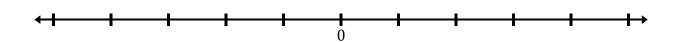
Activity 2:

a. Determine how to scale the number line to graph the points.

$$A: 18, B: -30, C: -27, D: 12, E: -8, F: 25$$

b. What if you have been given the number line below and asked to graph the same points as above? Would you use the same scale? Explain. Then, graph the points on the number line below.
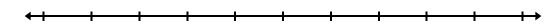
c. If you were creating your own number line to display the data, what scale would you use? Explain. Create your own number line in the space below in display the points from part a.

Activity 3: Graph and label the following points on the number lines provided. First, determine a scale that makes sense for the problem given. Use ideas about opposites to help you.
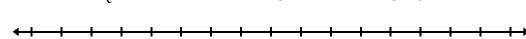
a. $A: 4$ $\qquad$ $B: -4$ $\qquad$ $C: 1$ $\qquad$ $D: -1$
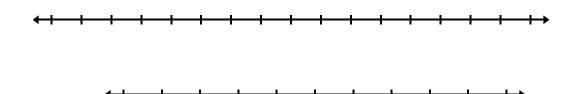
b. $P: -14$ $\qquad$ $Q: 11$ $\qquad$ $R: -5$ $\qquad$ $S: 10$
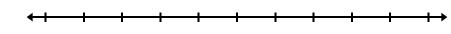
c. For this problem, determine how you would scale the number line if you were given the first number line. Then, determine how you scale the number line if you were given the second number line.

$R: 200$ $\qquad$ $S: -125$ $\qquad$ $T: 75$ $\qquad$ $U: -50$
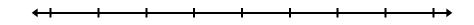
d. $P: 15$ $\qquad$ $Q: -30$ $\qquad$ $R: -60$ $\qquad$ $S: 45$
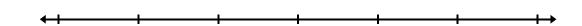
e. $H: -\frac{3}{4}$ $\qquad$ $I: -1$ $\qquad$ $J: 0.5$ $\qquad$ $K: -1.25$

f. $A: -\frac{2}{5}$ $B: -0.6$ $C: -\frac{1}{2}$ $D: -\frac{6}{5}$
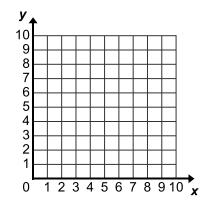
g. $Q: -10.25$ $R: -12$ $S: -11.5$ $T: -10\frac{3}{4}$

Spiral Review
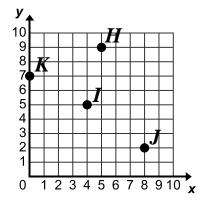
1. Graph and label the points on the coordinate grid.

$A: (1, 5)$

$B: (7, 3)$

$C: (9, 0)$

$D: (0, 9)$

2. List the ordered pairs that correspond to the points on the coordinate grid.

$H:$ _____

$I:$ _____

$J:$ _____

$K:$ _____

6WB3 - 54

3. Find the perimeter of each shape. Shapes are not drawn to scale.

a.	b.
$5\frac{1}{3}$ cm, $5\frac{1}{3}$ cm, $5\frac{1}{3}$ cm (triangle)	4.32 in., 1.08 in. (rectangle)

c.

1 m
1 m
1.5 m
1.5 m
0.5 m
2.5 m

d. A square with a side length of $3\frac{2}{3}$ feet.

4. Complete the table below.

Fraction Representation	Decimal Representation
$\frac{1}{2}$	
$\frac{3}{4}$	
	0.25
	1.25
$\frac{1}{5}$	
	0.3
	0.8

3.1g Homework: Representing Rational Numbers on a Number Line – Choosing a Scale

Directions: Graph and label each set of points on the number lines provided. First, determine a scale that makes sense for the points given in the problem.

1. $C: -4$ $D: -2$ $E: 1$ $F: 5$

2. $E: -15$ $F: -40$ $G: 5$ $H: 20$

3. $E: 150$ $F: -100$ $G: -75$ $H: 50$

4. $P: -8$ $Q: 12$ $R: -16$ $S: 4$

5. $A: 2$ $B: -2$ $G: -\frac{1}{2}$ $H: -1\frac{3}{4}$

6. $P: -5.2$ $Q: -5\frac{3}{10}$ $R: -5\frac{3}{5}$ $S: -5.9$

7. $H: 1$ $I: -1$ $J: \frac{1}{2}$ $K: -\frac{1}{2}$ $L: \frac{2}{3}$ $M: -\frac{2}{3}$

8. Construct your own number line to graph the points.
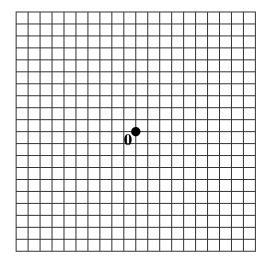 $E: -\frac{4}{3}$ $F: -\frac{2}{3}$ $G: \frac{1}{6}$ $H: 2$

3.1h Class Activity: Pairs of Rational Numbers in the Coordinate Plane

Activity 1: The Intersection of a Horizontal and Vertical Number Line ⊞

a. Construct a horizontal number line that passes through the point shown on the grid.

b. Construct a vertical number line that passes through the point shown on the grid.

c. Label the points $R: (2, 4); S: (-2, 4); T: (2, -4); U: (-2, -4)$.

d. Highlight the **x-axis** in blue. What must be true about the values of the x- and y-coordinates of a point for it to be on the x-axis?

e. Highlight the **y-axis** in purple. What must be true about the values of the x- and y-coordinates of a point for it to be on the y-axis?

f. Shade **Quadrant I** in red. What must be true about the values of the x-and y-coordinates of a point for it to be in Quadrant I?

g. Shade **Quadrant II** in orange. What must be true about the values of the x-and y-coordinates of a point for it to be in Quadrant II?
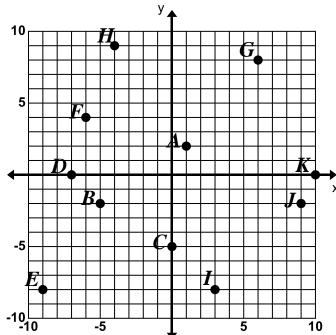
h. Shade **Quadrant III** in yellow. What must be true about the values of the x-and y-coordinates of a point for it to be in Quadrant III?

i. Shade **Quadrant IV** in green. What must be true about the values of the x and y-coordinates of a point for it to be in Quadrant IV?

j. Mark the **origin** in black. Define origin in your own words. What is the ordered pair that corresponds to the origin?

Directions: Use the coordinate plane below to answer #1 – 4.

1. Describe in words how to get from the origin to point *A*. Then, write the ordered pair for point *A*.

2. Describe in words how to get from the origin to point *B*. Then, write the ordered pair for point *B*.

3. Describe in words how to get from the origin to point *C*. Then, write the ordered pair for point *C*.

4. Write the ordered pair for points *D – K*.

   D: _____

   E: _____

   F: _____

   G: _____

   H: _____
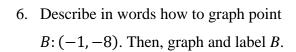
   I: _____
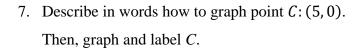
   J: _____
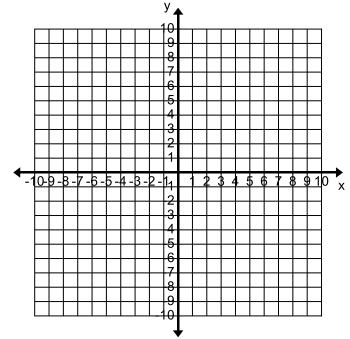
   K: _____

Directions: Use the coordinate plane to answer #5 – 13.

5. Describe in words how to graph the point
   $A: (3, -5)$. Then, graph and label A.

6. Describe in words how to graph point
   $B: (-1, -8)$. Then, graph and label B.

7. Describe in words how to graph point $C: (5, 0)$.
   Then, graph and label C.

8. Graph and label the following points.

   $D: (-4, 6)$ $E: (0, -4)$ $F: (-4, 0)$

   $G: (-1, -2)$ $H: (-5, 7)$ $I: (0, 0)$

   $J: (6, -6)$ $K: (1, 0)$ $L: (1, 9)$
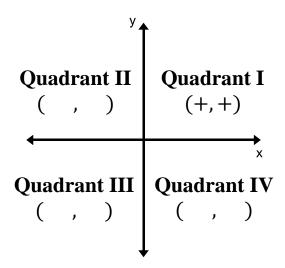
   $M: (0, 5)$ $N: \left(-2\frac{1}{2}, 4\right)$ $O: (-6.5, -3.25)$

9. List the points that are in…

Quadrant I	Quadrant II
Quadrant III	Quadrant IV

10. Are there any points you did not list in the table? Explain.

11. Plot a point in Quadrant II. Label your point P.

12. Plot a point that is not in any quadrant. Label your point Q.

13. Plot a point with a positive x-coordinate and a negative y-coordinate. Label your point R.

14. Plot a point with an x-coordinate equal to zero and a positive y-coordinate. Label your point S.

6WB3 - 59
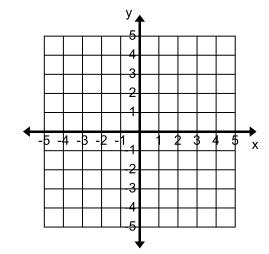
15. Complete the table below to show the sign of the *x*- and *y*-coordinate in each of the Quadrants. Quadrant I has been completed for you.

$$y$$

Quadrant II | **Quadrant I**
(,) | (+, +)

$$x$$

Quadrant III | **Quadrant IV**
(,) | (,)

16. Graph the following points on the coordinate plane.

$\{(-3, 3), (-2, 3), (-1, 3), (0, 3), (1, 3), (2, 3), (3, 3)\}$

a. Describe the shape of the graph. Why does the graph make this shape?
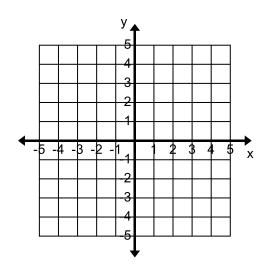
b. Write another ordered pair that would continue the shape of the graph.

17. Graph the following points on the coordinate plane.

$\{(-3, -3), (-2, -2), (-1, -1), (0, 0), (1, 1), (2, 2), (3, 3)\}$
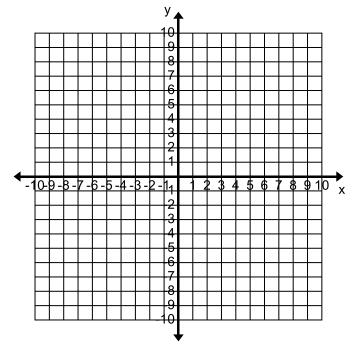
a. Describe the shape of the graph. Why does the graph make this shape?

b. Write another ordered pair that would continue the shape of the graph.

