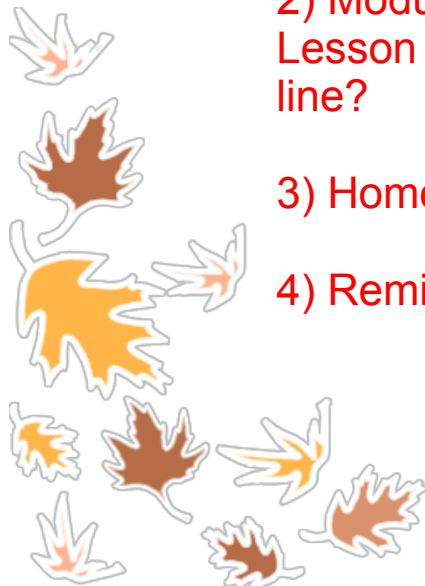Agenda:

1) Bell Ringer: p. 20b

2) Module 2- Rational Numbers
Lesson 3: How do you add integers using a number line?

3) Homework: Lesson 3 (1-5) and page 28

4) Reminder: Problem Sets 1-7 by friday

Lesson Summary

- On a number line, arrows are used to represent integers; they show length and direction.
- The length of an arrow on the number line is the absolute value of the integer.
- Adding several arrows is the same as combing integers in the Integer Game.
- The sum of several arrows is the final position of the last arrow.

Problem Set

For Questions 1–4, represent each of the following problems using both a number line diagram and an equation.

1.　David and Victoria are playing the Integer Card Game. David drew three cards, −6, 12 , and −4 . What is the sum of the cards in his hand? Model your answer on the number line below.
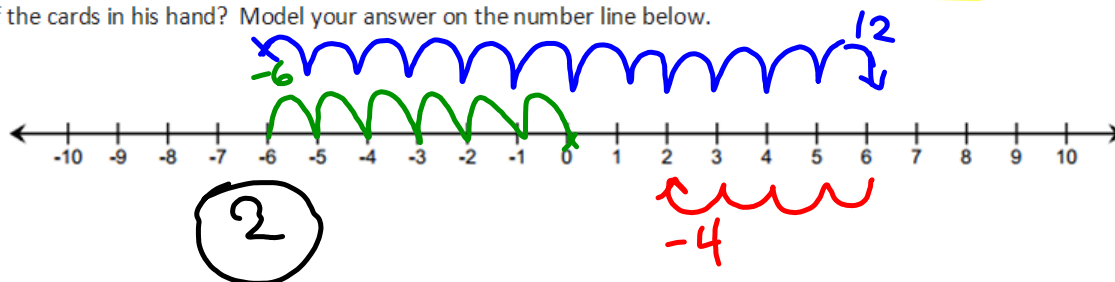
2.   In the Integer Card Game, you drew the cards, 2, 8, and −11. Your partner gave you a 7 from his hand. What is your new total? Model your answer on the number line below.
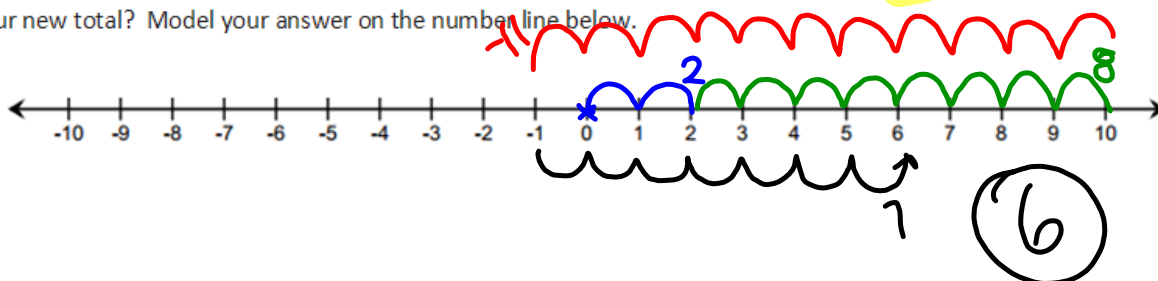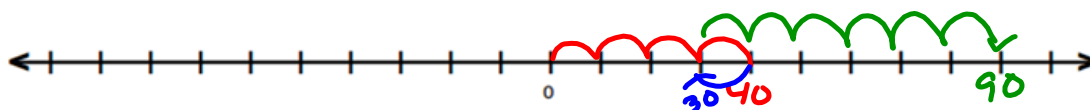
3. What cards would you need to get your score back to zero? Explain. Use and explain the term "additive inverse" in your answer.

