Name _____ Period _____ Date_____

IN2
STUDENT PACKET

INTEGERS
STUDENT PACKET 2: INTEGER CONCEPTS

WORD BANK

Word or Phrase	Definition or Description	Picture or Example
absolute value		
additive identity property		
additive inverse property		
equation		
inequality		
integer		
opposite		

TEMPERATURE AND NUMBER LINES

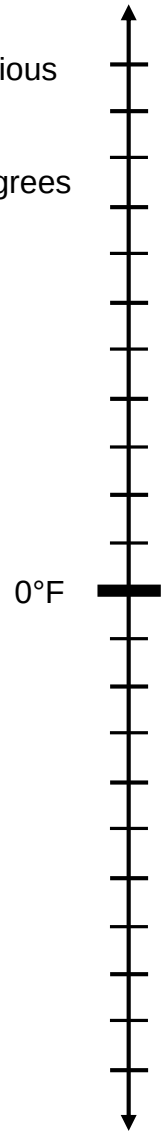
Ready (Summary)	Set (Goals)
We will use temperature as a context to locate integers on a number line. We will use integers to write equations and inequalities.	• Represent integers on a number line. • Explore integer addition and subtraction on the number line. • Use integers to write equations and inequalities. • Solve problems involving integers.

Go (Warmup)

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

- Label the vertical number line on the right, showing temperatures from 100 degrees below zero (-100°F) to 100 degrees above zero (100°F).
- Indicate the temperature for each location with a point on the number line.

1. Point *C*: Cape Denison (a region in Antarctica) at 0°F.
2. Point *M*: Moscow (a city in Russia) at 60°F.
3. Point *N*: North Pole (a city in Alaska) at 40°F.
4. Point *S*: The South Pole (a location in Antarctica) at -70°F.
5. Point *D*: Death Valley (a region in California) at 100°F.
6. Point *E*: Ellsworth Land (a region in Antarctica) at -35°F.



COMPARING TEMPERATURES

- Fold over the number line from the previous page.
- Compare the temperatures using your number line.
- Complete the verbal sentences. Write a number sentence using <, =, or > to match each verbal sentence.

Verbal Sentence		Number Sentence
1.	The temperature in Death Valley <u>is greater than</u> the temperature at the North Pole.	_____ > _____
2.	The temperature in Ellsworth Land <u>is less than</u> the temperature in Cape Denison.	
3.	The temperature in Ellsworth Land is _____ the temperature at the South Pole.	
4.	The temperature in Moscow is _____ the temperature at the South Pole.	

Use your number line to complete each number sentence with $<$, =, or $>$. Then, write a verbal sentence to match each number sentence.

Verbal Sentence		Number Sentence
5.	Forty is greater than zero	40 ☐ 0
6.		60 ☐ -45
7.		-35 ☐ -60
8.		55 ☐ 95 - 40

TEMPERATURE CHANGES 1

Find each afternoon temperature. Use the number line as a counting tool.

	Morning Temperature	Change	Afternoon Temperature
1.	0° F	rises 10°F	10°F
2.	60° F	rises 30°F	
3.	40° F	rises 0° F	
4.	-70° F	rises 85° F	
5.	-15° F	rises 10° F	
6.	-35° F	rises 35° F	
7.	0° F	falls 10° F	-10° F
8.	40° F	falls 70° F	
9.	-20° F	falls 20° F	
10.	15° F	falls 15° F	
11.	3° F	falls 5° F	
12.	-20° F	falls 50° F	

TEMPERATURE CHANGES 2

Find the missing value in each row. Use the number line as a counting tool.

	Morning Temperature	Change	Afternoon Temperature
1.		rises 10° F	-20° F
2.	50° F		-10° F
3.	20° F		45° F
4.	-30° F	rises 45° F	
5.		rises 10° F	5° F
6.	-20° F	rises 20° F	
7.	0° F		-15° F
8.		falls 40° F	-30° F
9.	-20° F	falls 20° F	
10.		falls 30° F	0° F
11.	5° F		-2° F
12.	-20° F	falls 10° F	

INTEGER PROBLEMS

Use the number line as a counting tool to answer each question.

1. At 7:00 AM, the temperature in Los Angeles was 55°F. At noon the temperature was 85°F. What is the temperature change from 7:00 AM to noon?	2. At 3:00 AM, the temperature on the Bering Strait Coast in Alaska was -10°F. At 3:00 PM the temperature was 5°F. What is the temperature change from 3:00 AM to 3:00 PM?
3. A freezer is kept at a temperature of -15°F. The electricity went out one morning, and that evening the temperature had climbed to 45°F. How much did the temperature change?	4. At the top of a mountain, the morning temperature is -5°F. In the afternoon, it is 20°F higher. What is the afternoon temperature?
5. In Anchorage, Alaska, the temperature rose 15°F during the day. The high temperature was -10°F. What was the low temperature?	6. In Siberia, Russia, the temperature rose 30 degrees from the day's low temperature. It is now 10°F. What was the low temperature?
7. At Hermosa Beach, the high temperature during the day was 80°F. The low temperature at night was 55°F. What is the difference in these temperatures?	8. The temperature in a refrigerator is 40°F. The temperature in another freezer is -5°F. What is the difference in these temperatures?

