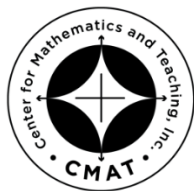


Name _____

Period _____

Date _____

**MathLinks****6-14**

STUDENT PACKET

MATHLINKS: GRADE 6
STUDENT PACKET 14
RATIONAL NUMBERS ON THE NUMBER LINE

14.1	Integers	1
	<ul style="list-style-type: none">• Represent integers on the number line.• Compare integers on the number line.• Write inequalities involving integers.• Draw arrows to represent distance and direction.• Solve problems involving integers.	
14.2	Opposites and Absolute Value	8
	<ul style="list-style-type: none">• Understand the meaning of opposites and absolute value.	
14.3	Rational Numbers	13
	<ul style="list-style-type: none">• Locate and graph rational numbers on number lines.• Compare rational numbers.• Find opposites and absolute values of rational numbers.• Solve problems involving rational numbers.• Graph solutions to inequalities on number lines.	
14.4	Skill Builders, Vocabulary, and Review	25

WORD BANK

Word or Phrase	Definition or Description	Example or Picture
absolute value		
distance		
elevation		
inequality		
integer		
opposite of a number		
rational number		

INTEGERS

Summary

We will extend the number line to include negative integers. We will use temperature as a context to locate numbers, write inequalities, and solve problems. We will use arrows to represent direction and distance.

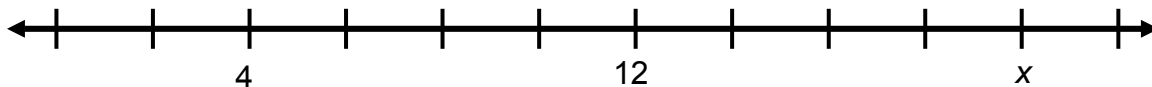
Goals

- Represent integers on the number line.
- Compare integers on the number line.
- Write inequalities involving integers.
- Draw arrows to represent distance and direction.
- Solve problems involving integers.

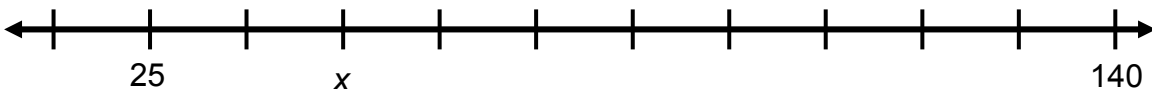
Warmup

All tick marks are equally spaced on each number line below. Find the unknown value (x) for each. Be prepared to explain your reasoning.

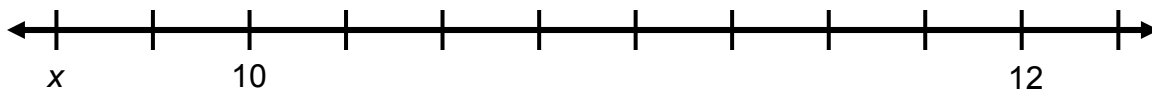
1.



2.



3.

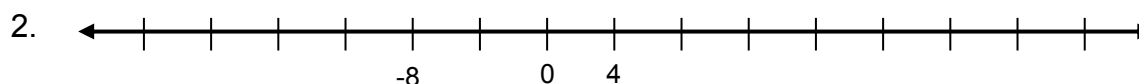
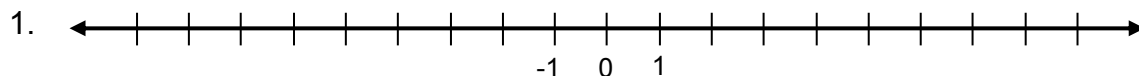


INTEGERS ON THE NUMBER LINE

The integers are the whole numbers and their opposites.

They are the numbers 0, 1, 2, 3, ... and -1, -2, -3,

For problems 1-3, write integer values directly under the unlabeled tick marks on each horizontal number line, and write integer values next to the unlabeled tick marks on the vertical number line.



Each statement below has a number missing. Choose a number you labeled on the vertical number line to make each statement true.

4. _____ $<$ 12 5. _____ $<$ -6 6. 0 $<$ _____

7. _____ $>$ 9 8. _____ $>$ -21 9. -3 $>$ _____

Write whether each statement is true or false.

10. _____ All positive numbers are greater than all negative numbers.
11. _____ As we move to the left on the horizontal number line, numbers decrease in value.
12. _____ The numbers 8 and -8 are the same distance from 0 on the number line.
13. _____ $-10 > 6$
14. _____ $-12 < -8$
15. _____ The number line in problem 1 ends at 10 in the positive direction and at -11 in the negative direction.

16. Choose one false statement from problems 10-15 and rewrite it so it is a true statement.

COMPARING TEMPERATURES

Below are some average temperatures in Fahrenheit for the month of July from locations around the world.

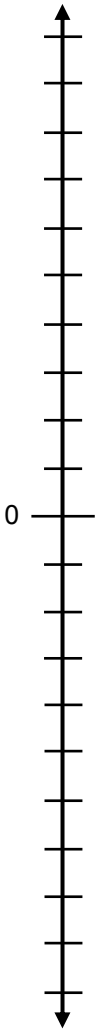
- 1. Label the vertical number line to the right, showing temperatures from 100 degrees below zero (-100°F) to 100 degrees above zero (100°F).

Indicate the temperature for each location in problems 2-7 location by graphing a point on the number line to the right.

- 2. Point G: Greenland at 0°F.
- 3. Point A: Auckland at 10°F.
- 4. Point M: Moscow at 50°F.
- 5. Point P: Patagonia at -20°F.
- 6. Point C: Cairo at 100°F.
- 7. Point S: South Pole at -35°F.

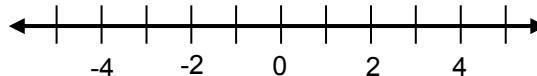
Fill in the missing numbers, inequality symbols (> or <), and verbal sentences.

Verbal Sentence	Number Sentence
8. The temperature in Patagonia is greater than the temperature in the South Pole.	_____ <input type="text"/> _____
9. The temperature in Greenland is less than the temperature in Auckland.	_____ <input type="text"/> _____
10. The temperature in Cairo _____ the temperature in Auckland.	_____ <input type="text"/> _____
11.	50° <input type="text"/> 0°
12.	-35° <input type="text"/> 10°
13.	-35° <input type="text"/> -20°



DIRECTION AND DISTANCE ON THE NUMBER LINE 1

Refer to the number line to the right for problems 1-8.
Distance is always greater than or equal to zero.

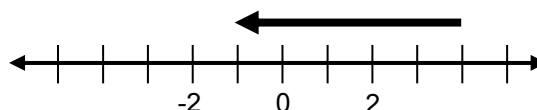


1. How do you get from -2 to 3? Move _____ units to the _____	2. What is the distance from -2 to 3? _____ units
3. How do you get from 3 to -2? Move _____ units to the _____	4. What is the distance from 3 to -2? _____ units
5. How do you get from -2 to -3? Move _____ units to the _____	6. What is the distance from -2 to -3? _____ units
7. How do you get from -3 to -2? Move _____ units to the _____	8. What is the distance from -3 to -2? _____ units

9. We can show direction and distance on a number line with an arrow. The length of the arrow will refer to the distance from its head to its tail.

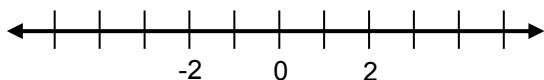
a. The first arrow starts at -1 and ends at 4. Its length is _____.

b. The second arrow starts at 4 and ends at -1. Its length is _____.



c. Now look at the direction of the arrows. Why do you think we say that the first arrow represents 5, while the second one represents -5?