$$6 + ? = 0$$
$$-6$$

4. If a football player gains 40 yards on a play, but on the next play, he loses 10 yards, what would his total yards be for the game if he ran for another 60 yards? What did you count by to label the units on your number line?

$$
\begin{array}{r}
+40 \\
-10 \\
+\;+60 \\
\hline
\end{array}
$$

$$
\begin{array}{r}
40 \\
+\;60 \\
\hline
100
\end{array}
$$

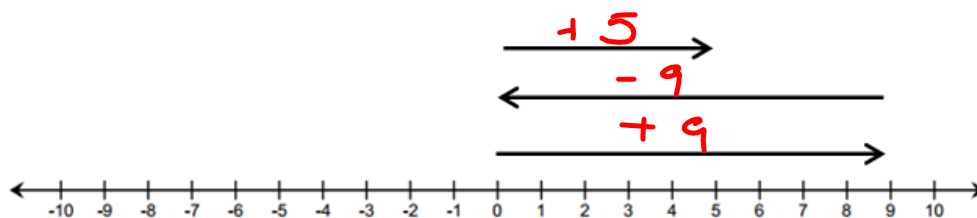$$100 + (-10) = 90 \text{ yds}$$

5. Find the sums.
   a. $-2 + 9 = 7$

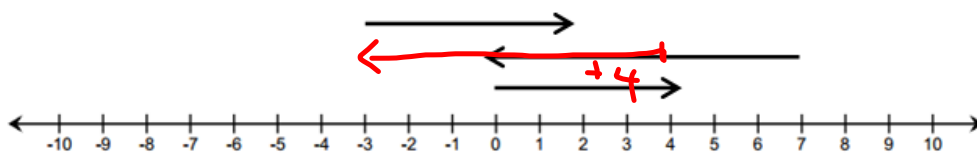b. $-8 + -8 \ = -16$

c. $-4 + (-6) + 10 \ = \ \bigcirc$

d. $5 + 7 + (-11) \ = 1$

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7. Write a story problem that would model the sum of the arrows in the number diagram below.

+5

- 9

+ 9

(number line from -10 to 10)

8. Do the arrows correctly represent the equation $4 + (-7) + 5 = 2$? If not, draw a correct model below.

+4

(number line from -10 to 10)

-7 arrow should have started at 4

Integers Practice 1- Addition

Directions: Solve.

1. (-3) + (-2) = __−5__

2. -2 + (− 14) = __−16__

3. -7 + (-2) = __−9__

4. -5 + (-6) = __−11__

5. 10 + (-12) = __−2__

6. -3 + (-4) = __−7__

7. 4 + 5 = __9__

8. 3 + (-14) = __−11__

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9. $-3 + 8 =$ __5__

10. $-13 + 14 =$ __1__

11. $9 + (-8) =$ __1__

12. $-6 + 10 =$ __4__

13. $6 + (-10) =$ __-4__

14. $-6 + 10 =$ __4__

15. $(-7) + (-6) =$ __-13__

16. $12 + 13 =$ __25__

17. $-8 + 8 =$ __0__

18. $-5 + 6 =$ __1__

19. $-5 + 15 =$ __10__

20. $9 + (-4) =$ __5__

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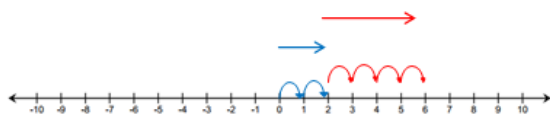# Lesson 3: Understanding Addition of Integers

Classwork

Exercise 1: Addition Using the Integer Game

Play the Integer Game with your group without using a number line.

