Agenda:

1) Bell Ringer- p. 43

2) Correct Practice Problems from last night

3) Module 2- Rational Numbers
finish Lesson 4: How do you add rational numbers?

4) Practice adding integers - BINGO

5) Homework: pages 39 and 44

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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.

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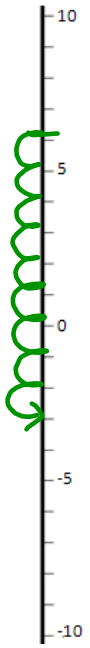
Problem Set

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 ℃	10	2 + 8 = 10
−2 ℃	fall of 6 ℃	−8	−2 + (−6) = −8
−4 ℃	rise of 7 ℃	3	−4 + 7 = 3
6 ℃	fall of 9 ℃	−3	6 + (−9) = −3
−5 ℃	fall of 5 ℃	−10	−5 + (−5) = −10
7 ℃	fall of 7 ℃	0	7 + (−7) = 0



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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.)

+(−7) same as −7

10 + (−7) = 3

10 − 7 = 3

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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.

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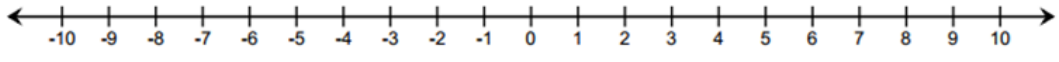
4. Given the expression $67 + (-35)$, can you determine, without finding the sum, the distance between 67 and the sum? Is the sum to the right or left of 67 on the number line?

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."



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Name: _____ date: _____
Math 7 Mrs. Bennett

Integers Homework - Addition

Directions: Solve.

1. (-7) + (-2) = -9
2. -2 + 15 = 13
3. -8 + (-2) = -10
4. 5 + (-6) = -1
5. -4 + (-12) = -16
6. 13 + (-4) = 9
7. -4 + -9 = -13
8. 8 + (-12) = -4
9. 23 + 8 = 31
10. -13 + -5 = -18

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11. -5 + (-8) = -13
12. -8 + 15 = 7
13. 16 + (-11) = 5
14. -7 + 10 = 3
15. (-7) + 6 = -1
16. 12 + 13 = 25
17. – 8 + 10 = 2
18. -11 + 6 = -5
19. -5 + 15 = 10
20. 9 + (-7) = 2

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Lesson 4: Efficiently Adding Integers and Other Rational Numbers

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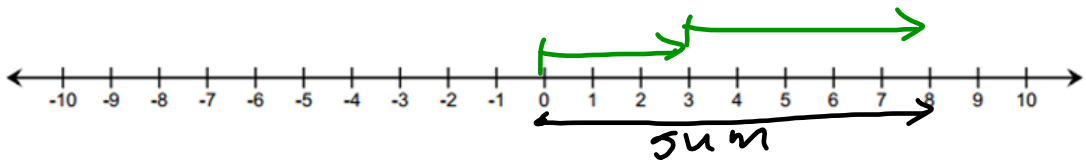
Classwork

Example 1: Rule for Adding Integers with Same Signs

a. Represent the sum of $3 + 5$ using arrows on the number line.



i. How long is the arrow that represents 3 ? 3

ii. What direction does it point? right

iii. How long is the arrow that represents 5 ? 5

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iv. What direction does it point?

right

v. What is the sum?

8

vi. If you were to represent the sum using an arrow, how long would the arrow be and what direction would it point?

8 right

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$|-5| = 5$ $|5| = 5$

vii. What is the relationship between the arrow representing the number on the number line and the absolute value of the number?

arrow length = absolute value

viii. Do you think that adding two positive numbers will always give you a greater positive number? Why?

yes, because both arrows are going right

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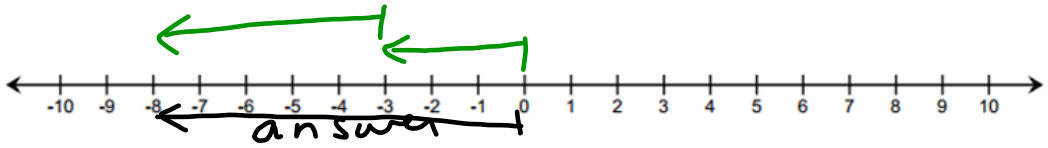
b. Represent the sum of $-3 + (-5)$ using arrows that represent -3 and -5 on the number line. From part (a), use the same questions to elicit feedback. In the Integer Game, I would combine -3 and -5 to give me -8.



i. How long is the arrow that represents -3 ? 3

ii. What direction does it point? left

iii. How long is the arrow that represents -5 ?

5

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iv. What direction does it point? left

v. What is the sum?

-8

vi. If you were to represent the sum using an arrow, how long would the arrow be and what direction would it point?

8 left

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vii. Do you think that adding two negative numbers will always give you ~~a smaller~~ bigger (further left) negative number? Why?

yes, because both arrows go left.

c. What do both examples have in common?

Ex (pos) + (pos) = bigger pos.

Ex (Neg) + (Neg) = bigger Neg.

① Add absolute values
② Keep sign

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RULE: Add integers with the same sign by adding the absolute values and using the common sign.