OPPOSITES AND ABSOLUTE VALUE

Ready (Summary)	Set (Goals)
We will learn to interpret and evaluate opposites and absolute value of numbers.	• Practice representing integers on a number line. • Understand the meaning of opposites. • Understand the meaning of absolute value. • Apply knowledge of opposites to observe what happens to points when reflected across the *x*- and *y*-axes.

Go (Warmup)

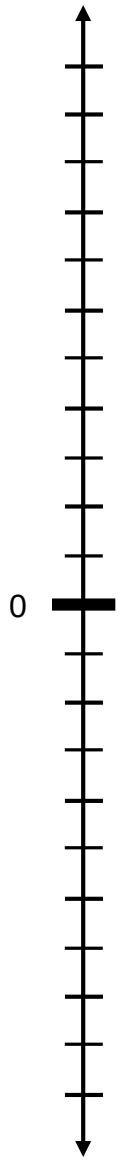
Elevation is a location above, below, or at sea level (0).
Elevation can be measured in miles, kilometers, feet, centimeters, etc.

1. Suppose we are measuring elevation in meters. Label the number line in increments of 10 meters so that the positive values represent elevation above sea level and the negative values represent elevation below sea level. What does an elevation of 0 meters represent?

2. A flying fish starts 10 meters below the surface and jumps to a height of 5 meters out of the water. What was its change in elevation?

3. A diver is 15 meters above the surface of the ocean. She dives in and swims to 30 meters below the surface. What is her change in elevation?

4. 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.

Situation		Opposite of the Situation	
Words	Number	Words	Number
1. Fall 10 feet	-10	Rise 10 feet	
2. Find $5			
3. Gain 4 yards (in football)			
4. Three steps backward			

Describe the end result of each situation in words.
Then write a number sentence to describe the situation.

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

6. You find $20 and then lose $20.

7. A football player gains 15 yards and then loses 15 yards.

8. You take 8 steps backward and then 8 steps forward.

Find the value that makes each statement true.

9. 6 + _____ = 0

10. -12 + _____ = 0

11. A number plus its opposite is equal to _____.

The <u>additive inverse property</u> states that $a + (-a) =$ _____ for any number a.

ABSOLUTE VALUE

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

Elevation is a location above, below, or at sea level (0 units).

Distance is always greater than or equal to zero.

Label the vertical number line 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.

1. Point ***P***: Pigeon at 10 m above sea level.
2. Point ***D***: Dolphin at 20 m below sea level.
3. Point ***W***: Whale at 60 m below sea level.
4. Point ***C***: Crow at 55 m above sea level.
5. Point ***S***: Swimmer at sea level.
6. Point **G**: Gull at 20 m above sea level.

Complete the table.

	What	**Elevation**	**Distance from zero (sea level)**	**Absolute value equation for the distance from sea level**
7.	pigeon	+10 m	10 m	$\|10\|=$_____
8.	dolphin		20 m	$\|-20\|=$_____
9.		-60 m		
10.			55 m	
11.	swimmer			$\|0\|=$_____
12.		+20 m		
13.	sea level			

ABSOLUTE VALUE (Continued)

Refer to the number line on the previous page. Fill in the blanks to make each statement true. Then, write the appropriate number sentences.

Verbal Sentence (use "is greater than," "is less than," or "is equal to")	**Number Sentence** (except for problem 19, use $>$, $<$, or $=$)
14a. The pigeon's *elevation* <u>is greater than</u> the dolphin's elevation.	$10 > -20$
14b. The pigeon's *distance* from sea level <u>is less than</u> the dolphin's distance.	$\|10\| < \|-20\|$ $10 < 20$
15a. The crow's *elevation* _____ the gull's elevation.	
15b. The crow's *distance* from sea level _____ the gull's distance.	
16a. The swimmer's *elevation* _____ the pigeon's elevation.	
16b. The swimmer's *distance* from sea level _____ the pigeon's distance.	
17a. The dolphin's *elevation* _____ the gull's elevation.	
17b. The dolphin's *distance* from sea level _____ the gull's distance.	
18a. The whale's *elevation* _____ the crow's elevation.	
18b. The whale's *distance* from sea level _____ the crow's distance.	
19a. The *distance* between the pigeon and dolphin is _____ m.	$\|-20 - 10\| =$ _____
19b. The *distance* between the whale and crow is _____ m.	

Use *elevation* or *distance from sea level* to answer each of the following.

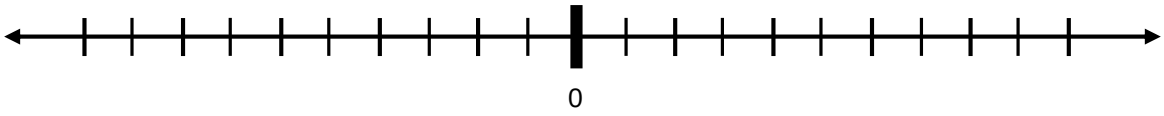
20. We use the actual numbers to compare _____.

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

OPPOSITES AND ABSOLUTE VALUE PRACTICE

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

5	-3	9	-10	0



Write the opposite of each expression in simplified form.