6WB3 - 60

18. Complete the table. Plot the points. Connect the points in the order they appear in the table.

x	y	(x, y)
0	10	
2	4	
7	4	
3	1	
6	−4	
0	0	
−6	−4	
−3	1	
−7	4	
−2	4	
0	10	
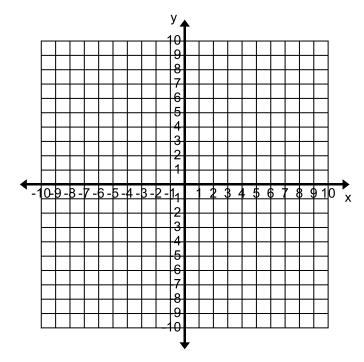
a. Does the figure exhibit symmetry? If yes, explain the symmetry and what causes it.
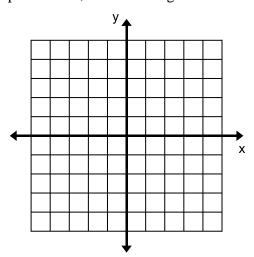
19. Create your own set of points that when connected are symmetric about the *x*-axis but not the *y*-axis.

x	y	(x, y)
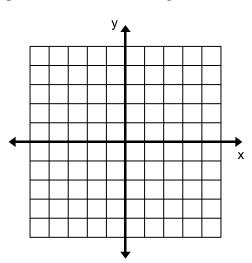
20. Graph the following points on the coordinate plane. First, determine a good scale for each axis.

$\{(-10, -4), (6, 8), (0, -7), (-8, 2)\}$
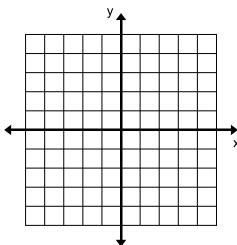
21. Graph the following points on the coordinate plane. First, determine a good scale for each axis.

$\{(50, -10), (-20, 5), (20, 0), (-40, 20)\}$

22. Graph the following points on the coordinate plane. First, determine a good scale for each axis.

$\{(-4, 80), (-1, -40), (0, 20), (5, -100)\}$

Spiral Review

1. Compare the decimals using $>$, $<$, or $=$.

a. 8.58 _____ 8.6	b. $\frac{3}{8}$ _____ 0.5	c. $1\frac{3}{5}$ _____ 1.06
d. 0.25 _____ $\frac{3}{12}$	e. $\frac{5}{9}$ _____ 0.5	f. $\frac{12}{5}$ _____ 2.38

2. Use a model to compare $\frac{1}{3}$ to 0.3.

3. Use a model to compare $\frac{2}{3}$ to 0.6.
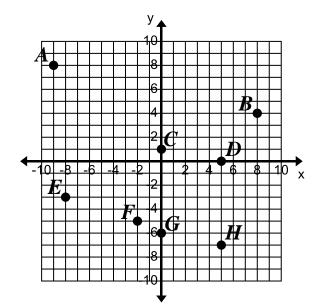
4. Solve and describe the difference between the two problems.

   a. Find 20% of 50.

   b. 50 is 20% of what number.

3.1h Homework: Pairs of Rational Numbers in the Coordinate Plane

1. Write an ordered pair that would be in Quadrant I when graphed. _____

2. Write an ordered pair that would be in Quadrant II when graphed. _____

3. Write an ordered pair that would be in Quadrant III when graphed. _____

4. Write an ordered pair that would be in Quadrant IV when graphed. _____

5. Write an ordered pair that would be on the *x*-axis when graphed. _____

6. Write an ordered pair that would be on the *y*-axis when graphed. _____

7. Write the ordered pair for points *A – H*.

   A: _____

   B: _____

   C: _____

   D: _____

   E: _____

   F: _____

   G: _____

   H: _____

8. Graph and label the following points on the coordinate plane.

L: $(2,5)$

M: $(-5,-3)$

N: $(7,-5)$

O: $(0,4)$
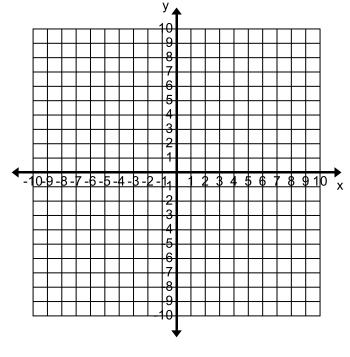
P: $(-3,9)$

Q: $(-7,0)$

R: $(5\frac{1}{2},-2)$

S: $(-3\frac{1}{2},4)$
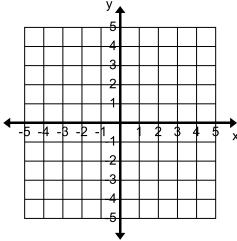
9. List 4 ordered pairs that when graphed would fall on the same **vertical** line.
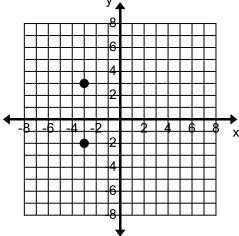
10. Graph the following points on the coordinate plane.

$\{(-4,3),(-4,0),(0,0),(0,3)\}$
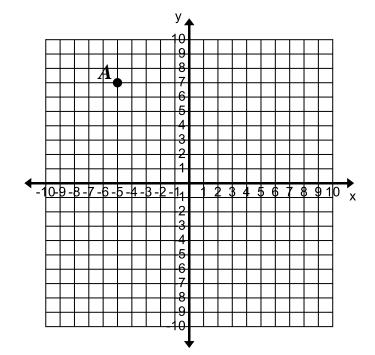
11. The points you graphed in the previous problem are vertices of a polygon. Classify the polygon.

12. Two vertices of a square are shown. Give two more ordered pairs that could be the other two vertices of the square.
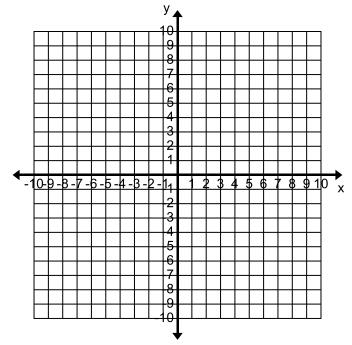
13. Use the grid to answer the questions.

    a. Plot the point that is symmetric about the *y*-axis to *A*. Label it *B*.

    b. Write the ordered pairs for *A* and *B* next to the points on the grid. What do you notice about the ordered pairs of *A* and *B*?

    c. Plot the point that is symmetric about the *x*-axis to *A*. Label it *C*.

    d. Write the ordered pairs for *A* and *C* next to the points on the grid. What do you notice about the ordered pairs of *A* and *C*?

    e. What is the distance between *A* and *B*?

    f. What is the distance between *A* and *C*?

14. Create your own set of points that when connected are symmetric about the *x*-axis *and* the *y*-axis.
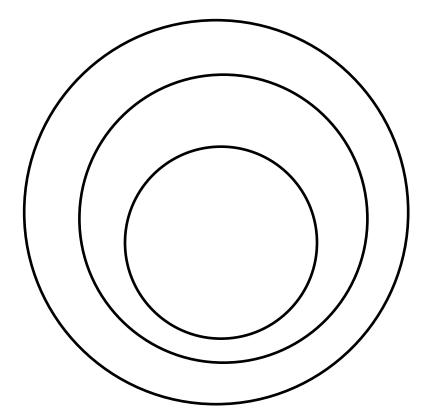
x	*y*	(x, y)

3.1i Class Activity: Classifying Rational Numbers *(Optional)*

Activity 1: Nested Venn Diagram on Sports

a. Show the relationship between the words **exercise**, **team sports**, and **sports** by placing the words in the correct place in the Venn Diagram. ▦

.
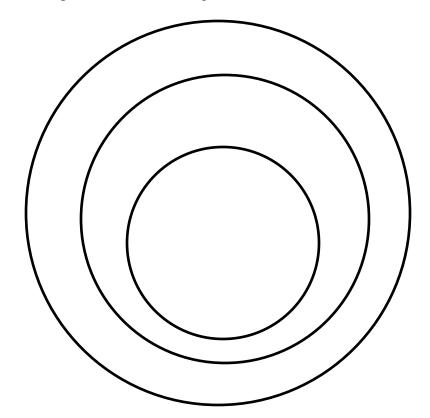
b. Place the following words in the diagram where they belong.
    surfing, soccer, walking, tennis, aerobics, skiing, karate, basketball

c. Add two of your own exercises to the diagram.

d. Write <u>three</u> true statements based on the diagram. For example, "All team sports are sports."

Activity 2: Nested Venn Diagram on Rational Numbers

a. Show the relationship between the words **whole number**, **integer**, and **rational number** by placing the words in the correct place in the Venn Diagram.

b. Place the following numbers in the diagram where they belong.
$0, 5, -5, \dfrac{2}{3}, 5\dfrac{1}{4}, -\dfrac{7}{4}, 17, -5.6, 90\%$

c. Add two of your own numbers to the diagram using a different colored pencil.

d. Tell whether the following statements are true or false. Justify your answers.

      All whole numbers are integers.

      All integers are whole numbers.

      Some rational numbers are integers.

      Not all integers are rational numbers.
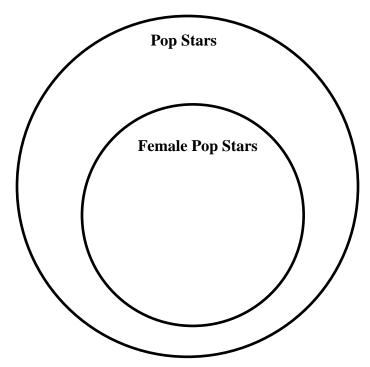
      Some whole numbers are not integers.

Activity 3: Complete the table below by writing a number in each row of the **Number** column that fits the classification given.

Number	Positive Number	Negative Number	Whole Number	Integer	Rational Number
	X		X	X	X
		X			X
			X	X	X
	X				X
		X		X	X

3.1i Homework: Classifying Rational Numbers *(Optional)*

1. Put the following music artists into the Venn Diagram below where they belong: Taylor Swift, Justin Timberlake, Beyoncé, Selena Gomez, and Jason Derulo.

Pop Stars

Female Pop Stars

2. Add two additional music artists to the Venn Diagram in #1.

3. Tell whether the following statements are true or false. Justify your answer.

   All female pop stars are pop stars.

   All pop stars are female pop stars.

   Some pop stars are not female pop stars.

   Not all pop stars are female pop stars.