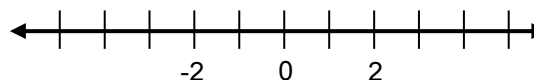
10. Draw an arrow that starts at -5 and represents the number 2.



The arrow ends at which number? _____

How do you know by its direction that this arrow represents a positive number?

11. Draw an arrow that starts at 0 and represents the number -4.



The arrow ends at which number? _____

How do you know by its direction that this arrow represents a negative number?

DIRECTION AND DISTANCE ON THE NUMBER LINE 1 (Continued)

12. Let the first arrow to the right represent 3.
On this same number line, draw a different arrow that also represents 3.

13. Let the second arrow to the right represent -3. Draw a different arrow near this number line that also represents -3.

14. How do you get from 4 to 0?

15. How do you get from -4 to -2?

16. How do you get from 2 to -2?

17. How do you get from -4 to 4?

18. Which of the movements in problems 14-17 required moving the greatest distance?

Is this a change in the positive or negative direction?

Use the number lines to the right to draw arrows for problems 19-21. Be sure to scale each number line appropriately.

19. Draw an arrow that starts at 8 and represents the number 7.

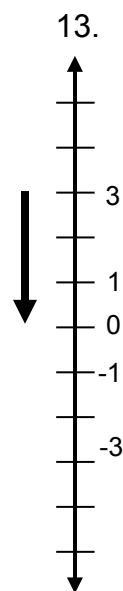
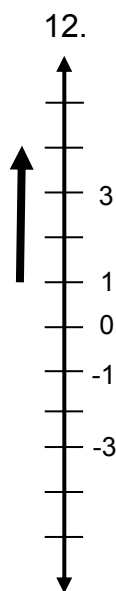
Where does the arrow end? _____

20. Draw an arrow that starts at -10 and represents the number -6.

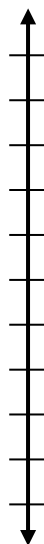
Where does the arrow end? _____

21. Draw an arrow that starts at -25 and represents the number 5.

Where does the arrow end? _____



19.



20.

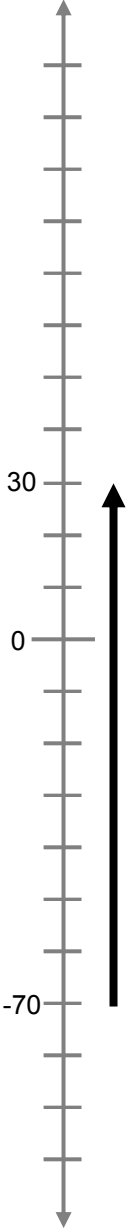
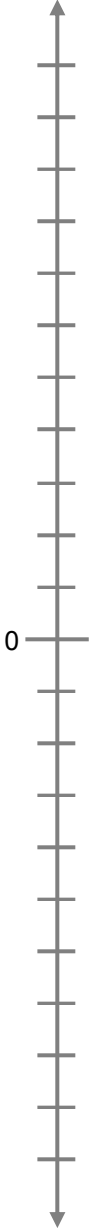
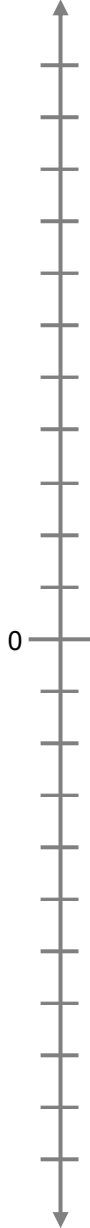
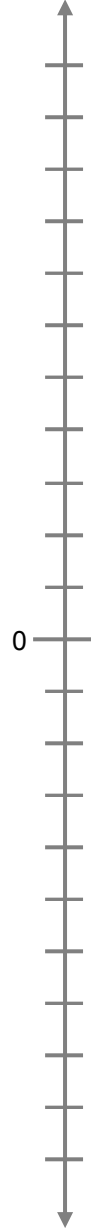
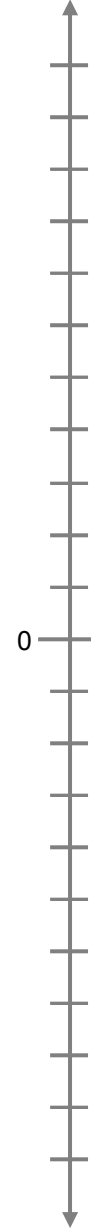
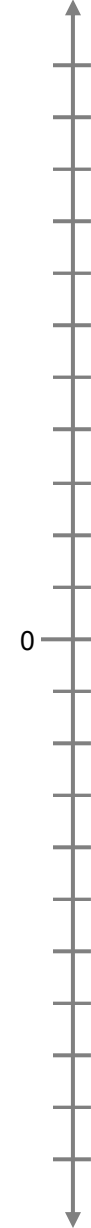


21.



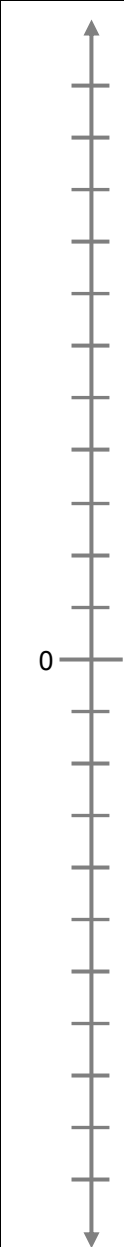
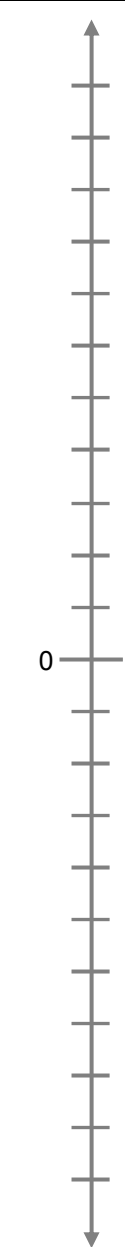
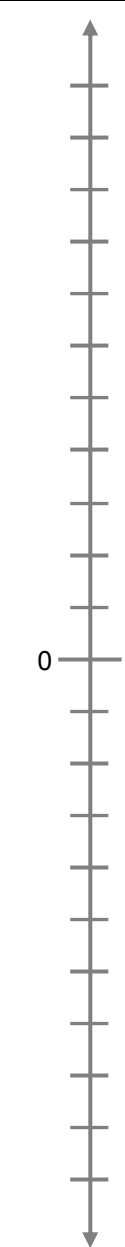
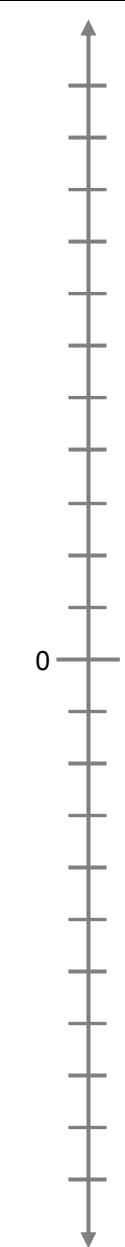
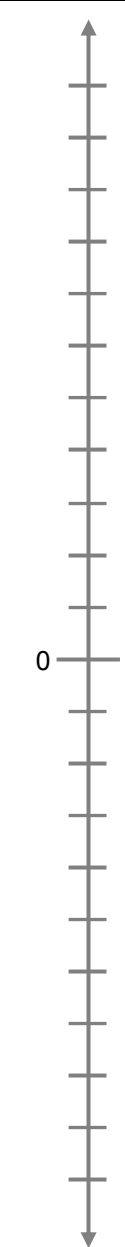
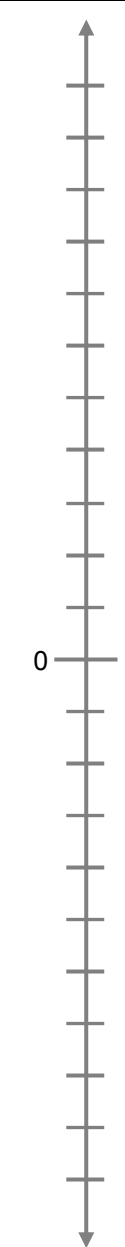
TEMPERATURE CHANGES

Find the missing value in each column by drawing arrows. Label tick marks as needed.