Example: $10 - 4 \rightarrow -(10 - 4) = -(6) = -6$	2. 12	3. $\lvert 0 \rvert$
4. $19 - 7$	5. $6 - 4$	6. $-\lvert 6 - 4 \rvert$

7. What is the opposite of the opposite of -6? _____

8. What is the opposite of the opposite of $\lvert -6 \rvert$? _____

Simplify the absolute value expressions.

14. $\lvert -16 \rvert$	10. $\lvert 12 \rvert$	11. $\lvert 0 \rvert$
12. $\lvert 19 - 7 \rvert$	13. $\lvert -4 \rvert$	14. $-\lvert -4 \rvert$

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

15. $\lvert -8 \rvert$ _____ 8	16. $\lvert -8 \rvert$ _____ -8	17. $-\lvert -8 \rvert$ _____ -8

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

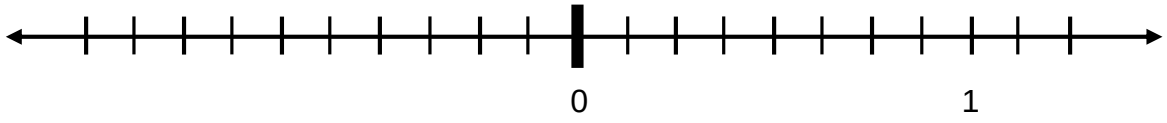
OPPOSITES ON A NUMBER LINE: FRACTION AND VARIABLE CHALLENGE

For problems 1 and 2:

- Graph and then label each number on the number line.
- Then graph and label the *opposite* of each number on the same number line.

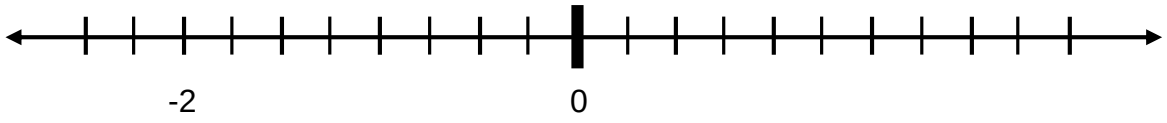
1.

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

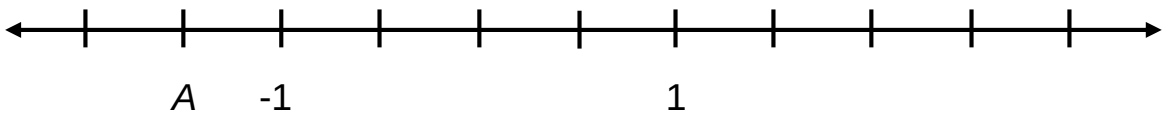


2.

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

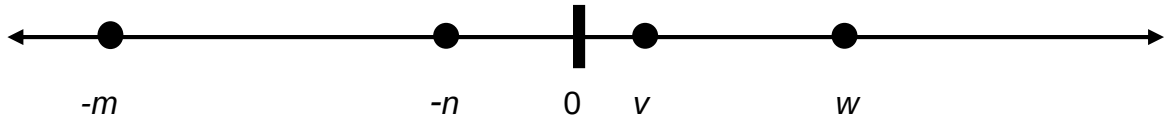


3. Locate *-A* on the number line below. What is its value?_____



4. Graph and label an estimated location of each of the following on the number line below.

-v	*m*	-(-*w*)	-(-*n*)