4. Classify each number by putting an X in the appropriate columns.

Point	Positive Number	Negative Number	Whole Number	Integer	Rational Number
-1					
-2.3					
$1,000$					
$-3\frac{1}{3}$					
0.25					
5%					

3.1j Self-Assessment: Section 3.1

Consider the following skills/concepts. Rate your comfort level with each skill/concept by checking the box that best describes your progress in mastering each skill/concept. Corresponding sample problems, referenced in brackets, can be found on the following page.

Skill/Concept	Minimal Understanding 1	Partial Understanding 2	Sufficient Mastery 3	Substantial Mastery 4
1. Understand a rational number as a point on the number line.				
2. Construct a number line to show negative numbers using ideas about symmetry. Recognize opposite signs of numbers as indicating locations on opposite sides of zero on the number line.				
3. Write and interpret symbolic statements about opposites (e.g., $-(-3)$ is read "the opposite of negative three" and can be simplified to 3).				
4. Determine the value of rational numbers represented on a horizontal and vertical number line.				
5. Represent rational numbers on horizontal and vertical number lines.				
6. Represent pairs of rational numbers on the coordinate plane.				

Sample Problems for Section 3.1
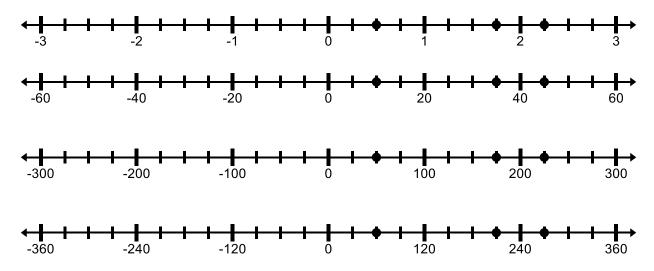
Square brackets indicate which skill/concept the problem (or parts of the problem) align to.

1. Is the following statement true or false? Justify your answer.

   "All rational numbers can be represented by a point on the number line."

2. Construct a number line to show the location of the integers from -8 to 8. Explain how you used ideas about symmetry and opposites to construct your number line. [2]

3. Three points are plotted on each number line below. [2]
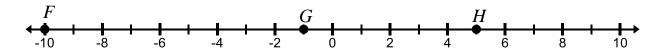
   a. Write the value of each point under the points.

   b. Compare the graphs. How are they similar? How are they different?

   c. Graph the opposite of each point on each number line.

   d. Write the value of the opposites under the points.

4. Complete the table. [3]

Statement in Words	Symbolic Statement	Simplified Form
The opposite of five		
The opposite of negative five		
	$-(-9)$	
	$-(-(8.5))$	
The opposite of zero		
The opposite of the opposite of negative twenty		
		11
		-11
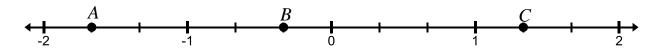
5. Determine the value of the points on the number line. [4]

F: _____   G: _____   H: _____
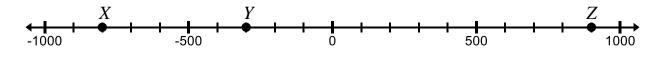
6. Determine the value of the points on the number line. [4]

A: _____   B: _____   C: _____
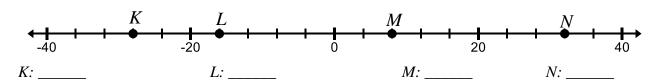
7. Determine the value of the points on the number line. [4]
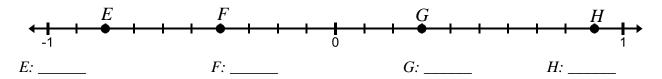
X: _____   Y: _____   Z: _____

8. Determine the value of the points on the number line. [4]

K: _____   L: _____   M: _____   N: _____

9. Determine the value of the points on the number line. [4]

E: _____   F: _____   G: _____   H: _____
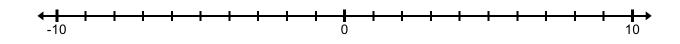
10. Represent the following points on the number line. [5]

$R: -6$ $S: -2$ $T: 4$ $U: 9$
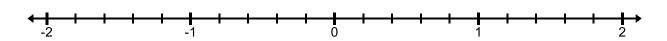
11. Represent the following points on the number line. [5]

$J: -1.8$ $K: -0.6$ $L: 0.8$ $M: 1.2$
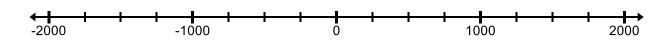
12. Represent the following points on the number line. [5]

$A: -1,750$ $B: -1,250$ $C: -500$ $D: 1,500$
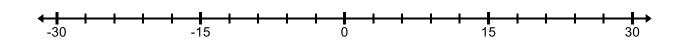
13. Represent the following points on the number line. [5]

$D: -24$ $E: -9$ $F: 6$ $G: 18$
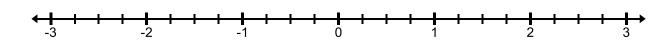
14. Represent the following points on the number line. [5]

$Q: -2\frac{3}{4}$ $R: -\frac{5}{4}$ $S: -0.5$ $T: 2.25$
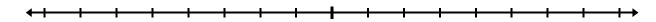
15. Byron's teacher asked him to graph the points 120 and -120 on the number line shown below.

Byron thought about using a scale of 10 for his graph. Is this a good scale for this problem? Why or why

16. Construct a number line to represent the points $H: \frac{1}{2}, I: -\frac{1}{2}, J: \frac{3}{8}$, and $K: -\frac{3}{8}$. [5]

17. Represent the following ordered pairs on the coordinate plane. [6]

$A: (-1, 5)$　　　　　　　$B: (0, 8)$　　　　　　　$C: (-2, -7)$

$D: (-9, 0)$　　　　　　　$E: (6, 1)$　　　　　　　$F: (-5, 10)$

$G: (9, -2)$　　　　　　　$H: (4, -9)$　　　　　　　$I: (0, 0)$

$J: (1.5, 7)$　　　　　　　$K: (0, -6.5)$　　　　　　　$L: (-5.5, -3.5)$

Section 3.2: Absolute Value and Ordering

Section Overview:
In this section, students are formally introduced to the meaning of absolute value and start to distinguish between the value of a number relative to zero and the magnitude of the number (e.g., the number's distance from zero). They simplify absolute value statements and use ideas about absolute value to find the distance between two points on the same horizontal or vertical line. Then, students compare and order rational numbers, relying on their understanding of the structure of the number line and understanding that smaller numbers are located to the left of bigger numbers on a number line. Students come to realize that one way to compare negative numbers is to compare their opposites first. When you compare two positive numbers, the larger positive number becomes *smaller* when you reflect the numbers over the vertical line passing through zero. For example, if a student is asked to compare -11 to -12, they may start by comparing 11 to 12. Because 12 is farther to the right on the number line, it is bigger than 11; however, when you reflect both numbers over the vertical line passing through zero, -11 is now farther to the right than -12 and therefore -11 is bigger than -12. Students also rely on a great deal on number sense and estimation strategies when comparing and ordering rational numbers. For example, when comparing $\frac{3}{8}$ to $\frac{1}{2}$, students may reason that since $\frac{1}{2}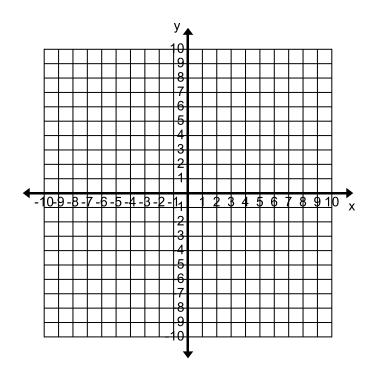 = \frac{4}{8}$, $\frac{3}{8}$ is smaller than $\frac{1}{2}$. Then, when students are faced with the problem of comparing $-\frac{3}{8}$ to $-\frac{1}{2}$, they can reason that $-\frac{3}{8}$ is farther to the right on the number line and therefore bigger than $-\frac{1}{2}$.

Concepts and Skills to Master:
By the end of this section, students should be able to:
1. Understand what the absolute value of a rational number represents. Simplify expressions containing absolute value.
2. Find the distance between two rational numbers on the same horizontal or vertical line.
3. Compare rational numbers.
4. Order rational numbers.

3.2a Class Activity: Absolute Value
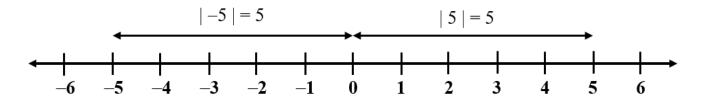
Activity 1: Consider the numbers 5 and −5. Compare these numbers. How are they the same? How are they different? 📏💬

Absolute Value: Absolute value is distance from zero. Absolute value is denoted with the symbol | |:

|5| is read "the absolute value of five"

|−5| is read "the absolute value of negative five"

Both |5| and |−5| simplify to 5 because 5 and −5 are both five units away from zero on the number line.

$|-5| = 5$ $|5| = 5$
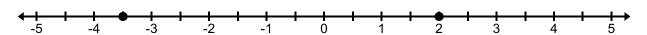
Activity 2:
a. How many numbers have an absolute value equal to 8? Justify your answer.

b. How many numbers have an absolute value equal to $\frac{2}{3}$? Justify your answer.

c. How many numbers have an absolute value equal to 0? Justify your answer.

d. How many numbers have an absolute value equal to −10?

Activity 3: Simplify.
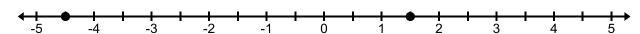
a. |−4|	b. |4|	c. |1|
d. $\left\|3\frac{1}{2}\right\|$	e. $\left\|-3\frac{1}{2}\right\|$	f. |0|
g. −|20|	h. −|−20|	i. −|1.1|

Activity 4: Determine whether the following statements are always true, sometimes true, or never true. Justify your answers. n# 💬

  a. The absolute value of a number is greater than the number.

  b. The absolute value of a number is the number's opposite.

  c. The absolute value of a negative number is greater than the number.

  d. There are always two numbers with the same absolute value.

  e. Opposites have the same absolute value.

  f. The absolute value of a positive number is a negative number.