Example 1: "Counting On" to Express the Sum as Absolute Value on a Number Line
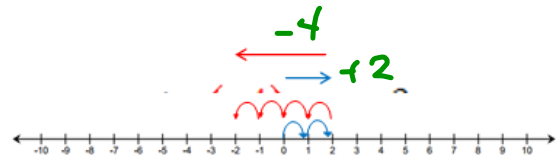
Model of Counting Up	Model of Counting Down
$2 + 4 = 6$	$2 + (-4) = -2$

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Remember that counting up $^-4$ is the same as "the opposite of counting up 4 ", and also means counting down 4 .

a. For each example above, what is the distance between **2** and the sum?

Ex1 $\underline{2} + 4 = \underline{6}$ $\underline{2} + (-4) = \underline{-2}$

4 spaces   4 spaces

b. Does the sum lie to the right or left of **2** on a horizontal number line? Vertical number line?

Ex1 / 4 right   Ex2 / 4 left

up   down

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c.   Given the expression $\underline{54} + 81 \underline{=} \; sum$, can you determine, without finding the sum, the distance between 54 and the sum? Why?

81 away to the right

d.   Is the sum to the right or left of 54 on the horizontal number line? On a vertical number line?

right or up

e. Given the expression (14) + (−3), can you determine, without finding the sum, the distance between 14 and the sum? Why?

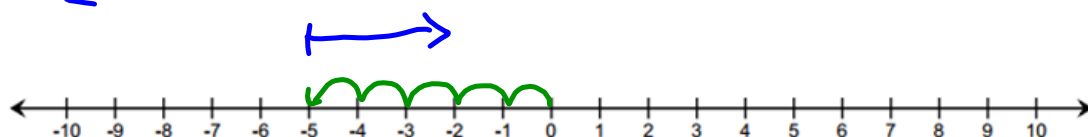$$3 \ away$$

f. Is the sum to the right or left of 14 on the number line? On a vertical number line?

$$left \quad or \quad down$$

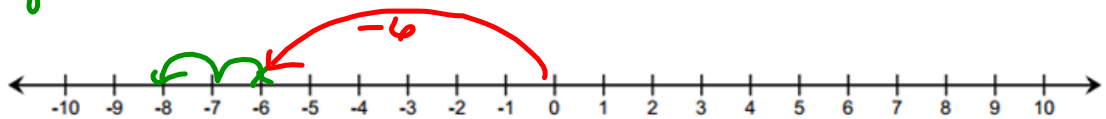p-value $=$ initial (starting pt)

Exercise 2

Work with a partner to create a horizontal number line model to represent each of the following expressions. Describe the sum using distance from the p -value along the number line.

1. $-5 + 3 = -2$

   p

3 to the right of the -5

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2. ℓ
$-6 + (-2)$ left 2 $= -8$

-6

2 to the left of -6

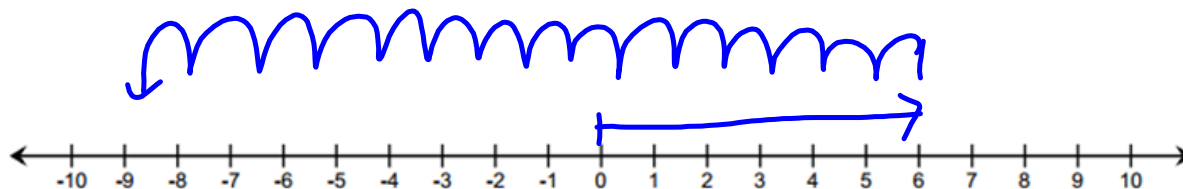3. $7 + (-8)$ left 8 $= -1$

8 to the left of 7

Exercise 3: Writing an Equation Using Verbal Descriptions

Write an equation, and using the number line, create an "arrow" diagram given the following information:

"The p -value is **6** *, and the sum lies* **15** *units to the left of the p -value."*

Equation:

$$6 + (-15) = -9$$

Lesson Summary

- Addition of integers is represented on a number line as "counting up", where counting up a negative number of times is the same as "counting down."