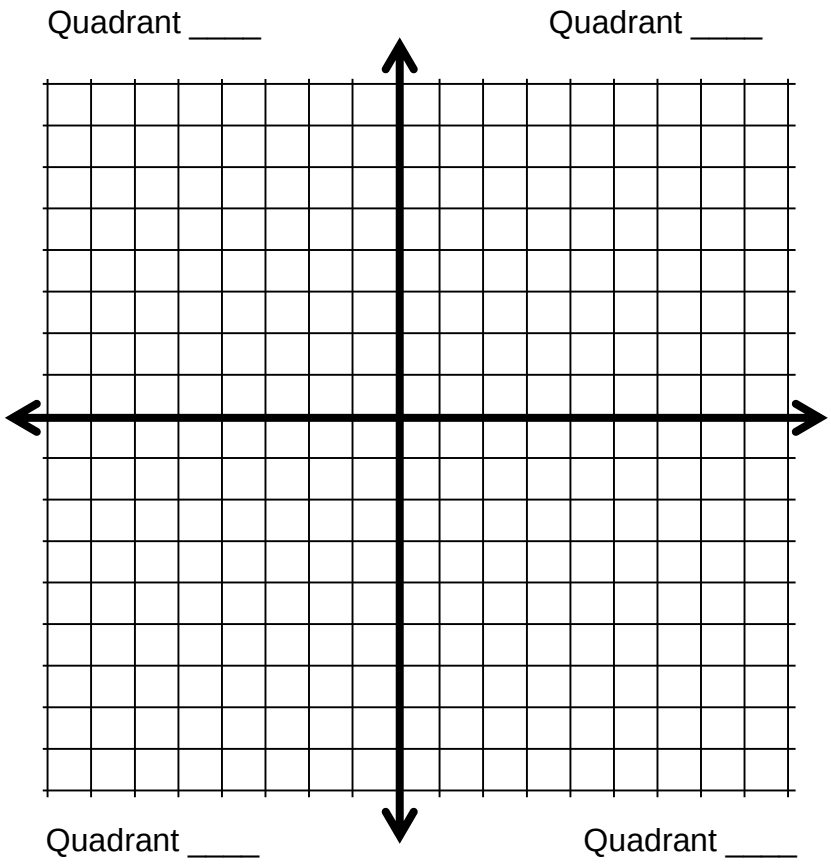


5. Why is the opposite of zero equal to zero? (Why is zero its own opposite?)

TRIANGLES IN THE COORDINATE PLANE

1. Label the *x*-axis and the *y*-axis.
2. Label the quadrants.
3. Name the horizontal axis.____
4. Name the vertical axis. _____
5. Graph the three ordered pairs below and connect them with line segments to form a shape.

   G (2, 1) *E* (2, 7) *F* (6, 1)
6. This shape is a _____.
7. It is in Quadrant _____.
8. We will name it △ _____.



A point of intersection of two lines is called a vertex (plural: vertices).

9. A triangle has ____ vertices.

10. Your teacher will give you a piece of tracing paper. Trace the axes and your triangle above.
11. Fold the paper containing △*GEF* so that the crease is on the *x*-axis. Trace the points *G*, *E*, and *F* where they appear on the other half of the creased paper. Name these points *N*, *A*, and *T*, respectively.

    Draw and label △*NAT*. This triangle is is in Quadrant _____.

    △ *NAT* is called a reflection of △*GEF* across the ____-axis.

    Explain why you think this is called a reflection.

TRIANGLES IN THE COORDINATE PLANE (Continued)

12. Fold the paper containing △*GEF* so that the crease is on the *y*-axis. Trace the points *G*, *E*, and *F* where they appear on the other half of the creased paper. Name these points *P*, *U*, and *M*, respectively.

    Draw and label △*PUM*. This triangle is in Quadrant _____.

    △ *PUM* is called a reflection of △ *GEF* across the ____-axis.

13. Fold the paper containing △*NAT* so that the crease is on the *y*-axis. Trace the points *N*, *A*, and *T* where they appear on the other half of the creased paper. Make dots where the vertices *N*, *A*, and *T* land. Name these points *B, O*, and *K*, respectively.

    Draw and label △ *BOK*. This triangle is in Quadrant _____.

    △ *BOK* is called a reflection of △*NAT* across the ____-axis.

14. Write the ordered pairs for the following triangles.

Triangle	Ordered pairs		
GEF	*G* (,)	*E* (,)	*F* (,)
NAT	*N* (,)	*A* (,)	*T* (,)
PUM	*P* (,)	*U* (,)	*M* (,)
BOK	*B* (,)	*O* (,)	*K* (,)

15. Compare *x*- and *y*-coordinates for the given triangles.

Triangles	Reflection about the	Compare *x*-coordinates (*same* or *opposites*)	Compare *y*-coordinates (*same* or *opposites*)
GEF and *NAT*	___-axis		
PUM and *BOK*	___-axis		
GEF and *PUM*	___-axis		
NAT and *BOK*	___-axis		

16. Summarize in your own words the results of reflecting across the *x*-axis and the *y*-axis.

INTEGER MODELS

Ready (Summary)	Set (Goals)
We will think about positive and negative numbers using “hot pieces” and “cold nuggets” in the context of a temperature change model. Then we will represent positive and negative numbers with integer counters.	• Explore how a temperature change model can be used to represent integers. • Explore how a counter model can be used to represent integers. • Understand the concepts of additive identity and additive inverse.

Go (Warmup)

Write the opposite of each expression.

1. -10	2. 7	3. 0	4. -(-8)

Simplify the absolute value expressions.

5. $\lvert 9 \rvert$	6. $\lvert -17 \rvert$	7. $\lvert 6 - 3 \rvert$	8. $-\lvert 7 - 2 \rvert$

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

9.	10.	11.	12.
-10 _____ -5	$\lvert -10 \rvert$ _____ $\lvert -5 \rvert$	$\lvert -2 \rvert$ _____ 2	$\lvert -2 \rvert$ _____ -2

A TEMPERATURE CHANGE MODEL

Suppose scientists discover an amazing way to control the temperature of liquid. They've invented "hot **p**ieces" and "cold **n**uggets" that maintain their temperature. If you have a liquid that you want to cool down, place some cold **n**uggets in it. They never melt! Too cold now? Put some hot **p**ieces in.

THINK:

Hot **P**ieces	**P**ositive (+)	Put in Hot → The liquid gets hotter
Cold **N**uggets	**N**egative (-)	Put in Cold → The liquid gets colder

In other words:

Put in 1 hot **p**iece	1 degree hotter	= + (+1)
Put in 1 cold **n**ugget	1 degree _____	= + (-1)

Write the change in the liquid's temperature. Each problem is independent of the others.

Example: Put in 2 hot **p**ieces. Answer: *The liquid becomes 2 degrees hotter.*
1. Put in 4 cold **n**uggets.
2. Put in 1 hot **p**iece and 1 cold **n**ugget.
3. Put in 2 hot **p**ieces and 1 cold **n**ugget.
4. Put in 2 hot **p**ieces and 4 cold **n**uggets.