Activity 5: Use ideas about absolute value to find the distance between the two points shown on the number line. 🔲

  a. Distance between the two points: _____

  b. Distance between the two points: _____

  c. Distance between the two points: _____

  d. Distance between the two points: _____

  e. Distance between the two points: _____
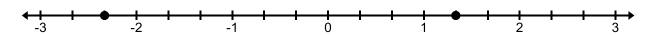
f. Distance between the two points: _____
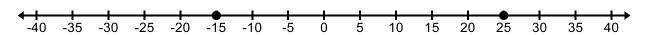
g. Distance between the two points: _____
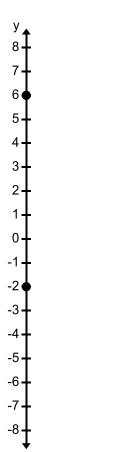
h. Distance between the two points: _____

i. Distance between the two points: _____
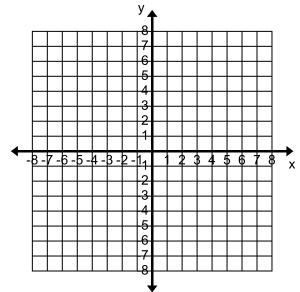
j. Distance between the two points: _____   k. Distance between the two points: _____
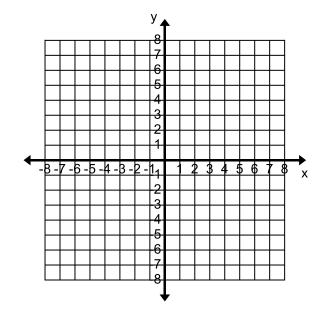
Activity 5: Graph the following sets of points and then find the distance between the two points.

a. $(3, 5)$ and $(3, -5)$
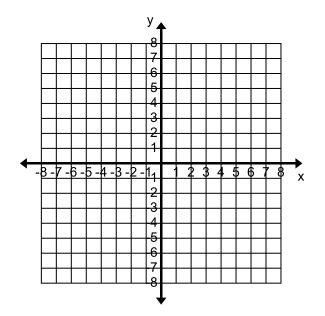
Distance between points: _____

b. $(-2, -4)$ and $(4, -4)$
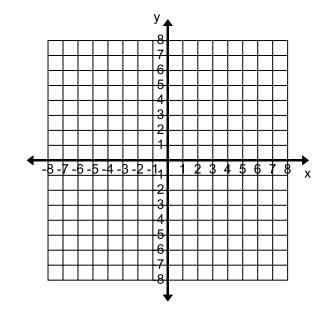
Distance between points: _____

c. $(0, 3)$ and $(0, -3)$
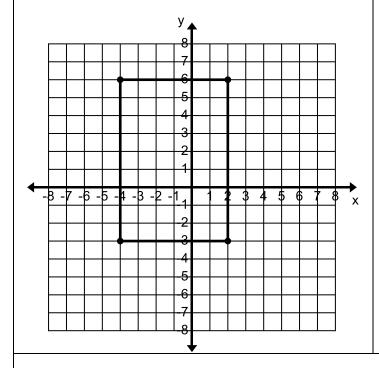
Distance between points: _____

d. $(-6, 6)$ and $(-2, 6)$

Distance between points: _____

6WB3 - 81

Activity 6: Find the perimeter of each polygon.
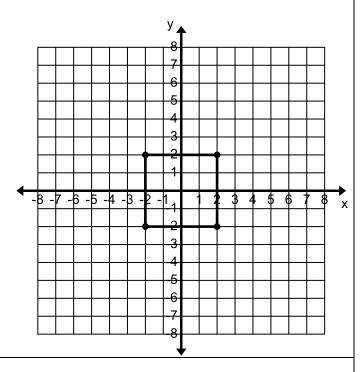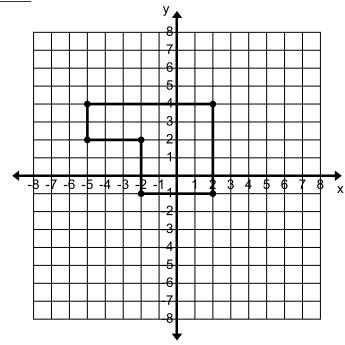
a. Perimeter: _____

b. Perimeter: _____
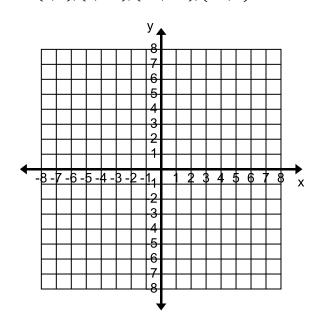
c. Perimeter: _____
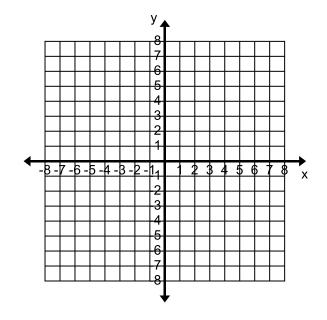
Activity 7: Graph and connect each set of points. Then, find the perimeter of the polygon.

a. $(5,5),(5,-5),(-5,-5),(-5,5)$	b. $(4,3),(4,-2),(-3,-2),(-3,3)$

Perimeter of Polygon: _____

Perimeter of Polygon: _____

Activity 8: Devise a strategy for finding the distance between the two points without graphing. Then, find the distance between the two points.

a. $(3,157)$ and $(3,84)$	b. $(-25,150)$ and $(174,150)$	c. $(20,-100)$ and $(20,-250)$

6WB3 - 83

Spiral Review

1. Complete the table to show the area of each rectangle.

Length	Width	Area
6 in.	7 in.	
1.5 ft	24 ft	
$1\frac{1}{4}$ yd	$2\frac{1}{2}$ yd	

2. Complete the table to show the missing dimension of each rectangle.

Length	Width	Area
3 ft		36 ft^2
0.5 m		4 m^2
	$3\frac{3}{4}$ yd	$10\frac{5}{8}$ yd^2

3. Complete the table to show the volume of each rectangular prism.
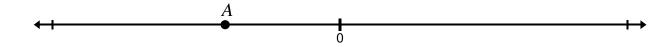
Length	Width	Height	Volume
10 cm	4 cm	7 cm	
0.8 m	2 m	1 m	
$\frac{1}{2}$ yd	$\frac{1}{2}$ yd	$\frac{1}{2}$ yd	

4. Complete the table to show the missing dimension of each rectangular prism.

Length	Width	Height	Volume
120 cm	50 cm		144,000 cm^3
5 ft		7 ft	0.35 ft^3
$\frac{2}{3}$ m	$\frac{3}{8}$ m		$6\frac{1}{4}$ m^3

3.2a Homework: Absolute Value

1. Use the number line below to answer the questions.
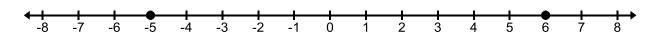
   a. Is the value of *A* positive or negative? Explain.

   b. Is the distance from zero to *A* positive or negative? Explain.

2. What number or numbers, if any, make the statement true? $|x| = 16$

3. What number or numbers, if any, make the statement true? $|x| = -9$

4. What number or numbers, if any, make the statement true? $|x| = 0$

5. Give two numbers with an absolute value greater than three.

Directions: Simplify.
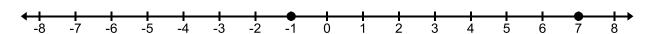
|		
6. $|5|$	7. $|-5|$	8. $|-250|$
9. $\left|-3\frac{9}{10}\right|$	10. $|11.06|$	11. $\left|\frac{11}{12}\right|$
12. $-|-18|$	13. $-|18|$	14. $|-18|$

Directions: Find the distance between the two points.
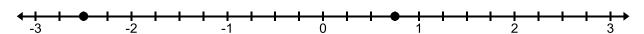
15. Distance between the two points: _____
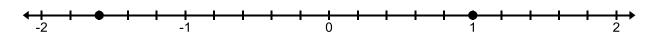
16. Distance between the two points: _____

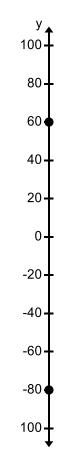17. Distance between the two points: _____
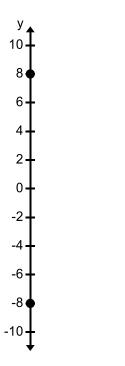
18. Distance between the two points: _____
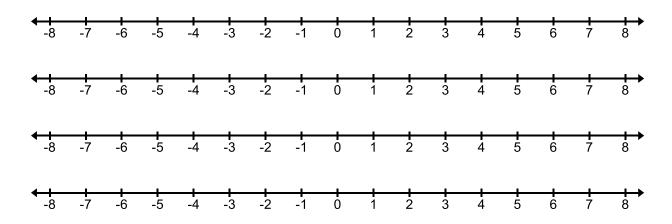
19. Distance between the two points: _____

20. Distance between the two points: _____
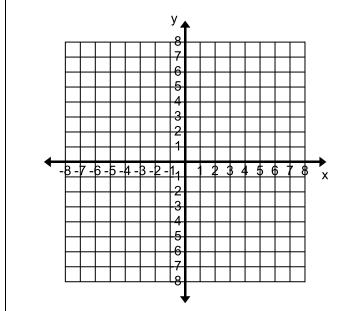
21. On the four graphs below, show four *different* sets of points that are 8 units apart.
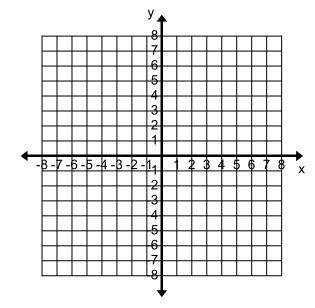
Directions: Graph the following sets of points and then find the distance between the two points.

22. $(-4, 0)$ and $(4, 0)$

Distance between points: _____
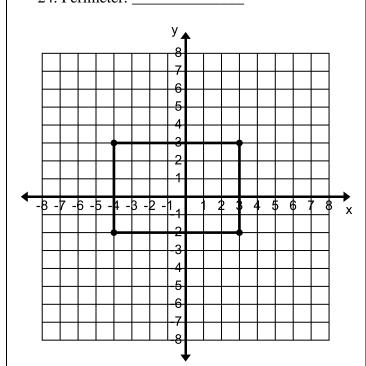
23. $(-4, 3)$ and $(-4, -6)$
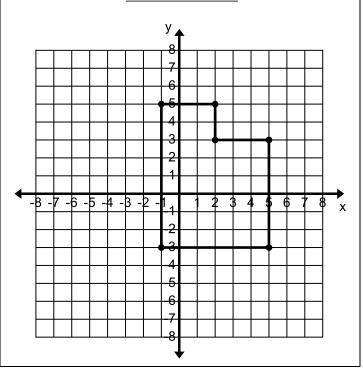
Distance between points: _____

Directions: Find the perimeter of each polygon.