	1.	2.	3.	4.	5.	6.
Beginning Temperature	-70° F	-15° F	-35° F	40° F	-20° F	-20° F
Change	rises 100° F	rises 10° F	rises 35° F	falls 70° F	falls 20° F	falls 50° F
Ending Temperature						
Number Lines (draw arrows)						

TEMPERATURE CHANGES (Continued)

Find the missing value in each column by drawing arrows. Label tick marks as needed.

	7.	8.	9.	10.	11.	12.
Beginning Temperature	50° F	0° F	5° F			
Change				rises 10° F	falls 30° F	falls 40° F
Ending Temperature	-10° F	-15° F	-2° F	-20° F	0° F	-30° F
Number Lines (draw arrows)						

OPPOSITES AND ABSOLUTE VALUE

Summary

We will interpret and find the value of the opposite of a number. We will interpret and find the value of the absolute value of a number.

Goals

- Understand the meaning of opposites and absolute value.

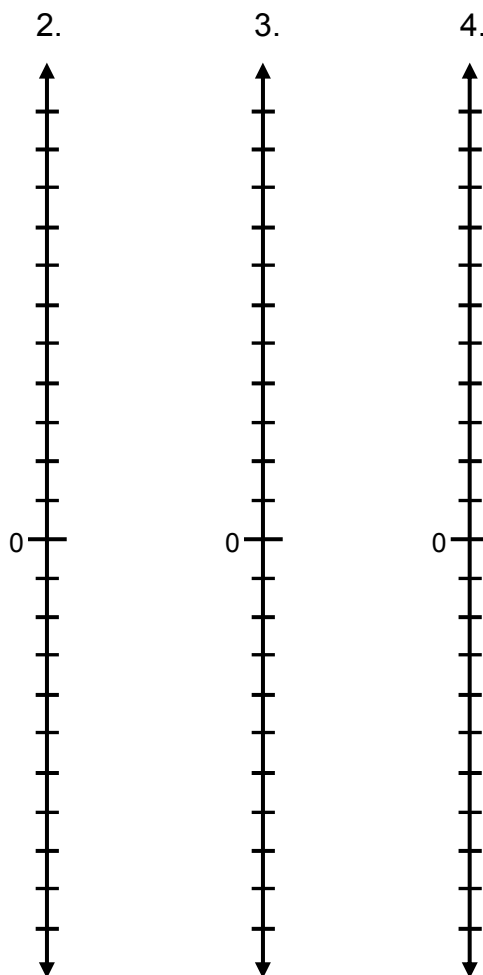
Warmup

Elevation relative to sea level is measured vertically from sea level. It can be measured in miles, kilometers, feet, etc. We use positive measurements for locations above sea level, and negative measurements for locations below sea level.

- Suppose we are measuring elevation relative to sea level in meters. What does an elevation of 0 meters represent?

Label the number lines to the right in increments of 10 meters for each problem. Illustrate each situation with an arrow and answer each question.

- A diver is 15 meters above the surface of the ocean. She dives in and swims to 40 meters below the surface. What is her change in elevation?
- A flying fish starts 10 meters below the surface and jumps to a height of 5 meters out of the water. What is its change in elevation?
- A shark is at an elevation of -25 meters. It swims down to an elevation of -75 meters. What is its change in elevation?



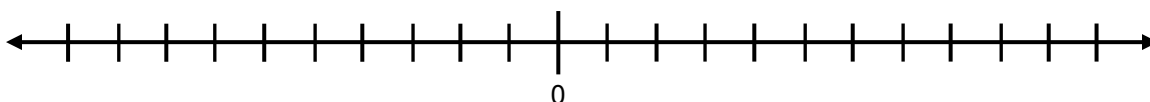
OPPOSITES

Complete the table below.

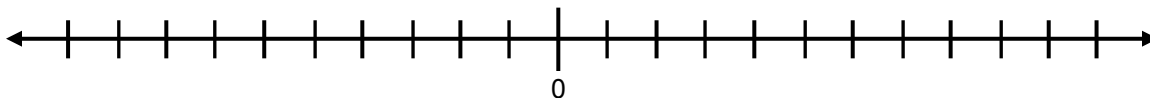
Situation		Opposite of the Situation	
Words	Number	Words	Number
1. Fall 8 feet	-8	Rise 8 feet	
2. Find \$10			
3. Gain 7 yards (in football)			
4. Four steps backward			

For problems 5 and 6, draw arrows on the number lines below, the first beginning at zero, to illustrate each situation.

5. A football player gains 7 yards and then loses 7 yards. What is his end result?



6. You take 4 steps backward and then 4 steps forward. What is your end result?



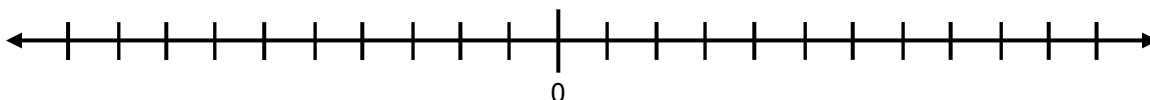
For problems 7 and 8, describe the end result of each situation in words.

7. A bird falls 50 feet and then rises 50 feet.

8. You find \$20 and then lose \$20.

9. Use the number line below to illustrate the opposite of an opposite. Locate 7. The opposite of 7 is _____, and in turn, the opposite of this number is _____.

Therefore, the opposite of the opposite of 7 is _____. We write $-(-7) = \underline{\hspace{2cm}}$.



ABSOLUTE VALUE

- The absolute value of a number is its distance from zero on the number line.
- The absolute value of a number n is denoted $|n|$.
- The number 20 has a distance of 20 from 0, and the number -20 also has a distance of 20 from 0, so both have absolute value equal to 20:

$$|20| = 20 \text{ and } |-20| = 20.$$

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

Label the vertical number line to the right to show elevations from 100 meters below sea level (-100 m) to 100 meters above sea level (+100 m). Then, locate the following points on the number line.

- Point P : A pigeon at 30 m above sea level.
- Point D : A dolphin at 30 m below sea level.
- Point W : A whale at 70 m below sea level.
- Point C : A crow at 45 m above sea level.
- Point S : A swimmer at sea level.
- Point G : A gull at 20 m above sea level.

Complete the table below.

	What	Elevation	Distance from zero (sea level)	Absolute value equation for the distance from sea level
7.	pigeon	30 m	30 m	$ 30 = \underline{\hspace{2cm}}$
8.	dolphin			$ -30 = \underline{\hspace{2cm}}$
9.		-70 m		
10.			45 m	
11.	swimmer			$ 0 = \underline{\hspace{2cm}}$
12.		20 m		
13.	sea level			

ABSOLUTE VALUE (Continued)

Use the number line on the previous page. For problems 14-18, fill in the blanks with $<$, $=$, or $>$ to make each statement true. Then write the appropriate number sentences.

Statement	Number Sentence
14a. The pigeon's elevation _____ the dolphin's elevation.	20 _____ -30
14b. The pigeon's distance from sea level _____ the dolphin's distance from sea level.	$ 10 < -20 \rightarrow 10$ _____ 20
15a. The crow's elevation _____ the gull's elevation.	
15b. The crow's distance from sea level _____ the gull's distance from sea level.	
16a. The swimmer's elevation _____ the pigeon's elevation.	
16b. The swimmer's distance from sea level _____ the pigeon's distance from sea level.	
17a. The dolphin's elevation _____ the gull's elevation.	
17b. The dolphin's distance from sea level _____ the gull's distance from sea level.	
18a. The whale's elevation _____ the crow's elevation.	
18b. The whale's distance from sea level _____ the crow's distance from sea level.	
19. The distance between the pigeon and dolphin is _____ m.	
20. The distance between the whale and crow is _____ m.	