A TEMPERATURE CHANGE MODEL (Continued)

There are other ways to control the temperature of the liquid. Rather than putting hot **p**ieces and cold **n**uggets in the liquid, you can take out **p**ieces or **n**uggets that are already there.

THINK:

Hot **P**ieces	**P**ositive (+)	Take out Hot → The liquid gets colder
Cold **N**uggets	**N**egative (–)	Take out Cold → The liquid gets hotter

In other words:

Take out 1 hot **p**iece	1 degree _____ = - (+1)
Take out 1 cold **n**ugget	1 degree _____ = - (-1)

Write the change in the liquid's temperature. Each problem is independent of the others.

5. Take out 2 hot **p**ieces.

6. Take out 4 cold **n**uggets.

7. Take out 1 hot **p**iece and 1 cold **n**ugget.

8. Take out 2 hot **p**ieces and 1 cold **n**ugget.

9. Take out 2 hot **p**ieces and 4 cold **n**uggets.

TEMPERATURE CHANGE MODEL PRACTICE

Using hot **p**ieces and cold **n**uggets in the temperature change model, what is the change in temperature if you:

Put in…	Take out…
1. 3 hot **p**ieces?	2. 4 hot **p**ieces?
3. 6 cold **n**uggets?	4. 9 cold **n**uggets?
5. 2 hot **p**ieces and 2 cold **n**uggets?	6. 5 hot **p**ieces and 5 cold **n**uggets?
7. 4 hot **p**ieces and 1 cold **n**ugget?	8. 2 hot **p**ieces and 6 cold **n**uggets?

Using hot **p**ieces and/or cold **n**uggets, write four different ways to increase the temperature of a liquid by 3 degrees.

9.	10.
11.	12.

Using hot **p**ieces and/or cold **n**uggets, write four different ways to decrease the temperature of a liquid by 2 degrees.

13.	14.
15.	16.

A COUNTER MODEL

We can use different counters to represent positive numbers and negative numbers.

A positive counter is represented by _____ .

It is recorded using a plus (**+**).

A negative counter is represented by _____ .

It is recorded using a minus (**–**).

1. Record a value of 5 in three different ways.

Example: + + + + + + –		

2. Record a value of -3 in three different ways.

3. Record a value of 4 in the following ways.

more than 7 counters	less than 7 counters	exactly 7 counters

ZERO PAIRS

Additive Inverse Property

For every number *a*,

$a + (-a) = 0$ and $-a + a = 0$.

A number plus its opposite is always_____.

Additive Identity Property

For every number *a*,

$a + 0 = a$ and $0 + a = a$.

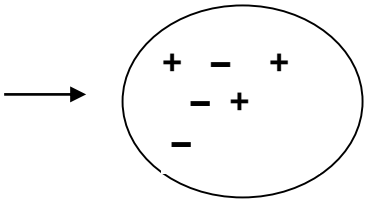
A number plus zero is always _____.

Answer these questions.

1. What is the value of this collection? _____

   Write the value as a number sentence in TWO ways.

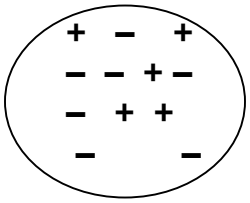
   _____ and _____



2. What is the value of this collection? _____

   Write the value as a number sentence in TWO ways.

   _____ and _____



3. Use a combination of ten counters to draw a value of 4.

How many “zero pairs” are in your collection? _____

4. Does adding a “zero pair” to a number change the value of the number? _____

5. Why is $-135 + 135 = 0$? _____

6. Why is $73 + 0 = 73$? _____

7. Explain the meaning of “zero pairs” in your own words. _____

   _____

COUNTER MODEL PRACTICE

Build each value using positive and negative counters. Record pictures in the spaces provided. *There may be values that are not possible to build as indicated.*

1. A value of 7	2. A value of -8
3. A value of zero using 4 counters	4. A value of zero using 8 counters
5. A value of 3	6. A value of 3 (different than in problem 5)
7. A value of -6	8. A value of -6 (different than in problem 7)
9. A value of -7 using *at least* 11 counters	10. A value of 3 using *exactly* 8 counters