24. Perimeter: _____
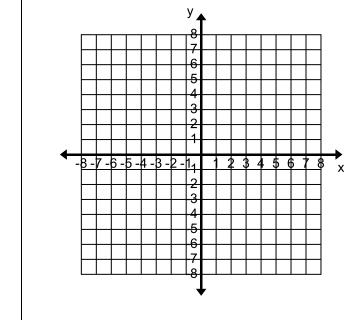
Perimeter: _____
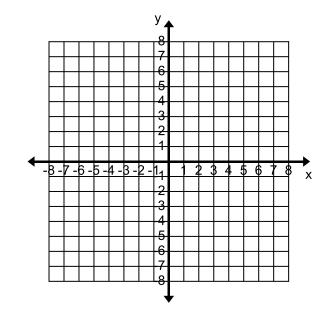
Directions: Graph and connect each set of points. Then, find the perimeter of the polygon.

25. $(-6, 5), (-3, 5), (-3, 1), (-6, 1)$

Perimeter of Polygon: _____

26. $(-2, 2), (2, 2), (2, -2), (-2, 2)$

Perimeter of Polygon: _____

6WB3 - 88
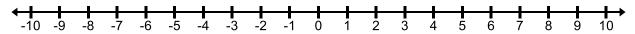
3.2b Class Activity: Comparing Rational Numbers

Activity 1:

a. Graph the numbers 3 and 5 on the number line.

b. Compare 3 and 5 using <, >, or =.

3 _____ 5
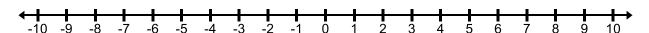
c. How does the number line help you determine which number is larger? ▦

d. Next, graph the opposites of 3 and 5 on the number line above.
e. Compare -3 and -5 using <, >, or =.

-3 _____ -5

f. Graph the numbers 1 and 10 on the number line.
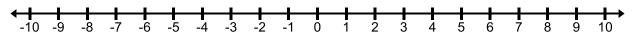
g. Compare 1 and 10 using <, >, or =.

1 _____ 10

h. Graph the numbers -1 and -10 on the number line above.
i. Compare -1 and -10 using <, >, or =.

-1 _____ -10

j. Graph $\frac{3}{4}$ and $1\frac{1}{2}$ on the number line.

k. Compare $\frac{3}{4}$ and $1\frac{1}{2}$ using <, >, or =.

$\frac{3}{4}$ _____ $1\frac{1}{2}$

l. Graph $-\frac{3}{4}$ and $-1\frac{1}{2}$ on the number line above.
m. Compare $-\frac{3}{4}$ and $-1\frac{1}{2}$ using <, >, or =.

$-\frac{3}{4}$ _____ $-1\frac{1}{2}$

n. In your own words, explain how to compare numbers. Use examples to support your explanation.

Directions: Compare the numbers below using $<$, $>$, or $=$. Use a number line to help you.
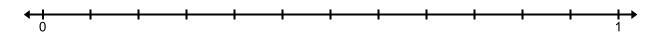
2. 7 _____ 5 3. -7 _____ -5	4. 12 _____ 15 5. -12 _____ -15	6. 350 _____ 400 7. -350 _____ -400
8. 2 _____ $2\frac{1}{2}$ 9. -2 _____ $-2\frac{1}{2}$	10. 8.25 _____ $8\frac{1}{4}$ 11. -8.25 _____ $-8\frac{1}{4}$	12. 6.45 _____ 6.4 13. -6.45 _____ -6.4
14. 0.7 _____ 0.07 15. -0.7 _____ -0.07	16. 1.75 _____ $1\frac{4}{5}$ 17. -1.75 _____ $-1\frac{4}{5}$	18. $\frac{5}{8}$ _____ 0.5 19. $-\frac{5}{8}$ _____ -0.5
20. -3 _____ -4	21. -54 _____ -44	22. $-\frac{827}{2,481}$ _____ $\frac{1}{4}$
23. $-3\frac{1}{3}$ _____ $-3\frac{1}{4}$	24. $-\frac{9}{20}$ _____ -0.5	25. $\frac{5}{3}$ _____ $-1\frac{2}{3}$
26. -0.6 _____ $-\frac{2}{3}$	27. -6.49 _____ -6.5	28. $-\frac{7}{8}$ _____ $-\frac{4}{5}$
29. $-\frac{1}{4}$ _____ -0.23	30. $-\frac{1}{8}$ _____ $-\frac{1}{4}$	31. -101 _____ -100
32. $-\frac{5}{9}$ _____ -0.5	33. $-\frac{13}{25}$ _____ $-\frac{9}{20}$	34. -0.25 _____ $-\frac{3}{16}$

35. Give a number between -6 and -7.

36. Give a number between $-2\frac{1}{2}$ and -3.

37. Give a number between -4 and -4.3.

38. Give a number between $-\frac{3}{10}$ and $-\frac{2}{5}$.

39. Ms. Tucker tells her class that a and b are rational numbers and $a < b$. Describe what would have to be true about the values of a and b for the following statements to be true. Justify your answers.

   a. The absolute value of a is larger than the absolute value of b.

   b. The absolute value of a is smaller than the absolute value of b.

   c. a is farther away from zero than b.

Spiral Review

1. Use the number line below to complete this activity.

   a. Label the tick marks to show the scale of the graph.

   b. Graph and label the following points on the graph:

   $A: \frac{1}{6}$ $B: \frac{1}{3}$ $C: \frac{1}{2}$ $D: \frac{2}{3}$ $E: \frac{3}{4}$ $F: \frac{5}{6}$

2. Tell whether the number given is bigger than $\frac{1}{2}$ or smaller than $\frac{1}{2}$.

a. 0.45	b. 0.052	c. 0.501
d. $\frac{19}{40}$	e. $\frac{6}{11}$	f. $\frac{12}{25}$

3. In each problem, an attribute of a two-dimensional figure is given. Write the name(s) of the figure(s) that have that attribute.

    a. A quadrilateral with four right angles

    b. A triangle with three congruent angles

    c. A quadrilateral with four congruent sides

    d. A quadrilateral with two sets of parallel lines

4. Simplify.

a. 0.2×5	b. 0.01×345	c. 15×0.03
d. $5 \div 0.1$	e. $40 \div 0.8$	f. $3.6 \div 12$

3.2b Homework: Comparing Rational Numbers

1. Fill in the Blank: As you move to the right on the number line, the numbers _____.

2. Paul's teacher asked him to compare -2 and -1 using $<$, $>$, or $=$. Paul's answer and thinking is shown below.

   Paul's Response:
   Since 2 is greater than 1, -2 is greater than -1.

   Is Paul's thinking correct? Justify your answer using a model.

Directions: Compare the numbers below using $<$, $>$, or $=$.
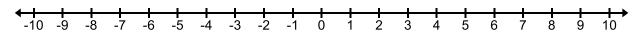
3. 19 _____ 20 4. -19 _____ -20	5. 50 _____ 45 6. -50 _____ -45	7. 8 _____ 8.1 8. -8 _____ -8.1
9. 1.45 _____ 1.5 10. -1.45 ____ -1.5	11. 1.2 _____ 1.02 12. -1.2 ____ -1.02	13. $\frac{7}{12}$ _____ $\frac{5}{12}$ 14. $-\frac{7}{12}$ _____ $-\frac{5}{12}$
15. -15 _____ -8	16. -200 _____ -225	17. -8.14 _____ -8.1
18. 8 _____ -2	19. $-1\frac{1}{4}$ _____ $-\frac{5}{4}$	20. $-\frac{3}{8}$ _____ $-\frac{5}{8}$
21. 1.5 _____ $-\frac{3}{2}$	22. -1 _____ $-\frac{3}{4}$	23. $-2\frac{1}{2}$ _____ -2.4
24. $-\frac{1}{4}$ _____ $-\frac{1}{2}$	25. 0 ____ $-\frac{1}{4}$	26. $-\frac{2}{3}$ _____ $-\frac{3}{4}$
27. -0.35 _____ $-\frac{1}{3}$	28. -0.8 ____ $-\frac{3}{4}$	29. -0.48 _____ $-\frac{1}{2}$

30. Write three numbers that are less than -1.

31. A is located to the right of B on the number line. Select all statements that you know are true.

☐ $A > B$

☐ $|A| < |B|$

☐ $-A < -B$

32. If $a < b$ and $|a| = |b|$, what is true of a and b?

3.2c Class Activity: Ordering Integers

Activity 1:
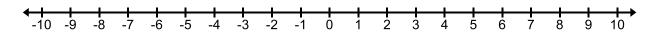
a. Graph the numbers $8, 2, 5, 3$ on the number line shown.

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

c. Graph the numbers $-8, -2, -5, -3$ on the number line shown.

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

e. What do you notice? How does a number line help you to order numbers?

Directions: Order the numbers.

a. Put the numbers $1, 4, 7, -1, -4, -7$ in order from least to greatest.

b. Put the numbers $45, -45, 40, -40, 50, -50$ in order from greatest to least.

c. Put the numbers $-11, -15, -2, -7$ in order from greatest to least.

d. Put the numbers $-1,000, -1,050, -1,500, -1,005$ in order from greatest to least.

Activity 2: The numbers below are listed in order from least to greatest. Give *two* possible *integer* values for the ? in each problem. Use a number line to help you.

    a. $-10, ?, -4, -1$

    b. $-7, -3, -1, ?$

    c. $?, 0, 5, 8$

    d. $-5, ?, 0, 2$

    e. $?, -2, 5, 2$

Activity 3:
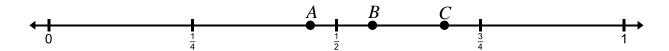
    a. If $a < b < c$ and $|a| < |b| < |c|$, give some possible values for a, b, and c.

    b. If $a < b < c$ and $|a| > |b| > |c|$, give some possible values for a, b, and c.

    c. If a, b, and c are to the left of zero and $|a| < |b| < |c|$, order a, b, and c from least to greatest.

Activity 4: The following questions will help to prepare you for the next lesson.

    a. Is $\frac{5}{12}$ greater than or less than $\frac{1}{2}$? Explain.

    b. Is $\frac{4}{9}$ greater than or less than $\frac{1}{2}$? Explain.

c. Is $\frac{8}{23}$ greater than or less than $\frac{1}{3}$? Explain.

d. Replace the ? in the fraction $\frac{?}{16}$ with a number that would make the fraction greater than $\frac{1}{2}$ but less than $\frac{3}{4}$.

e. Replace the ? in the fraction $\frac{5}{?}$ with a number that would make the fraction greater than $\frac{1}{4}$ but less than $\frac{1}{2}$.

f. Which point best shows the location of $\frac{9}{16}$ on the number line below? Explain.

g. Which point best shows the location of $\frac{5}{19}$? Explain.

h. Which point best shows the location of $\frac{29}{40}$?