Fill in the blanks with "elevation" or "distance from sea level."

21. We use signed numbers to compare the _____.

22. We use the absolute value of the numbers to compare the _____.

PRACTICE

1. On the number line below, graph the following numbers and their opposites.



Write the opposite of each number or expression in simplified form.

Example: $8 - 4$ opposite: $-(8 - 4) = -4$	2. 11 opposite:	3. $ 0 $ opposite:
4. $15 - 6$ opposite:	5. $16 - 8$ opposite:	6. $- 16 - 8 $ opposite:

7. What is the opposite of the opposite of -5 ? _____
8. What is the opposite of the opposite of $|-5|$? _____
9. On the number line, how do you get from a positive number to its opposite?
10. On the number line, how do you get from a negative number to its opposite?

Simplify.

11. $- -17 $	12. $ 14 $	13. $ 0 $
14. $ 22 - 6 $	15. $ -3 $	16. $- -3 $

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

17. $ -10 $ _____ 10	18. $ -10 $ _____ -10	19. $- -10 $ _____ -10
------------------------	-------------------------	--------------------------

20. Maggie thinks that the opposite of a number and the absolute value of a number are the same thing. Is Maggie correct? Use examples to support your answer.

RATIONAL NUMBERS

Summary

We will use number lines to explore the meaning of rational numbers. We will find opposites and absolute values of rational numbers. We will use arrows on a number line to represent direction and distance. We will solve problems with rational numbers. We will graph solutions to inequalities on the number line.

Goals

- Locate and graph rational numbers on number lines.
- Compare rational numbers.
- Find opposites and absolute values of rational numbers.
- Solve problems involving rational numbers.
- Graph solutions to inequalities on number lines.

Warmup

1. Estimate and label the location of the following numbers on the number line below.

$\frac{3}{4}$

0

1

$\frac{5}{8}$

$\frac{8}{7}$

$\frac{7}{8}$



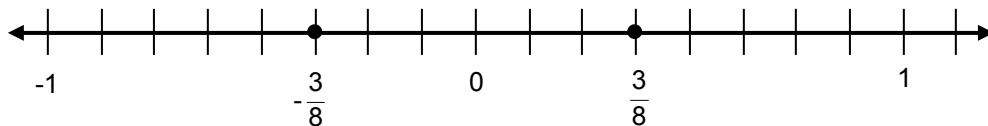
2. Write an inequality statement to show the order of the numbers in problem 1.

_____ < _____ < _____ < _____ < _____ < _____

3. Explain how you located $\frac{3}{4}$ and $\frac{5}{8}$ on the number line in problem 1.

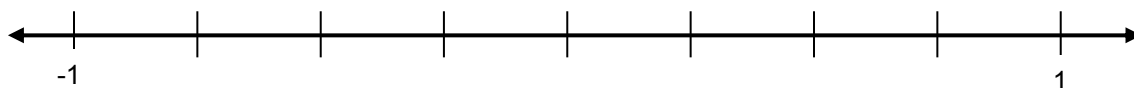
FRACTIONS, DECIMALS, AND THEIR OPPOSITES

The opposite of a fraction is its additive inverse. It is located the same distance from zero as the fraction, but in the opposite direction. For example, $\frac{3}{8}$ is a fraction, and $-\frac{3}{8}$ is its opposite.



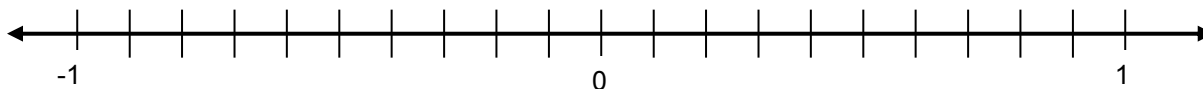
1. Label the tick marks on the number line below as whole numbers, fractions, or the opposites of fractions.

Then write the equivalent representations for these numbers as decimals and their opposites.



2. Graph and label the following numbers on the number line below: $\frac{2}{10}$, $\frac{2}{5}$, $-\frac{6}{10}$, $-\frac{1}{5}$, $-\frac{4}{5}$.

Then write the equivalent representations for these numbers as decimals and their opposites above the original fraction.



Simplify.

3. $\left| \frac{1}{5} \right|$

4. $\left| -\frac{1}{5} \right|$

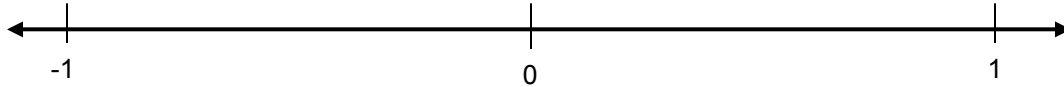
5. $-\left| \frac{1}{5} \right|$

6. What is the opposite of $\frac{1}{5}$? ____ What is the opposite of the opposite of $\frac{1}{5}$? ____

FRACTIONS, DECIMALS, AND THEIR OPPOSITES (Continued)

7. Fill in the blanks with the following numbers: $-\frac{1}{5}$ $\frac{2}{5}$ $-\frac{4}{5}$ _____ $>$ _____ $>$ _____

8. Draw appropriate tick marks to help you estimate the location of $\frac{1}{3}$ and $\frac{2}{3}$ on the number line below. Then locate and label the opposites of these two fractions.



9. What is the opposite of the opposite of $-\frac{2}{3}$? _____

10. On the vertical number line to the right, draw and label appropriate tick marks to help you estimate the location of the numbers below. Then write the equivalent representations for these numbers as decimals and their opposites.

$$\frac{0}{8}$$

$$\frac{1}{8}$$

$$\frac{2}{8}$$

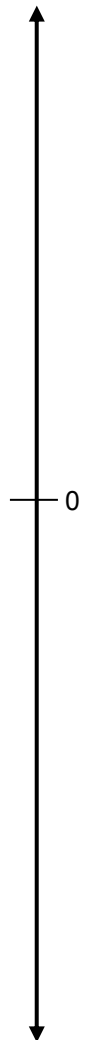
$$\frac{4}{8}$$

$$\frac{7}{8}$$

$$-\frac{3}{8}$$

$$-\frac{6}{8}$$

$$-\frac{8}{8}$$



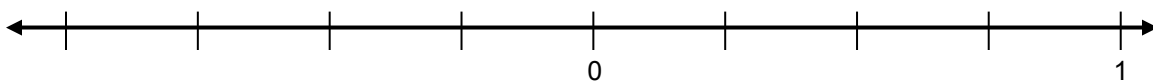
A rational number is a number that can be expressed in the form $\frac{a}{b}$ or $-\frac{a}{b}$ for some fraction $\frac{a}{b}$. Rational numbers are numbers that can be expressed as a quotient of integers.

11. All of the fractions and their opposites on this page are rational numbers. How do you know that the decimals and their opposites you wrote (numbers like 0.2 and -0.125) are also rational numbers?

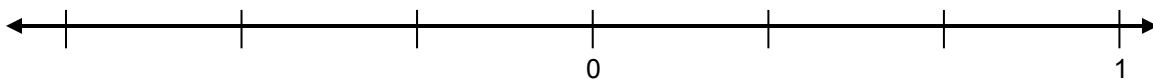
PRACTICE 1

Graph and label each number on its corresponding number line below.