11. Can you make *any* even value with an odd number of counters? Explain.

12. Can you make *any* odd value with an even number of counters? Explain.

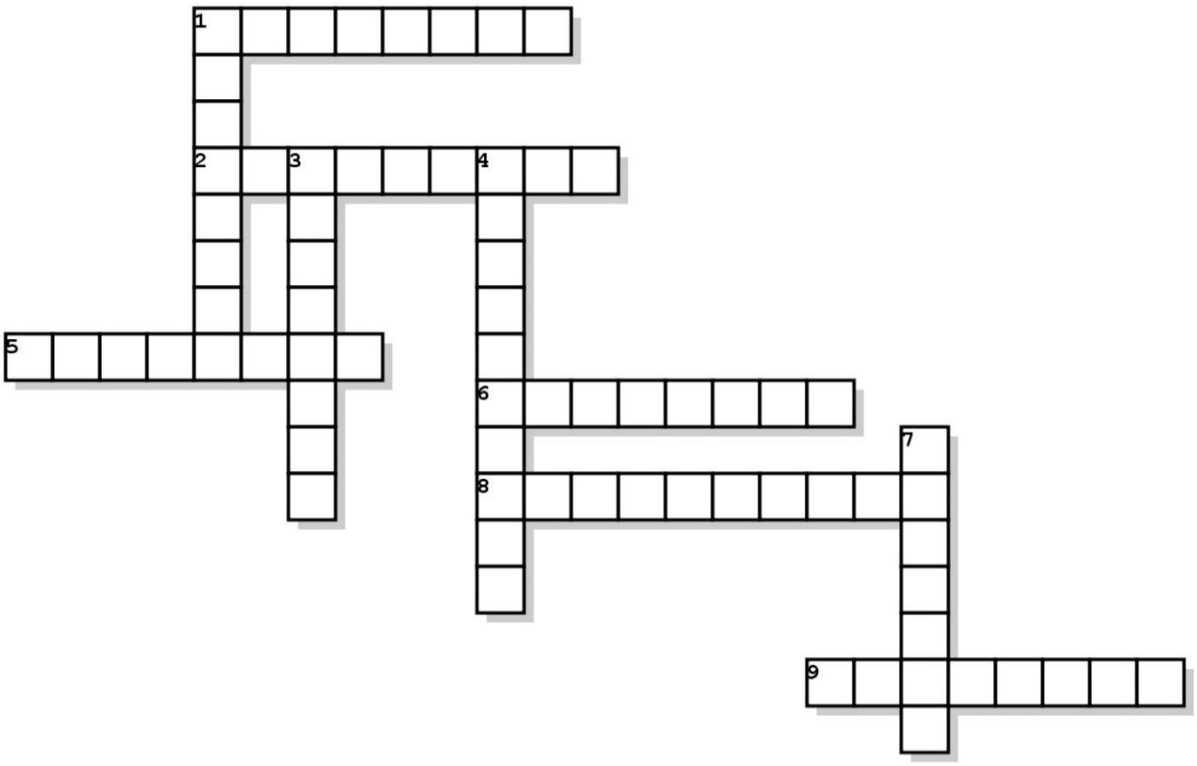
13. How are the temperature change model and the counter model the same?

14. How are the temperature change model and the counter model different?

VOCABULARY, SKILL BUILDERS, AND REVIEW

FOCUS ON VOCABULARY

Fill in the crossword puzzle using vocabulary from this packet.



Across

1. zero, for addition
2. a distance above (or below) sea level
5. Inverse
6. ___ value: a number's distance from zero
8. meaning of "<" (3 words)
9. Length

Down

1. …-3, -2, -1, 0, 1, 2, 3…
3. mathematical statement that asserts the equality of two expressions
4. mathematical statement that asserts that one expression is less than another
7. the opposite of a number: additive _____

SKILL BUILDER 1

SOME PROPERTIES OF ARITHMETIC

Commutative property of addition For all numbers *a* and *b*, $a + b = b + a$.	**Commutative property of multiplication** For all numbers *a* and *b*, $ab = ba$.
Associative property of addition For all numbers *a, b,* and *c*, $(a + b) + c = a + (b + c)$.	**Associative property of multiplication** For all numbers *a, b,* and *c,* $(ab)c = a(bc)$.
Distributive property For all numbers *a*, *b*, and *c*, $a(b + c) = ab + ac$.	

Complete each equation and state the arithmetic property used.

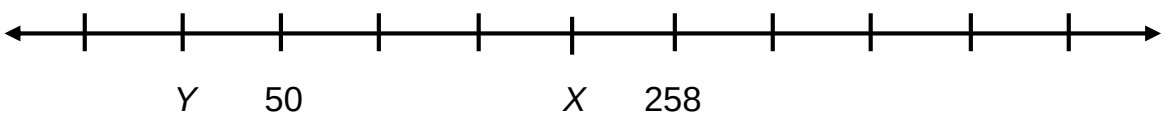
1. $4 \cdot 23 =$ _____ $4(20 + 3) = (4 \cdot 20) + (4 \cdot 3) =$ _____ Property:	2. $(85 + 64) + 36 = 85 + (64 + 36) =$ _____ Property:
3. $245 + 155 = 155 + 245 =$ _____ Property:	4. $20(2 \cdot 4) = (20 \cdot 2) \cdot 4 =$ _____ Property:
5. $9 \cdot 20 = 20 \cdot 9 =$ _____ Property:	6. $53 \cdot 2 =$ _____ $(50 + 3) \cdot 2 = 50 \cdot 2 + 3 \cdot 2$ Property:
7. What property is illustrated in each equation below? a. $14 + (6 + 4) = (14 + 6) + 4$ b. $14 + (6 + 4) = (6 + 4) + 14$	

SKILL BUILDER 2

Solve each problem. Then, check your solution.