Spiral Review

1. Complete the table below.

Fraction	Decimal	Percent
		50%
	0.25	
$\frac{3}{4}$		
		10%
$\frac{4}{5}$		
	1.2	

2. Simplify.

a. $5 \div \frac{1}{3}$	b. $\frac{1}{2} \div 3$	c. $\frac{2}{3} \div \frac{1}{6}$
d. $2\frac{1}{2} \div \frac{1}{4}$	e. $\frac{1}{16} \div \frac{1}{8}$	f. $\frac{3}{8} \div \frac{5}{8}$
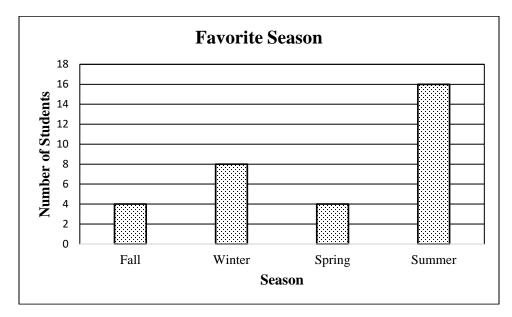
3. Griffin rolled a six-sided die several times and recorded the number he rolled each time. He organized his results in the line plot below.

```
                X                                   X
                X           X                       X           X
    X           X           X           X           X           X
    X           X           X           X           X           X
    X           X           X           X           X           X
  ──────────────────────────────────────────────────────────────────
    1           2           3           4           5           6
```

Number on Dice

   a. How many times did Griffin roll the die?

   b. Which number did Griffin roll the most often?

   c. What percent of the rolls did the die land on an even number?

   d. What percent of the rolls did the die land on a number greater than 4?

4. Hannah surveyed the students in her class and asked what their favorite season is. She created a bar graph to display the results. Use the bar graph to answer the questions.

Favorite Season

a. How many students were surveyed?

b. What season was chosen the most?

c. What season was chosen the least?

d. How many more students chose summer than spring?

e. What percentage of students chose each season?

Fall: _____   Winter: _____   Spring: _____   Summer: _____

3.2c Homework: Ordering Integers

1. Select all lists that show the numbers ordered from least to greatest.

    ☐ $-1, -2, -3, -4, -5$

    ☐ $-5, -4, -3, -2, -1$

    ☐ $-5, -10, 0, 5, 10$

    ☐ $-20, -10, 0, 10, 20$

2. Order the numbers $5, 9, 1, -5, -9, -1$ from least to greatest.

3. Order the numbers $175, -175, 150, -150, 190, -190$ from greatest to least.

4. Order the numbers $-15, -6, 0, -7, 3$ from greatest to least.

5. Order the numbers $-54, 2, -72, -10, 10$ from least to greatest.

Directions: The numbers below are listed in order from least to greatest. Give *two* possible *integer* values for the ? in each problem. Use a number line to help you.

6. $?, -10, 3, 8$
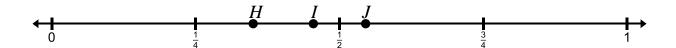
7. $-3, ?, 0, 5$

8. $-2, -1, 0, ?$
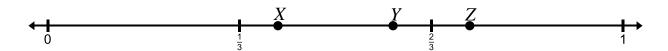
Directions: The following questions will help to prepare you for the next lesson.

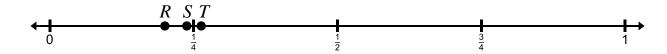9. Is $\frac{11}{20}$ greater than or less than $\frac{1}{2}$? Explain.

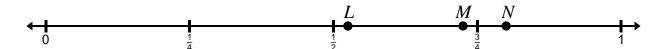10. Is $\frac{4}{15}$ greater than or less than $\frac{1}{4}$? Explain.

11. Is $\frac{4}{15}$ greater than or less than $\frac{1}{3}$? Explain.

12. Replace the ? in the fraction $\frac{?}{18}$ with a number that would make the fraction less than $\frac{1}{3}$.

13. Replace the ? in the fraction $\frac{?}{12}$ with a number that would make the fraction greater than $\frac{2}{3}$ but less than 1.

14. Which point best shows the location of $\frac{5}{11}$? Explain.

15. Which point best shows the location of $\frac{11}{15}$? Explain.

3.2d Class Activity: Ordering Rational Numbers

Activity 1:

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

$$0.45, \frac{7}{8}, \frac{5}{9}, \frac{1}{10}, 0.9, \frac{5}{8}, \frac{2}{5}, 0.09, \frac{1}{5}, 0.75$$

b. In this problem, you will order the *opposites* of the numbers from the previous problem, also from least to greatest.

$$-0.45, -\frac{7}{8}, -\frac{5}{9}, -\frac{1}{10}, -0.9, -\frac{5}{8}, -\frac{2}{5}, -0.09, -\frac{1}{5}, -0.75$$

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

$$\frac{1}{3}, 0.25, \frac{5}{18}, \frac{7}{10}, \frac{3}{16}, \frac{5}{8}, 0.75$$

2. Order the numbers from least to greatest.

$$-\frac{1}{3}, -0.25, -\frac{5}{18}, -0.4, -\frac{7}{9}, -\frac{3}{16}, -\frac{5}{8}, -0.75$$

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

$$7.05, 7.5, 7\frac{5}{24}, \frac{39}{5}, 7\frac{11}{20}, 7.25, 7\frac{1}{6}, 7\frac{9}{20}, 7.802$$

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

$$-7.05, -7.5, -7\frac{5}{24}, -\frac{39}{5}, -7\frac{11}{20}, -7.25, -7\frac{1}{6}, -7\frac{9}{20}, -7.802$$

Spiral Review

1. Compare using $<$, $>$, or $=$.

a. $\|-2\|$ _____ -2	b. $\|-2\|$ _____ 2	c. $\|6\|$ _____ $\|-6\|$
d. $\|6.1\|$ _____ 6.1	e. $\left\|\frac{3}{5}\right\|$ _____ $\left\|\frac{3}{4}\right\|$	f. $\|0\|$ _____ $\|-1\|$
g. $-\|-2\|$ _____ -2	h. $-\|-2\|$ _____ 2	i. $-\|2\|$ _____ -2
j. $-(4)$ _____ $\|-4\|$		k. $-(-4)$ _____ $\|-4\|$

2. Sammy's class collected canned food for a local food pantry for 10 days. The stem-and-leaf plot shows the number of cans collected over the 10-day period. Use the stem-and-leaf plot to determine the *total* number of cans Sammy's class collected over the 10-day period.

Stem	Leaf
0	7 8 8
1	0 0 2 5 8
2	1 5

3. Tell whether the following numbers are divisible by 2.

a. 68	b. 130	c. 121
d. 50	e. 11	f. 1,001

4. Tell whether the following numbers are divisible by 3.

a. 111	b. 304	c. 120
d. 123	e. 620	f. 1,000

3.2d Homework: Ordering Rational Numbers

1. Put the following numbers in order from least to greatest. Explain the process you used to order the numbers.

$$\frac{11}{15}, \frac{7}{8}, \frac{2}{3}, \frac{1}{5}, \frac{1}{7}, \frac{5}{6}$$

2. Put the following numbers in order from least to greatest. Explain the process you used to order the numbers.

$$-\frac{11}{15}, -\frac{7}{8}, -\frac{2}{3}, -\frac{1}{5}, -\frac{1}{7}, -\frac{5}{6}$$

3. Put the following numbers in order from greatest to least. Explain the process you used to order the numbers.

$$1.5, 1\frac{3}{4}, 1\frac{3}{8}, 1.74, 1\frac{9}{10}, 1.09$$

4. Put the following numbers in order from greatest to least. Explain the process you used to order the numbers.

$$-1.5, -1\frac{3}{4}, -1\frac{3}{8}, -1.74, -1\frac{9}{10}, -1.09$$

5. Put the following numbers in order from greatest to least. Explain the process you used to order the numbers.

$$-4.5, -4\frac{3}{8}, -4\frac{13}{25}, -4\frac{13}{100}, -4.125$$

6. Put the following numbers in order from least to greatest. Explain the process you used to order the numbers.

$$-\frac{5}{4}, -1.087, -1.2, -2, -1\frac{3}{5}$$

7. Give a number between -1 and -2.

8. Give a number between -0.2 and $-\frac{1}{4}$.

9. Give a number between -6.1 and -6.2.

10. Give a number between $-1\frac{3}{4}$ and -1.7.

3.2e Self-Assessment: Section 3.2

Consider the following skills/concepts. Rate your comfort level with each skill/concept by checking the box that best describes your progress in mastering each skill/concept. Corresponding sample problems, referenced in brackets, can be found on the following page.

Skill/Concept	Minimal Understanding 1	Partial Understanding 2	Sufficient Mastery 3	Substantial Mastery 4
1. Understand what the absolute value of a rational number represents. Simplify expressions containing absolute value.				
2. Find the distance between two rational numbers on the same horizontal or vertical line.				
3. Compare rational numbers.				
4. Order rational numbers.				

Sample Problems for Section 3.2

Square brackets indicate which skill/concept the problem (or parts of the problem) align to.
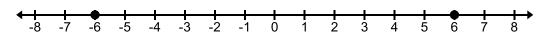
1. Describe absolute value in your own words. Use examples to support your explanation. [1]

2. Simplify. [1]
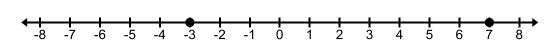
a. $|10|$	b. $|-10|$	c. $|3.2|$
d. $-|1|$	e. $-|-1|$	f. $-(-1)$

3. What number or numbers, if any, make the statement true? [1]
   $|x| = 12$

4. What number or numbers, if any, make the statement true? [1]
   $|x| = \frac{1}{3}$

5. Write your own absolute value statement for which there is not a number that makes the statement true. [1]

6. Find the distance between the two points on the number line. [2]
   a.
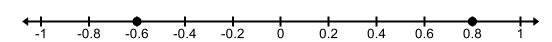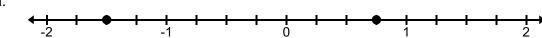
   b.

   c.

   d.