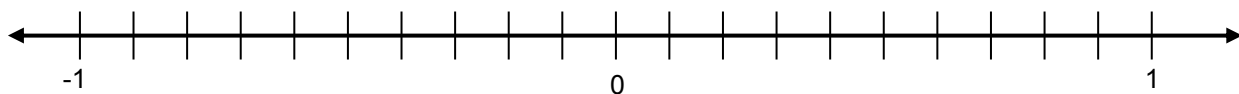
1. $\frac{1}{8}$ $\frac{1}{2}$ $-\frac{3}{4}$ $-\frac{3}{8}$ $-\frac{5}{8}$



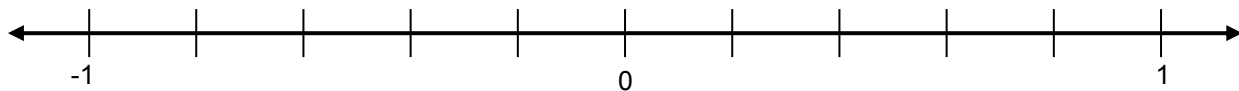
2. $\frac{1}{6}$ $\frac{5}{6}$ $-\frac{1}{3}$ $-\frac{1}{2}$ $-\frac{5}{6}$



3. 0.53 -0.5 0.8 -0.2 0.25 -0.35



4. 0.54 -0.6 0.7 -0.3 0.15 -0.45



5. Write the following as fractions or opposites of fractions. Then use less than symbols to order them from least to greatest.

a. 0.8

b. 0.54

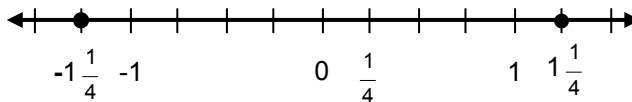
c. -0.2

d. -0.45

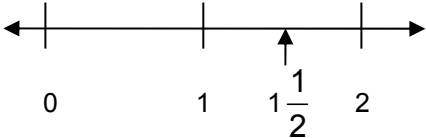
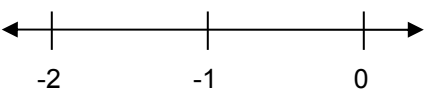
_____ _____ _____ _____

MIXED NUMBERS AND THEIR OPPOSITES

The opposite of a mixed number is its additive inverse. It is located the same distance from zero as the mixed number, but in the opposite direction. For example, $1\frac{1}{4}$ is a mixed number, and $-1\frac{1}{4}$ is its opposite.



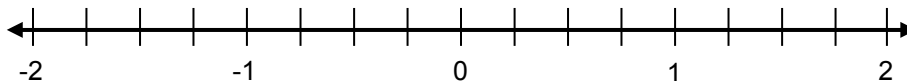
Fill in the table below.

	Mixed Number	Opposite of the Mixed Number
Example	$1\frac{1}{2}$	$-1\frac{1}{2}$
1. Read as	“one and one-half”	“_____”
2. The combination of	1 and $\frac{1}{2}$	-1 and _____
3. Number line representation		
4. As a fraction or its opposite	$1\frac{1}{2} = \frac{3}{2}$	$-1\frac{1}{2} = -\left(\square \frac{\square}{\square}\right) = -\frac{\square}{\square}$

Fill in the table below.




Number	The combination of	As a fraction or its opposite
5. $1\frac{3}{4}$	_____ and _____	
6. $-1\frac{3}{4}$	_____ and _____	
7. $-2\frac{1}{2}$	_____ and _____	

8. Graph $1\frac{3}{4}$ and $-1\frac{3}{4}$ on the number line below.



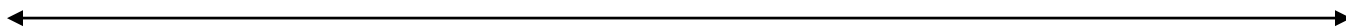
MIXED NUMBERS AND THEIR OPPOSITES (Continued)

Complete the table and graphs below.

Number	Round to the nearest greater integer	Round to the nearest lesser integer	Sketch of graph (scale appropriately)
9. $-4\frac{1}{3}$			
10. $-3\frac{1}{3}$			
11. $-\frac{5}{3}$			

Graph each set of numbers below.

12. $\frac{3}{8}$ $1\frac{1}{2}$ $-\frac{3}{8}$ $-1\frac{3}{4}$ $-1\frac{3}{8}$ $-\frac{3}{2}$



13. $\frac{5}{8}$ $-1\frac{1}{2}$ $1\frac{2}{5}$ $-2\frac{1}{10}$ $-\frac{7}{4}$ $-\frac{1}{4}$



Write each of the following as decimals or their opposites.

14. $1\frac{2}{5}$	15. $-2\frac{1}{10}$	16. $-\frac{7}{4}$
--------------------	----------------------	--------------------

Rewrite the given numbers to show that they are rational numbers.

17. $-1\frac{3}{8}$	18. 3.15
---------------------	----------

PRACTICE 2

Write the following as mixed numbers or their opposites.

1. 1.5	2. -1.8	3. 1.25	4. -1.65
--------	---------	---------	----------

Write the following as decimals or their opposites.

5. $1\frac{3}{10}$	6. $-1\frac{23}{100}$	7. $-3\frac{3}{4}$	8. $-\frac{5}{2}$
--------------------	-----------------------	--------------------	-------------------

Use the following numbers for problems 9-10.

$$-\frac{3}{4} \quad -\frac{6}{5} \quad -0.8 \quad -0.08 \quad -1.1 \quad -1\frac{9}{10}$$

9. Estimate the location of each number on the number line below. Label some integers and/or benchmark fractions you might use first.



10. Write an inequality statement to show the order of the numbers.

_____ < _____ < _____ < _____ < _____ < _____

11. Explain how you located $-\frac{3}{4}$ and $-\frac{6}{5}$ on the number line.

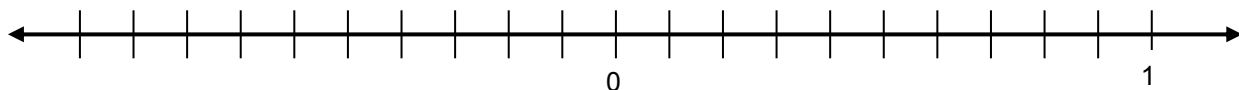
12. Explain how you located -0.8 and -0.08 on the number line.

13. Write an inequality statement to show the order of the following numbers.

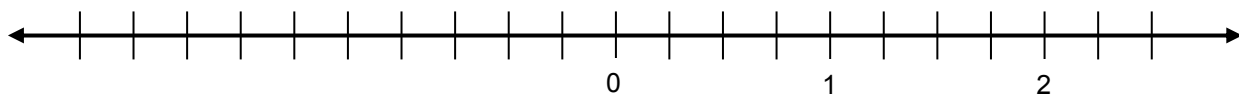
$$-|0.8| \quad -|0.08| \quad |-0.8| \quad |-0.08|$$

DIRECTION AND DISTANCE ON THE NUMBER LINE 2

Use the number line below for problems 1-8. Use the next number line below for problems 9-18.



1. How do you get from 0.2 to 0.7?	2. What is the distance from 0.2 to 0.7?
3. How do you get from 0.7 to 0.2?	4. What is the distance from 0.7 to 0.2?
5. How do you get from -0.4 to 0.5?	6. What is the distance from -0.4 to 0.5?
7. How do you get from 0.5 to -0.4?	8. What is the distance from 0.5 to -0.4?