1. Mattie read 378 pages of a book during his vacation. He read the same number of pages each day. His vacation was 7 days long. How many pages did he read each day? Solution: Toolkit:	2. Olivia is sewing 6 identical dresses. She needs 78 buttons to complete all the dresses. How many buttons are on each dress? Solution: Toolkit:

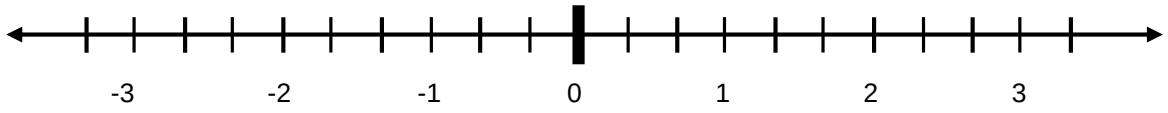
3. Find the values for points *X* and *Y*. Explain your strategy.



SKILL BUILDER 3

1. Locate the following numbers and their opposites on the number line.

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



Write the opposite of each expression.

2. -5	3. $\lvert 14 \rvert$	4. (9 – 7)
5. $\lvert 8-6 \rvert$	6. 0	7. 34

Simplify the absolute value expressions.

8. $\lvert 14 \rvert$	9. $\lvert -5 \rvert$	10. $-\lvert 5 \rvert$
11. $\lvert 0 \rvert$	12. $\lvert 9-7 \rvert$	13. $-\lvert -9 \rvert$

14. What is the opposite of the opposite of 10?

15. Simplify -(-25)

16. Simplify $-\lvert -(5-1) \rvert$

17. Stephanie says that -(-5) and $\lvert 5 \rvert$ have the same value. Do you agree? Explain.

SKILL BUILDER 4

1. Label the two axes and four quadrants.

2. Graph the four ordered pairs below and connect them to form □*ABCD*.

   A (0, 3), *B* (4, 3)
   C (4, 7), *D* (0, 7)

   □*ABCD* is in Quadrant ___.

3. Draw □*EFGH* so that it is a reflection of □*ABCD* over the *x*-axis.

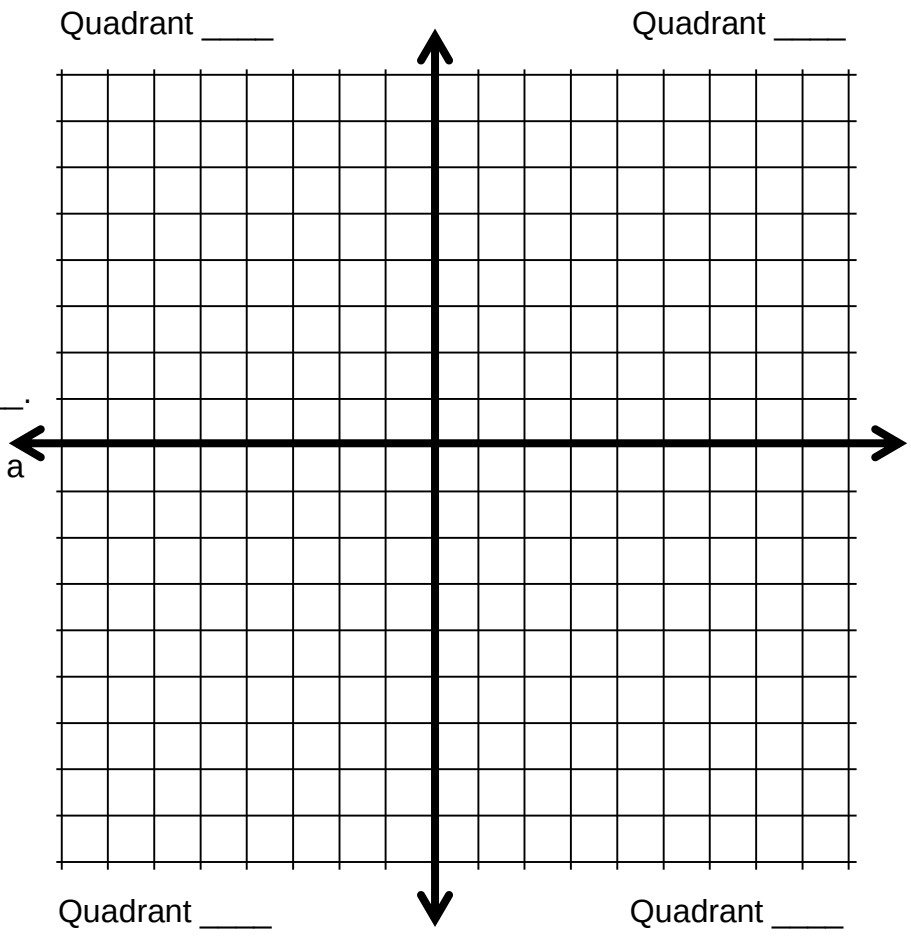
4. List the ordered pairs for □ *EFGH*:

   E (_____, _____)

   F (_____, _____)

   G (_____, _____)

   H (_____, _____)



5. Look at □ *EFGH* and □ *ABCD.* Describe how the *x*-coordinates and *y*-coordinates of the vertices are related.

6. Draw □*KLMN* so that it is a reflection of □ *ABCD* over the *y*-axis.

7. List the ordered pairs for □*KLMN*.

8. Look at □ *KLMN* and □*ABCD.* Describe how the *x*-coordinates and *y*-coordinates of the vertices are related.

SKILL BUILDER 5

Using hot pieces and cold nuggets, what is the change in temperature if you **put in**:

1. 4 hot pieces?	2. 7 cold nuggets?	3. 5 hot pieces and 2 cold nuggets?