7. List three negative integers greater than -5. [3]

8. Compare the numbers below using $<$, $>$, or $=$. [3]

a. 0 _____ -3	b. -10 _____ -11	c. 5 _____ -9
d. -6 _____ -6.1	e. -0.65 _____ -0.6	f. $-\frac{1}{5}$ _____ $-\frac{1}{8}$
g. $-\frac{3}{100}$ _____ $-\frac{3}{10}$	h. -8.99 _____ -9	i. $-\frac{3}{4}$ _____ -1
j. $-\frac{1}{2}$ _____ -0.45	k. $-\frac{11}{8}$ _____ -1.375	l. -5 _____ 1

9. Order the numbers from least to greatest. [4]
   a. $-2.25, -2, -2.3, -2.09, -1.99$

   b. $-5.8, -5.75, -6, -5$

   c. $-0.3, -\frac{1}{3}, -0.48, -\frac{7}{12}, -1.3$

10. Order the numbers from greatest to least. [4]
   a. $-2.45, -2.5, -2, -2\frac{1}{4}$

   b. $-4.1, -4, -4.01, -4.11$

Section 3.3: Negative Numbers in the Real World

Section Overview:
This section only includes two lessons. The first lesson is focused on the vocabulary associated with positive and negative quantities. Students are also exposed to different real-world contexts that necessitate the use of positive and negative numbers to represent quantities. They explain the meaning of zero in each situation and what it means in the context to be to the left of zero versus being to the right of zero. The second lesson is a collection of activities that synthesizes the concepts learned in the chapter and provides the opportunity for students to apply the skills they learned in sections one and two in real-world situations.

Concepts and Skills to Master:
By the end of this section, students should be able to:
1. Use and interpret academic vocabulary used to describe situations with positive and negative quantities.
2. Represent real-world situations using positive and negative numbers.
3. Apply the skills learned in Sections 1 and 2 of this chapter to solve real-world problems involving positive and negative numbers.

3.3a Class Activity: Using Negative Numbers to Represent Real World Quantities

Activity 1:

a. Give some examples of situations in the real world that people use negative numbers.

b. Complete the table below.

Word or Phrase	Opposite of Word or Phrase
Above Sea Level	
Gain	
Deposit	
Earn Money	
Credit	
Rise	
Ascend	
Profit	

c. Which column contains quantities represented by positive numbers?
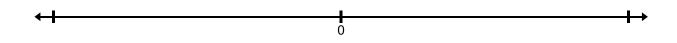
d. Which column contains quantities represented by negative quantities?

Activity 2:
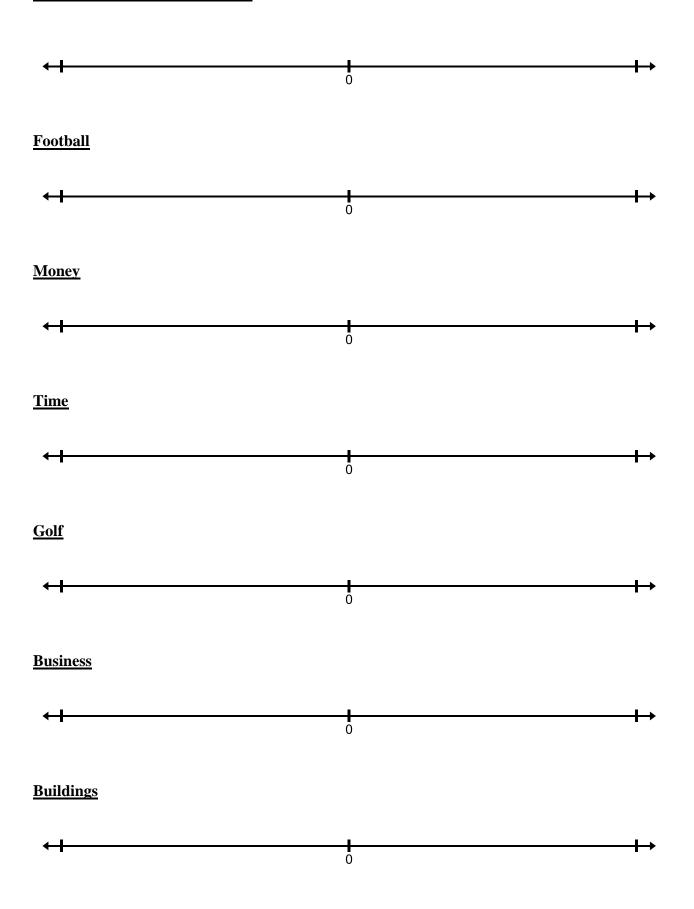
For each of the following situations…
   a. Write what zero represents.
   b. Write what it means to be to the right of zero.
   c. Write what it means to be to the left of zero.

Elevation:

```
◄——|————————————————————+————————————————————|——►
                        0
```
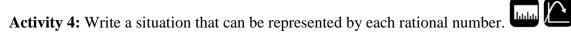
Temperature in Degrees Celsius

|—————————————————————————|—————————————————————————|
0

Football

|—————————————————————————|—————————————————————————|
0

Money

|—————————————————————————|—————————————————————————|
0

Time

|—————————————————————————|—————————————————————————|
0

Golf

|—————————————————————————|—————————————————————————|
0

Business

|—————————————————————————|—————————————————————————|
0

Buildings

|—————————————————————————|—————————————————————————|
0

6WB3 - 113

Activity 3: Write a rational number to represent each of the following situations.

    a. A debt of $10 _____

    b. A gain of 15 yards _____

    c. 20 feet below sea level _____

    d. 2 points extra credit _____

    e. A deposit of $200 _____

    f. 4 degrees below freezing in degrees Celsius _____

    g. A savings account earns $60.30 in interest _____

    h. Tyler earned $5 for cleaning his mom's car _____

    i. A $20 credit on a gift card _____

    j. A stock price fell $0.33 _____

    k. A loss of $150 _____

    l. A fine of $50 _____

    m. The line of scrimmage _____

    n. The freezing point of water in degrees Celsius _____

    o. The opposite of a debt of $25 _____

    p. The opposite of a loss of 7 yards _____

    q. The opposite of 5 degrees above zero _____

    r. The opposite of a withdrawal of $100 _____

    s. The opposite of a rise of 20 feet _____

    t. The opposite of 15 feet below sea level _____

Activity 4: Write a situation that can be represented by each rational number.

a. −6

b. 11

c. −15.25

d. 150

e. −2

Activity 5:
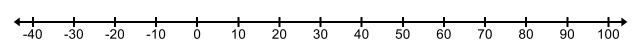
Write a story or draw a picture about a swimming pool where the surface of the swimming pool is zero. Include the location of at least four objects. Then, construct a number line showing the position of each object relative to the surface of the water.

Spiral Review

1. Order the numbers $-0.2, -1.2, -0.02, -0.15$ from least to greatest.

2. Show the approximate location of each point on the number line.

   $D: -4$ $E: 32$ $F: 68$ $G: -17$

   ```
   ◄──┬───┬───┬───┬───┬───┬───┬───┬───┬───┬───┬───┬───┬───┬──►
    -40  -30  -20  -10   0   10   20   30   40   50   60   70   80   90  100
   ```

3. Compare using $<, >,$ or $=$.

a. -5 _____ $\|5\|$	b. 4 _____ $\|-7\|$	c. $\|-11\|$ _____ 11
d. $\|100\|$ _____ 100	e. $\|-4.2\|$ _____ $\|-5\|$	f. $\left\|\frac{3}{4}\right\|$ _____ $\left\|-\frac{4}{5}\right\|$
g. $-(4)$ _____ $-\|4\|$	h. $-(-(4))$ _____ $-\|4\|$	

4. Order the numbers from least to greatest.

a. $9.9, \|-10\|, -10.1, \|9.5\|$	b. $\frac{5}{4}, \|-1.5\|, \left\|\frac{1}{2}\right\|, -\frac{3}{4}$
c. $2, \|-3\|, -3, \|4\|$	d. $-1, \|-1.11\|, -1.11, \|-1.1\|$

3.3a Homework: Using Negative Numbers to Represent Real World Quantities

Directions: Write a rational number to represent each of the following situations.

1. 20 meters below sea level _____

2. 8 degrees above freezing in degrees Celsius _____

3. A loss of seven yards _____

4. A $200 deposit into a savings account _____

5. A weight loss of 15 pounds _____

6. A stock price rose $0.25 _____

7. A profit of $2,400 _____

8. The temperature dropped 12 degrees Fahrenheit _____

9. A withdrawal of $60 _____

10. Deduct 5 points for an assignment being late _____

11. Cheryl owes her dad $15 _____

12. A company reports a loss of $500,000 _____

13. Sea level _____

14. The balloon ascended two meters per second _____

15. The opposite of a drop of 2 degrees _____

16. The opposite of a profit of $1,500 _____

17. The opposite of a gain of 4 pounds _____

18. The opposite of a credit of $10 _____

19. Ground Level _____

20. The lowest known point on Earth is the Mariana Trench. The Mariana Trench is 10,911 m below sea

Directions: Write a situation that can be represented by each rational number.

21. 2

22. 0

23. −10

24. −15,000

25. 3.25

26. Write a story about your life where zero represents today. Include at least four events. Then, construct a number line showing the position of each event relative to today.

3.3b Class Activity: Applying What You've Learned

As you work through the activities in this lesson, reflect on how you use the following practice standards:
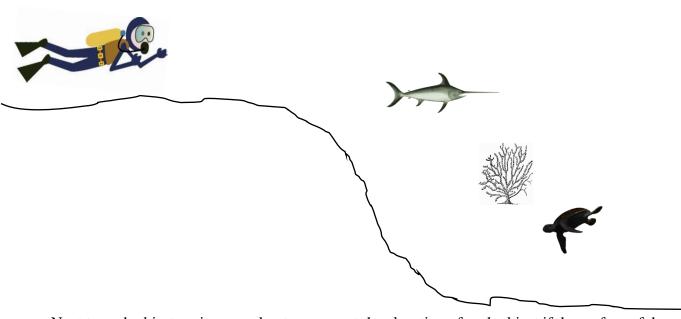
Activity 1: Use the following information about the picture below to answer the questions that follow:

- The bird is flying 15 feet above the surface of the water.

- The scuba diver is 30 feet below the surface of the water.

- The clown fish is 15 feet below the surface of the water.

- The swordfish is 34 feet below the surface of the water.