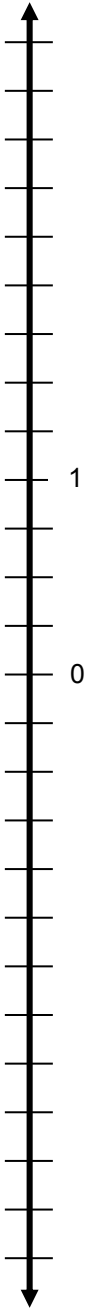


9. How do you get from $\frac{1}{4}$ to $\frac{3}{4}$?	10. What is the distance from $\frac{1}{4}$ to $\frac{3}{4}$?
11. How do you get from $\frac{3}{4}$ to $\frac{1}{4}$?	12. What is the distance from $\frac{3}{4}$ to $\frac{1}{4}$?
13. How do you get from $2\frac{1}{4}$ to $\frac{1}{2}$?	14. What is the distance from $2\frac{1}{4}$ to $\frac{1}{2}$?
15. How do you get from $\frac{3}{4}$ to $-1\frac{1}{4}$?	16. What is the distance from $\frac{3}{4}$ to $-1\frac{1}{4}$?
17. How do you get from $-2\frac{1}{2}$ to $1\frac{3}{4}$?	18. What is the distance from $-2\frac{1}{2}$ to $1\frac{3}{4}$?

ALBATROSS PROBLEMS

An albatross is a type of bird that dives into the water to find its food. Use the number line to the right as needed to help you complete this page.

1. Label the tick marks on the number line to the right. If the “1” represents an elevation of 1 yard above sea level, what does the “0” represent?
2. A Tristan Albatross (*T*) is flying $2\frac{1}{2}$ yards above sea level and dives to catch a squid (*S*) directly below it that is $1\frac{1}{4}$ yards below sea level.



a. Write a number that represents the squid’s elevation relative to sea level.	b. Which is at the higher elevation , the bird or the squid? Include an inequality to justify your answer.
c. Which is the greater distance from sea level, the bird or the squid? Include an inequality to justify your answer.	d. What is the distance between the Tristan Albatross and the squid before the bird starts its dive?

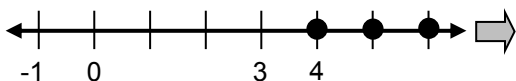
3. A Great Albatross (*G*) is flying $1\frac{1}{2}$ yards above sea level and dives to catch a fish (*F*) directly below it that is $2\frac{3}{4}$ yards below sea level.

a. Write a number that represents the fish’s distance below sea level.	b. Which is at the higher elevation, the bird or the fish? Include an inequality to justify your answer.
c. Which is the greater distance from sea level, the bird or the fish? Include an inequality to justify your answer.	d. What is the distance between the Great Albatross and the fish before the bird starts its dive?

GRAPHING INEQUALITIES

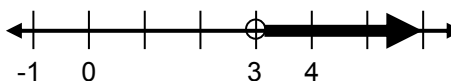
Here are two ways of representing solutions to inequalities on a number line. Graph the solution set of the inequality $n > 3$ when n is restricted to be an integer, and $x > 3$ when x is any number.

Integer values on the number line that satisfy the inequality $n > 3$.



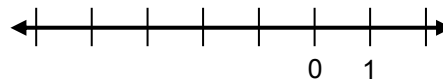
The dots represent integers that are greater than 3. These are integer solutions to the inequality. The arrow indicates that all the integers to the right on the number line are solutions.

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



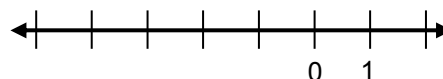
The “open dot” indicates that $x = 3$ is not included in the solution set. That is, it is not a solution to the inequality $x > 3$. The arrow indicates that all numbers to the right on the number line are solutions.

1. Graph the integer solutions of $n < -2$.



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

3. Graph the solutions of $x < -2$ (for all values of x).

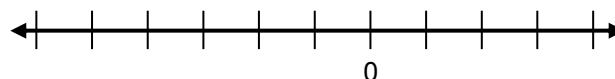


4. List four non-integer numbers that are less than -2. _____

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

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

7. On the number line to the right, graph the solutions to $x > -1$; $x < -1$.



What is the only number that is not graphed?

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

-7

4.9999

5

5.0000001

$936\frac{2}{5}$

1,000,000,000

GRAPHING INEQUALITIES (Continued)

Fill in each box with $<$, $=$, or $>$. Label and scale the graphs below appropriately.

Situation	Equation or inequality	Graph
9. Roberto is 11 years old.	Let r = Roberto's age r <input type="text"/> 11	
10. You must be taller than 48 inches to ride the rollercoaster.	Let h = height h <input type="text"/> <input type="text"/>	
11. You must weigh less than 275 pounds to ride the rollercoaster.	Let w = weight <input type="text"/> <input type="text"/> <input type="text"/>	
12. You can register to vote after your 16 th birthday.	Let a = voting age <input type="text"/> <input type="text"/> <input type="text"/>	

13. A car seat is tested to be safe for children weighing 20 pounds or less. Why is the inequality $x < 20$ an incomplete description of allowable weights?

Write true or false for each statement below. When reading inequality statements, consider all numbers.

14. _____ The graph of $x = 10$ is a solid dot at 10.
15. _____ The graph of $x < 5$ is an open dot at 5 and an arrow pointing to the right.
16. _____ One solution to $x < -5$ is $x = -4$.
17. _____ The integer solutions to $n < -1$ are the integers, $-1, -2, -3, -4, \dots$
18. _____ The solutions to $x > 0$ are all of the positive numbers.
19. Choose one false statement above and explain why it is false.

ORDER IT!

Need:

- 2 or more players
- 32 or more Fraction Cards

The object of this game is to get five numbers in a row, in order, from least value to greatest value.

Once a card is placed on the table face up, it may not be moved to another location. However, a new card may be placed on top of it.

- Shuffle all the cards and place the cards face down in a pile.
- To begin, put 5 cards face-up in the center, in the order they are drawn.
- The first player draws a card from the pile and places it *on top of* one of the existing face-up cards. If all of the cards are now in order from least to greatest, then the player wins. If not, then play continues.
- The next player draws a card from the pile and places it *on top of* one of the existing face-up cards. If all the cards are now in order from least to greatest, then the player wins. If not, then play continues until all five cards are in order from least to greatest.

In order to win, a player must convince his or her opponents with a reasonable argument that the cards are in order.

1. Play two rounds of the Order It! Record one of the ordered card sequences here.

2. Explain how you know that the numbers are in order.

SKILL BUILDERS, VOCABULARY, AND REVIEW**SKILL BUILDER 1**

Compute.

1. $45.09 - 32.1$	2. $18 + 234.5$	3. $6.5(18.3)$
4. $54.285 \div 5.5$	5. $115.02 \div 0.54$	6. $56,112 \div 28$

7. Francine's horses all eat the same amount of hay per day. One day, she fed 4 of her horses 56 pounds of hay.

- Make a double number line showing the amount of hay eaten by different numbers of horses.
- If she wanted to buy hay for 10 horses for one day, how many pounds of hay would she need?

Compute.

8. What number is 45% of 230?	9. 1.5% of what number is 15?	10. 108% of 54 is what number?
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11. What is $\frac{5}{16}$ as a percent? Round your answer to the nearest tenth of a percent.

SKILL BUILDER 2

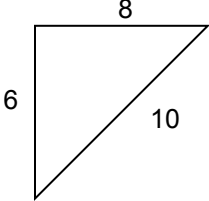
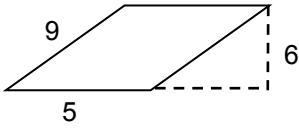
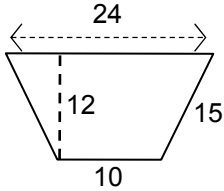
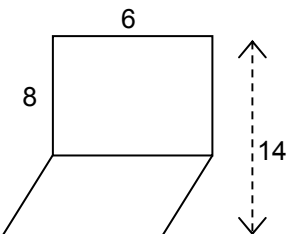
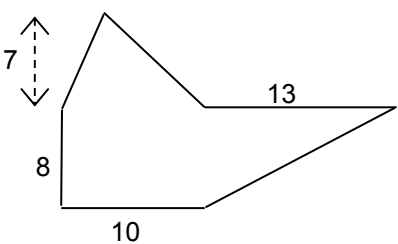
Solve. If mental math is used, write MM. Otherwise show all your work.