- Arrows show the sum of two integers on a number line.

- The sum is the distance $|q|$ from the p -value (the first addend) to the right if q is positive and to the left if q is negative.

$p = 1^{st}$ value $q = 2^{nd}$ value
$+ q = up/Right$
$- q = down/left$

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Problem Set

1. Below is a table showing the change in temperature from morning to afternoon for one week.

   a. Use the vertical number line to help you complete the table. As an example, the first row is completed for you.

Change in Temperatures from Morning to Afternoon

Morning Temperature	Change	Afternoon Temperature	Number Sentence
1 ℃	rise of 3 ℃	4 ℃	1 + 3 = 4
2 ℃	rise of 8 ℃		
−2 ℃	fall of 6 ℃		
−4 ℃	rise of 7 ℃		
6 ℃	fall of 9 ℃		
−5 ℃	fall of 5 ℃		
7 ℃	fall of 7 ℃		

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b. Do you agree or disagree with the statement: "A rise of $-7°C$ " means "a fall of $7°C$ "? Explain. (Note: No one would ever say, "A rise of -7 degrees"; however, mathematically speaking, it is an equivalent phrase.)

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For Questions 2–3, refer to the Integer Game.

2.   Terry selected two cards. The sum of her cards is -10 .
   a.   Can both cards be positive? Explain why or why not.
   b.   Can one of the cards be positive and the other be negative? Explain why or why not.
   c.   Can both cards be negative? Explain why or why not.

3.   When playing the Integer Game, the first two cards you selected were -8 and -10 .
   a.   What is the value of your hand? Write an equation to justify your answer.
   b.   For part (a), what is the distance of the sum from -8 ? Does the sum lie to the right or left of -8 on the number line?
   c.   If you discarded the -10 and then selected a 10 , what would be the value of your hand? Write an equation to justify your answer.

4. Given the expression $67 + (-35)$, can you determine, without finding the sum, the distance between 67 and the sum? Is the sum to the right or left of 67 on the number line?

5. Use the information given below to write an equation. Then create an "arrow diagram" of this equation on the number line provided below.

"The P -value is , and the sum lies 12 units to the right of the P -value."
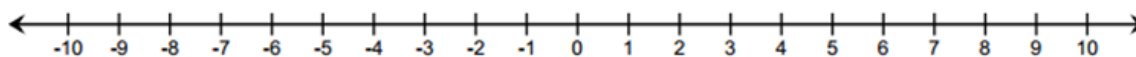
Name: _____   date: _____
Math 7   Mrs. Bennett

 Integers Homework - Addition

Directions: Solve.

1. $(-7) + (-2) =$ _____   2. $-2 + 15 =$ _____

3. $-8 + (-2) =$ _____   4. $5 + (-6) =$ _____

5. $-4 + (-12) =$ _____   6. $13 + (-4) =$ _____

7. $-4 + -9 =$ _____   8. $8 + (-12) =$ _____

9. $23 + 8 =$ _____   10. $-13 + -5 =$ _____

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11. $-5 + (-8) =$ _____　　　　　　　12. $-8 + 15 =$ _____

13. $16 + (-11) =$ _____　　　　　　14. $-7 + 10 =$ _____

15. $(-7) + 6 =$ _____　　　　　　　16. $12 + 13 =$ _____

17. $-8 + 10 =$ _____　　　　　　　18. $-11 + 6 =$ _____

19. $-5 + 15 =$ _____　　　　　　　20. $9 + (-7) =$ _____

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