Using hot pieces and cold nuggets, what is the change in temperature if you **take out**:

4. 8 hot pieces?	5. 5 cold nuggets?	6. 4 hot pieces and 2 cold nuggets?

7. Using hot pieces and/or cold nuggets, write two different ways to increase the temperature of a liquid by 4 degrees.

Build and draw each value with positive and negative counters. *Some values may not be possible to build as indicated.*

8. A value of 5	9. A value of zero using 6 counters
10. A value of 4	11. A value of 4 (*different than in problem 10*)
12. A value of 5 using *exactly* 6 counters	13. A value of zero using *at least* 7 counters

TEST PREPARATION

Show your work on a separate sheet of paper and choose the best answer.

1. At the top of Mt. McKinley, the morning temperature was -5°F. In the afternoon it was 5°F. What was the temperature change from the morning to the afternoon?

   A. -10° B. 0° C. 5° D. 10°

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2. In northern China, the temperature rose 25°F during the day. The high temperature was 40°F. What was the low temperature?

   A. -65°F B. -15°F C. 15°F D. 65°F

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3. What is the opposite of -5?

   A. -5 B. 0 C. 5 D. 10

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4. Evaluate $|-(5+5)|$.

   A. -10 B. 0 C. 5 D. 10

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5. Which property states that the sum of a number and its opposite is 0?

   A. additive identity property
   B. addition property of equality
   C. additive inverse property
   D. distributive property

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6. Using the temperature change model for integers, choose ALL the ways that you can increase the temperature of a liquid by 3 degrees.

   A. put in 3 hot pieces
   B. put in 4 hot pieces and 1 cold nugget
   C. take out 3 cold nuggets
   D. put in 4 cold nuggets and 1 hot piece.

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7. What is the opposite of the opposite of $|-7|$ in simplest form?

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

KNOWLEDGE CHECK

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

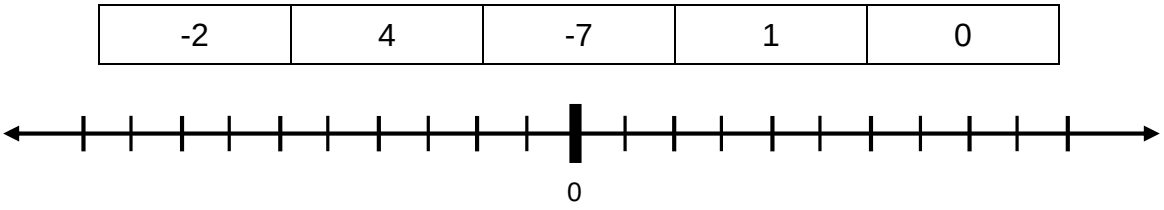
2.1 Temperature and Number Lines

1. The morning temperature at the University of Minnesota was -2°F. In the afternoon, it was 11 degrees higher. What was the afternoon temperature?

2. Write a number sentence comparing the morning and afternoon temperatures in the above problem using the *greater than* symbol.

2.2 Opposites and Absolute Value

3. Locate the following integers and their opposites on the number line below. Then write the integers from least to greatest.



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

2.3 Integer Models

5. Using the counter model, build and draw the value of -4 in two different ways.

   Use positive and negative counters if needed.

HOME-SCHOOL CONNECTION

Here are some questions to review with your young mathematician.

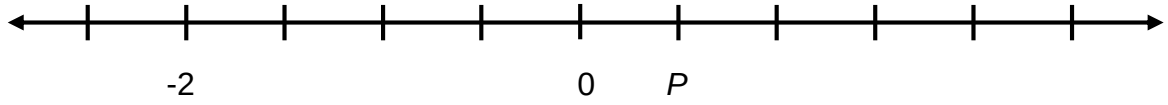
1. In Harbin (China), the low temperature for the day was -12°F and the high temperature was 9°F. What was the difference in the temperature?

2. Use > , < , or = to make a true statement.

$$-(-7) \_\_\_\_\_ -|-7|$$

3. Using the temperature change model, what is the temperature change if you put in 4 hot pieces and 2 cold nuggets?

4. What is the value of point *P* on the number line? Explain.



Parent or Guardian Signature_____

COMMON CORE STATE STANDARDS – MATHEMATICS

STANDARDS FOR MATHEMATICAL CONTENT

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.NS6a	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 number 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 itself, e.g., -(-3) = 3, and that 0 is its own opposite.
6.NS6b	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 number line and in the plane with negative number coordinates. 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.
6.NS6c	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 number 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.NS7a	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. *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.*
6.NS7b	Understand ordering and absolute value of rational numbers. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write -3°C is warmer than -7°C.*
6.NS7c	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. *For example, for an account balance of -30 dollars, write* $\lvert -30 \rvert$ *= 30 to describe the debt in dollars*.
6.NS7d	Understand ordering and absolute value of rational numbers. 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.*
7.NS1a	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.*

STANDARDS FOR MATHEMATICAL PRACTICE

MP1	Make sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.
MP7	Look for and make use of structure.
MP8	Look for and express regularity in repeated reasoning.

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