- The sea turtle is 44 feet below the surface of the water.

a. Next to each object, write a number to represent the elevation of each object if the surface of the water is at sea level.

b. Which object is at the highest elevation? _____The lowest elevation? _____

c. Which object is closest to sea level? _____ Farthest from sea level? _____
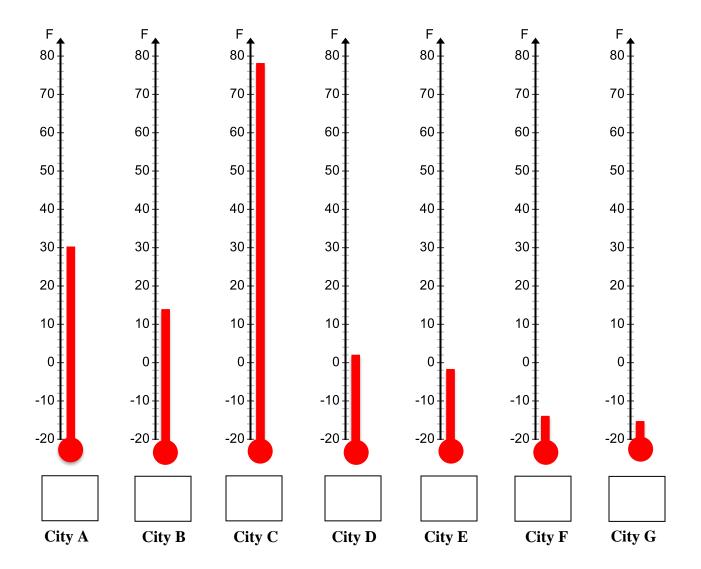
d. Which object(s) are less than 32 feet from sea level? _____

e. Which is farther from sea level, the bird or the swordfish? _____

f. Complete the following statements: The bird is _____ feet above sea level. The elevation of the bird can be represented by the number _____.

g. Complete the following statements: The swordfish is _____ feet below sea level. The elevation of the swordfish can be represented by the number _____.

h. Which two objects are equidistant from the surface of the water? _____

i. Add your own object that is farther from sea level than any of the other objects shown. Add your own object that is closer to sea level than any of the other objects shown.

j. If the bird is directly above the fish, how far apart are the bird and fish? _____

k. If the bird continues flying in a straight path, how far apart will the bird and scuba diver be when the bird is directly above the scuba diver? _____

l. Write a comparison statement using words and symbols to compare the elevation of the sea turtle to the elevation of the scuba diver.

m. Write a comparison statement using words and symbols to compare the elevation of the swordfish to the elevation of the bird.

Activity 2: The table below shows the change in 5 different stock prices on a certain day.

Stock	Change in Stock Price (in dollars)
Stock A	+0.36
Stock B	−0.48
Stock C	+0.17
Stock D	−0.13
Stock E	−0.36

a. Which stock prices fell? _____ Which stock prices rose? _____

b. Which stock price changed the most? _____ By how much did it change? _____

c. Which stock price changed the least? _____ By how much did it change? _____

d. Which stock prices changed by more than 0.30? _____

e. Complete the following statements: Stock A rose _____. The change in the price of Stock A can be represented by the number _____.

f. Complete the following statements: Stock B fell _____. The change in the price of Stock B can be represented by the number _____.

g. Stock F, which is not listed in the table, fell more than $0.55. Write a possible number to represent the change in the price of Stock F. _____

h. Stock G, which is not listed in the table, changed by 0.07. Write two different numbers to represent the change in the stock price of Stock G. _____ or _____.

Activity 3: The thermometers below show the temperatures of 7 different U.S. cities at noon on a certain day in February.

| City A | City B | City C | City D | City E | City F | City G |

a. Write the temperature, to the nearest degree, shown on each thermometer. Write your answer in the box below the thermometer.

b. Order the temperatures from coldest to hottest.

c. Give a temperature that is colder than the temperatures shown above. _____

d. Water freezes at 32° F. Put a star by the thermometers that show temperatures below freezing in degrees Fahrenheit.

e. What is the range between the highest temperature and the lowest temperature? _____

f. What is the difference between the temperature in City A and City F? _____

g. What is the difference between the temperature in City E and City F? _____

6WB3 - 122

Activity 4: The table below is a table of distances from New York City to cities that lie directly north and directly south of New York City. The table starts with the city that is furthest north of NYC and ends with the city furthest to the south of NYC. The city locations are identified by their centers. Use this information to answer the questions that follow.

City	Miles From New York City
Great Falls	201
Albany	150
Peekskill	48
Yonkers	20
New York	0
Newark	15
Princeton	50
Philadelphia	96
Baltimore	191

a. Create a model to show the location of the cities relative to New York City.

b. Which of these cities is farthest from New York City?

c. Which of these cities is closest to New York City?

d. Which of these cities are within 50 miles of New York City?

e. What is the distance between Great Falls and Peekskill?

f. What is the distance between Peekskill and Newark?

g. What is the distance between Newark and Princeton?

Activity 5: The table below shows the elevations of eight different cities in California.

Cities in California	Elevation (in meters)
Desert Shores	−61
Indio	−6
Imperial	−18
Salton Sea Beach	−67
El Centro	−12
Heber	−5
Thermal	−37
Coachella	−22

a. Put the cities in order from greatest elevation to least elevation in the table below. Start the table with the city with the greatest elevation.

Cities Ordered from Greatest Elevation to Least Elevation	
Cities in California	Elevation (in meters)

b. Put the cities in order from the city that is farthest from sea level to the city that is closest to sea level. Start the table with the city that is farthest from sea level.

Cities Ordered from Farthest from Sea Level to Closest to Sea Level	
Cities in California	Distance from Sea Level (in meters)

c. What is the difference in elevation between Heber and Indio?

d. What is the difference in elevation between Heber and Salton Beach?

Activity 6: The biggest temperature changes to occur in the same day occurred in Spearfish, South Dakota on January 22, 1943. The table below shows the temperature at different times during the day. Use this information to answer the questions below.

Time	Temperature in Degrees Fahrenheit
7:30 am	−4°
7:32 am	45°
9:00 am	54°
9:27 am	−4°

    f.   What was the change in temperature from 7:30 am to 7:32 am?

    g.   What was the change in temperature from 7:32 am to 9:00 am?

    h.   What was the change in temperature from 9:00 am to 9:27 am?

    i.   What was the warmest time of the day?

    j.   What was the coldest time of the day?

Activity 7: In February of 2011, Nowata, Oklahoma experienced a 110-degree rise in temperature over a 7-day period. On February 10, 2011, the low temperature in Nowata was −31°F, the coldest temperature ever recorded in Oklahoma. On February 17, 2011, the temperature at one point during the day was 110 degrees hotter than the temperature on February 10, 2011. What was the high temperature on February 17, 2011 in Nowata, Oklahoma?

Activity 8:

   a. Lance owes his dad money. His debt is greater than $30. Give a possible number to represent Lance's debt.

   b. The temperature in Chicago is -4 degrees F. It is colder in Minneapolis. Give a possible temperature for Minneapolis.

   c. The temperature in Chicago is -4 degrees F. It is warmer in Milwaukee. Give a possible temperature for Milwaukee.

   d. While scuba diving, Cath descended more than 15 feet below sea level. Give a possible number to represent Cath's lowest elevation.

   e. One day in January, the temperature in Salt Lake City at 4:00 pm was 8 degrees Fahrenheit. Over the next 6 hours, the temperature fell more than 10 degrees. Give a possible temperature for Salt Lake City at 10:00 pm that night.

Activity 9: The table below represents the transactions that took place in Michael's bank account over a three-day period.

Day	Transaction	Change to Account
1	Purchased groceries for $109	
2	Wrote a check to pay off a $90 loan	
2	Made a $40 cash deposit	
3	Withdrew $20 out of his account for lunch money	
3	Automatic deposit of paycheck totaling $150	

a. Complete the table with the numbers that represent the change in the account balance for each transaction.

b. During which transactions did Michael's bank account change by more than $50?

c. Which transaction caused the biggest change in Michael's bank account?

d. Which transaction caused the smallest change in Michael's bank account?

e. After the automatic deposit on Day 3, the amount of money in Michael's bank account was positive. What does that tell you about the amount of money in Michael's account before he purchased groceries on Day 1?

Activity 10: Judy is a financial advisor who helps her clients get out of credit card debt. The following table shows the credit card debt carried by 5 of her clients:

Client	Credit Card Debt
Alex	−8,500
Barb	−2,300
Chad	−1,800
Derek	−12,000
Ellie	−9,830

a. Order the clients from the client with the least amount of credit card debt to the client with the most amount of credit card debt.

b. Which of Judy's clients have a credit card debt greater than $10,000?

c. Which of Judy's clients have a credit card debt less than $2,500?

d. What is the difference between the credit card debt held by Derek and the credit card debt held by Alex?

e. Ferdinand has more credit card debt that anyone listed in the table. Give a possible number to represent Ferdinand's credit card debt.

f. Gwen has less credit card debt than anyone in the table. Give a possible number to represent Gwen's credit card debt.

Activity 11: The ordered pairs show the location of the thrill rides at an amusement park.

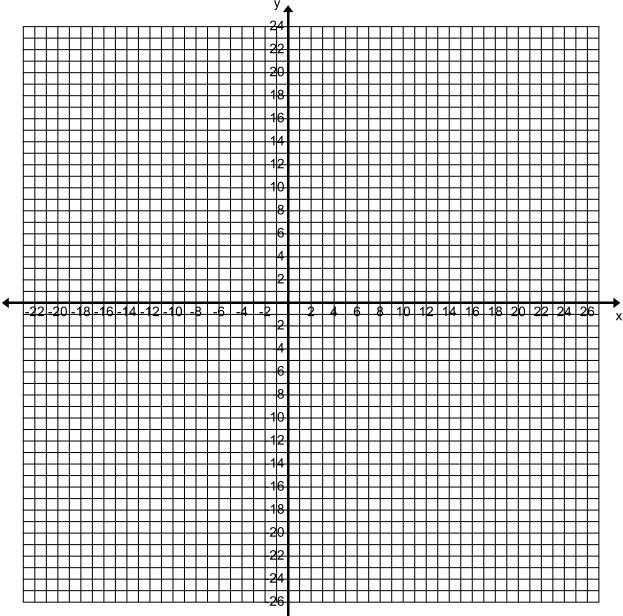a. Plot and label each ordered pair on the coordinate plane below.

Blazing Bungee $(-20, 20)$ Grizzly Gulch $(0, 0)$ Roaring Roller Coaster $(10, -24)$

Dynamic Drop $(18, 20)$ Loop-de-Loop $(-20, -8)$ Spinning Spiders $(-10, 7)$

Force Factor $(10, -8)$ Power Pendulum $(18, 7)$ Wild Wave $(-10, -24)$

If each unit on the grid represents 5 feet, find the distances between the following rides:

b. Blazing Bungee and Dynamic Drop

c. Dynamic Drop and Power Pendulum

d. Spinning Spiders and Wild Wave

e. Loop-de-Loop and Force Factor

f. Force Factor and Roaring Roller Coaster

g. Wild Wave and Roaring Roller Coaster

h. Blazing Bungee and Loop-de-Loop

i. Spinning Spiders and Power Pendulum

Want to find more books like this?

Totally

free kids Books

YAY!

https://www.freekidsbooks.org

Simply great free books –

Preschool, early grades, picture books, learning to read,
early chapter books, middle grade, young adult,

Pratham, Book Dash, Mustardseed, Open Equal Free, and many more!

Always Free – Always will be!