1. $x + 3\frac{1}{4} = 5\frac{3}{4}$	2. $x - 2\frac{7}{8} = 1\frac{3}{8}$	3. $x + 7\frac{2}{5} = 10\frac{4}{5}$
4. $x + 64 = 87$	5. $13g = 156$	6. $78.9 = d - 4.56$
7. $\frac{k}{3.5} = 4.2$	8. $\frac{3}{5}y = 2\frac{7}{8}$	9. $3\frac{8}{9} + w = 8\frac{1}{3}$

10. Robert wants to buy a video game for \$64 and has already saved some money (m) from mowing lawns. Explain what the expression $64 - m$ represents in this context.
11. Salvador got 88% of the items correct on a 50-item trivia quiz. How many items did he get correct?
12. Mahlia paid \$5.78 for school supplies and had \$14.71 left over. Write an equation to find how much money she started with, x . Then solve the equation.
13. The area of the bottom of a rectangular pool is 184 ft^2 . If the pool is 6 ft deep, what is the volume of the pool?

SKILL BUILDER 3

Find the area of each figure below in square units. Assume any angle that appears to be a right angle is a right angle, and that any sides that appear parallel are parallel. The figures are not drawn to scale.

<p>1.</p> 	<p>2.</p> 	<p>3.</p> 
<p>4.</p> 		<p>5.</p> 

6. Jahill says that if you want to divide $\frac{5}{4}$ by $\frac{2}{3}$, then multiply $\frac{2}{3}$ by $\frac{4}{5}$. Is Jahill correct? Explain.

A rectangular prism has a length of 5 cm, a width two times the length, and a height one-half of the length.

<p>7. Find the volume of the prism.</p>	<p>8. Find the surface area of the prism.</p>
---	---

9. Circle all expressions that are equivalent to $4y + 8x - 3y + 2x + y$.

$8y + 10x$

$2(y + 5x)$

$2y + 5x$

$2(4y + 5x)$

$2y + 10x$

SKILL BUILDER 4

Use the number lines to the right to draw arrows. Be sure to label and scale each number line appropriately.

1. Draw an arrow that starts at 5 and represents the number 3.

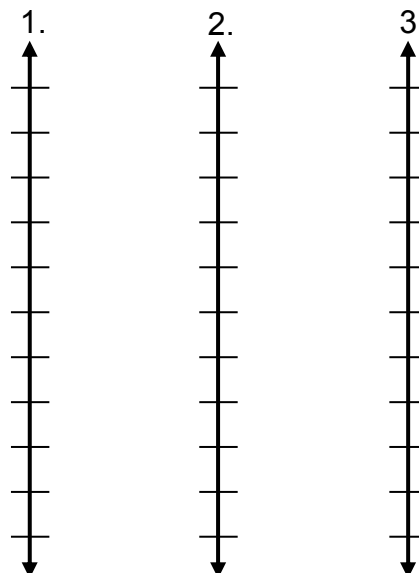
Where does the arrow end? _____

2. Draw an arrow that starts at -7 and represents the number -8.

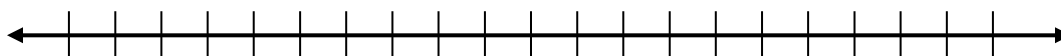
Where does the arrow end? _____

3. Draw an arrow that starts at -20 and represents the number 20.

Where does the arrow end? _____



4. On the number line below, graph the following numbers and their opposites: 4 -3 9 -7 0



Simplify the absolute value expressions.

5. $- -19 $	6. $ 16 $	7. $ -42 $
-------------	-----------	------------

Write the opposite of each expression in simplified form.

8. $124 - 82$ opposite:	9. $96 - 39$ opposite:	10. $- 18 - 2 $ opposite:
----------------------------	---------------------------	------------------------------

11. What is the opposite of the opposite of -3? _____

12. What is the opposite of the opposite of $|-3|$? _____

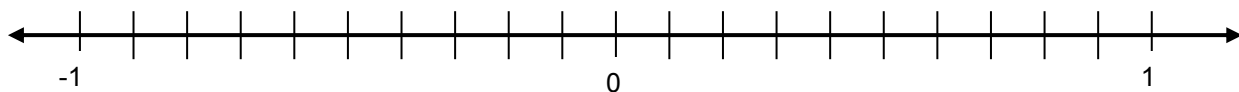
Write $<$, $=$, or $>$ in the blanks to make each statement true.

13. $ -9 $ _____ 9	14. $ -16 $ _____ the opposite of -5	15. $- -7 $ _____ -8
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SKILL BUILDER 5

Graph and label each set of numbers below.

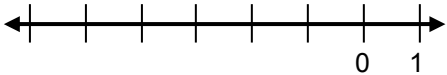
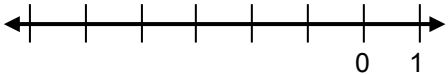
1. 0.1 -0.2 0.45 -0.5 0.75 -0.95



2. $\frac{3}{4}$ $2\frac{3}{5}$ $-\frac{1}{8}$ $-2\frac{7}{8}$ $-\frac{6}{5}$ $-\frac{2}{3}$



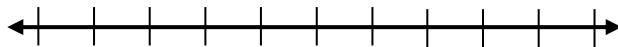
Use the inequality $x < -3$ for problems 3-7.

<p>3. Circle all rational numbers that are solutions.</p> <p>0 -3 -4.5 2.4 -2.5</p>	<p>4. List three more solutions.</p>
<p>5. Draw the graph for all integer values of x.</p> 	<p>6. Draw the graph for all values of x.</p> 
<p>7. Are there solutions you didn't graph in problem 6? Explain.</p>	

Helen is a recreational jogger. She jogs less than 8 miles every day.

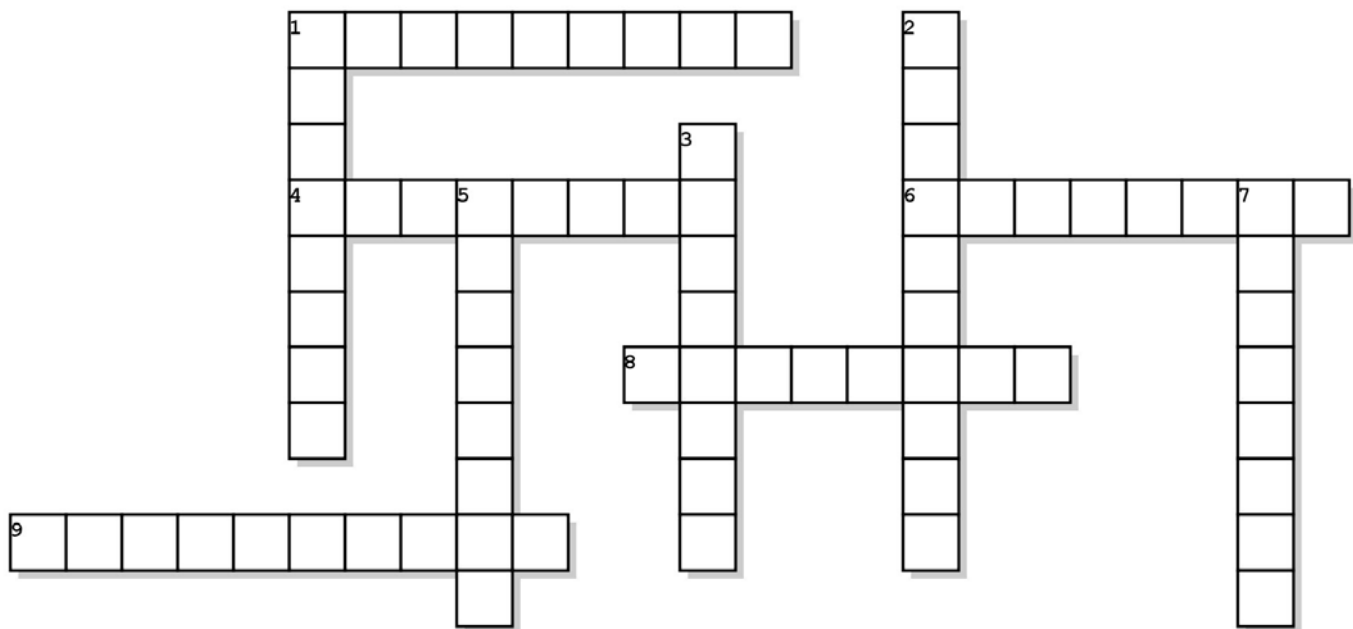
8. Write an inequality for this situation.

9. Graph the inequality on the number line to the right.



10. Explain which values you graphed are reasonable in this context.

FOCUS ON VOCABULARY



Across

1 location relative to sea level

4 The ____ value of -4 is 4.

6 whole numbers and their opposites

8 length of a straight path from one point to another

9 $x - 4 < 4$ is an ____.

Down

1 statement that two expressions are equal

2 Numbers are negative to the left of zero on this number line.

3 Numbers are positive above zero on this number line.

5 -4 is the ____ of 4.

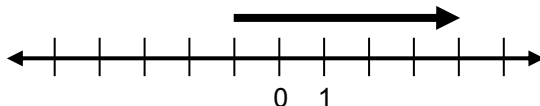
7 fractions and their opposites are ____ numbers

(For word hints, see the word bank and other vocabulary used in this packet.)

SELECTED RESPONSE

Show your work on a separate sheet of paper and select the best answer(s).

1. Choose all the expressions that accurately describe the diagram below.



- | | |
|--|--|
| A. The arrow goes from a negative number to a positive number. | B. The arrow represents a negative number. |
| C. The arrow represents a positive number. | D. The arrow represents the number 4. |

2. What is the distance from -5 to -2?

- | | | | |
|------|-------|------|-------|
| A. 3 | B. -3 | C. 7 | D. -7 |
|------|-------|------|-------|

3. Which of the following expressions represents the greatest value?

- | | | | |
|------------------|-------------------|---------------|--------------------|
| A. $ 10 - -6 $ | B. $ -10 + -6 $ | C. $ 10 - 6 $ | D. $- 10 \cdot 6 $ |
|------------------|-------------------|---------------|--------------------|

4. Choose all statements that are true.

- | | | | |
|------------------|--------------|--------------------|---------------------|
| A. $ -11 > 7 $ | B. $-7 < -8$ | C. $- 10 - 6 = 4$ | D. $- 10 - 6 = -4$ |
|------------------|--------------|--------------------|---------------------|

5. Choose all statements that are true.

- | | | | |
|---------------------------------|-------------------------|---------------------------------|--|
| A. $\frac{3}{2} = 1\frac{1}{2}$ | B. $-2\frac{1}{4} < -3$ | C. $-\frac{1}{2} < \frac{1}{4}$ | D. $\left -\frac{1}{2}\right < \frac{1}{4}$ |
|---------------------------------|-------------------------|---------------------------------|--|

6. Choose all the statements that are true.

- | | |
|----------------------|--------------------|
| A. $-1.5 < -0.5$ | B. $ -1.5 < -0.5$ |
| C. $- 3.25 = -3.25$ | D. $ -0.1 < 0.1$ |

7. Choose all statements that are true for the inequality $p > -3$.

- | | |
|--------------------------------------|---|
| A. $p = -4$ is a solution | B. $p = -3$ is a solution |
| C. $p = -2\frac{1}{3}$ is a solution | D. There are infinitely many solutions. |

KNOWLEDGE CHECK

Show your work on a separate sheet of paper and write your answers on this page.

14.1 Integers

1. Find the missing value in each column in the table below. Use a number line with arrows to help find the missing numbers.

Beginning Temperature	70° F	-15° F		-35° F	0° F
Change	falls 100° F	falls 10° F	rises 70° F		
Ending Temperature			30° F	0° F	-50° F

14.2 Opposites and Absolute Value

2. For each pair of numbers, circle the greater number. Then draw a star next to the number that is closer to zero on the number line.

-4 and 5

-5 and -4

-5 and 4

-3 and 2

-100 and 99

3. What number is the opposite of the opposite of $-|-5|$?

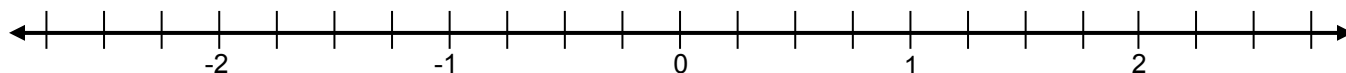
14.3 Rational Numbers

4. Graph and label the following numbers on the number line below.

-2.2

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

0.5

 $2\frac{1}{4}$ $-\frac{9}{4}$ 

5. Use the number line above to find the distance between the following pairs of numbers.

 $-1\frac{3}{4}$ and $\frac{3}{2}$ $-\frac{9}{4}$ and 0.5

HOME-SCHOOL CONNECTION

Here are some problems to review with your young mathematician.

- At the top of Mount Whitney, the morning temperature was -16°F .
By midday, the temperature had increased to 40°F .

Label the tick marks on the number line to the right.

Then draw an arrow that represents the change in temperature.

What was the temperature change?

- Explain why the absolute value of -2 is equal to the opposite of -2 .

- Geraldo says that the distance between -8 and -5 is -3 .
Correct Geraldo's mistake.

- Write the following numbers in order from least to greatest.

$$\frac{7}{4}$$

$$-\frac{7}{2}$$

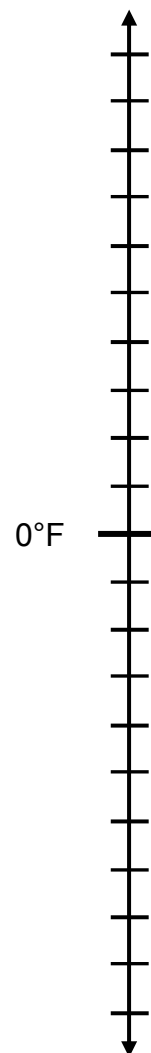
$$-4.1$$

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

$$-4.2$$

$$4$$

_____ < _____ < _____ < _____ < _____ < _____



Parent (or Guardian) Signature _____

COMMON CORE STATE STANDARDS – MATHEMATICS

STANDARDS FOR MATHEMATICAL CONTENT

6.NS.C	Apply and extend previous understandings of numbers to the system of rational numbers.
6.NS.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation
6.NS.6a	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 : Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite.
6.NS.6c	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: Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
6.NS.7a	Understand ordering and absolute value of rational numbers. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. <i>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.</i>
6.NS.7b	Understand ordering and absolute value of rational numbers. Write, interpret, and explain statements of order for rational numbers in real-world contexts. <i>For example, write -3°C is warmer than -7°C.</i>
6.NS.7c	Understand ordering and absolute value of rational numbers. 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. <i>For example, for an account balance of -30 dollars, write $-30 = 30$ to describe the debt in dollars.</i>
6.NS.7d	Understand ordering and absolute value of rational numbers. Distinguish comparisons of absolute value from statements about order. <i>For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.</i>
6.EE.B	Reason about and solve one-variable equations and inequalities.
6.EE.8	Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

STANDARDS FOR MATHEMATICAL PRACTICE

MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP6	Attend to precision.



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