Exercise 2

a. Decide whether the sum will be positive (+) or negative (−) without actually calculating the sum.

i. $-4 + (-2)$ ___ − ___

ii. $5 + 9$ ___ + ___

iii. $-6 + (-3)$ ___ − ___

iv. $-1 + (-11)$ ___ − ___

v. $3 + 5 + 7$ ___ + ___

vi. $-20 + (-15)$ ___ − ___

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b. Find the following sums:

i. $15 + 7$ 22

ii. $-4 + (-16)$ -20

iii. $-18 + (-64)$ -82

iv. $=205 + (=123)$ -328

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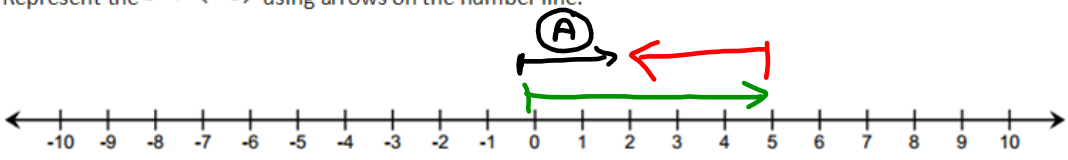
Example 2: Rule for Adding Opposite Signs

a. Represent the $5 + (-3)$ using arrows on the number line.



i. How long is the arrow that represents -3 ? 3

ii. What direction does it point? left

iii. Which arrow is longer? 5

iv. What is the sum? If you were to represent the sum using an arrow, how long would the arrow be and what direction would it point?

2 (2 to the right)

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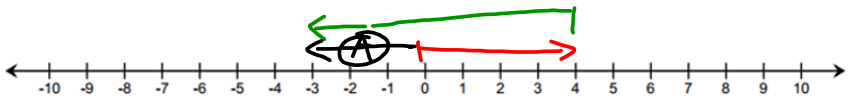
b. Represent the $4 + (-7)$ using arrows on the number line.

p q



i. In the two examples above, what is the relationship between length of the arrow representing the sum and the lengths of the arrows representing the p -value and q -value?

$|p| - |q|$ subtract absolute values

ii. What is the relationship between the direction of the arrow representing the sum and the direction of arrows representing the p -value and q -value?

direction follows larger absolute value

iii. Write a rule that will give the length and direction of the arrow representing the sum of two values that have opposite signs.

① Subtract their absolute values

② take the sign (direction) of the larger absolute value

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RULE: Add integers with the opposite signs by subtracting the absolute values and using the sign of the integer with the greater absolute value.

Exercise 3

1. Circle the integer with the greater absolute value. Decide whether the sum will be positive or negative without actually calculating the sum.

a. $-1 + 2$ +1

b. $5 + (-9)$ −4

c. $-6 + 3$ −3

d. $-11 + 1$ −10

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2. Find the following sums:

a. $-10 + 7$ -3

b. $8 + (-16)$ -8

c. $-12 + (65)$ $+53$

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d. $105 + (-126)$ -21

$126 - 105$

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Example 3: Applying Integer Addition Rules to Rational Numbers

Find the sum of $6+\left(-2\frac{1}{4}\right)$. The addition of rational numbers follows the same rules of addition for integers.

a. Find the absolute values of the numbers.

$|6| = 6 \qquad \left|-2\frac{1}{4}\right| = 2\frac{1}{4}$

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

b. Subtract the absolute values.

c. The answer will take the sign of the number that has the greater absolute value.

$+\ 3\frac{3}{4}$

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$6+\left(-2\frac{1}{4}\right)$

$6+(-2)+\left(-\frac{1}{4}\right)$

$4+\left(-\frac{1}{4}\right)$

$3\frac{3}{4}$

Nov 4-9:06 AM

Exercise 4

Solve the following problems. Show your work.

a. Find the sum of $-18 + 7$.

-11

b. If the temperature outside was 73 degrees at 5:00 pm, but it fell 19 degrees by 10:00 pm, what is the temperature at 10:00 pm? Write an equation and solve.

$73 + 19 = 54$
$73 - 19 = 54$

c. Write an addition sentence, and find the sum using the diagram below.

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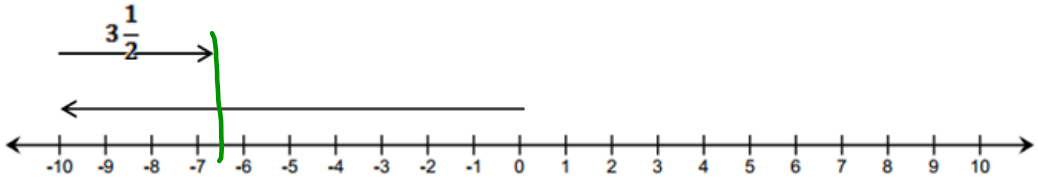

$-10 + 3\frac{1}{2} = -6\frac{1}{2}$

$9\frac{2}{2}$
$-\ 3\frac{1}{2}$
$6\frac{1}{2}$

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Lesson Summary

- Add integers with the same sign by adding the absolute values and using the common sign.
- Steps to adding numbers with opposite signs:
  1. Find the absolute values of the numbers.
  2. Subtract the absolute values.
  3. The answer will take the sign of the number that has the greater absolute value.
- To add rational numbers, follow the same rules used to add integers.

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1. Find the sums. Show your work to justify your answer.
   a. $4 + 17$
   b. $-6 + (-12)$
   c. $2.2 + (-3.7)$
   d. $-3 + (-5) + 8$
   e. ~~$3 + (-1)$~~

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$2\frac{3}{12} - \frac{4}{12}$

$\frac{27}{12} - \frac{4}{12} = \frac{23}{12} = 1\frac{11}{12}$

Nov 10-9:51 AM

2. Which of these story problems describes the sum $19 + (-12)$? Check all that apply. Show your work to justify your answer.

_____ Jared's dad paid him $19 for raking the leaves from the yard on Wednesday. Jared spent $12 at the movie theater on Friday. How much money does Jared have left?

_____ Jared owed his brother $19 for raking the leaves while Jared was sick. Jared's dad gave him $12 for doing his chores for the week. How much money does Jared have now?

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+19 −8

✓ Jared's grandmother gave him $19 for his birthday. He bought $8 worth of candy and spent another $4 on a new comic book. How much money does Jared have left over?

−4

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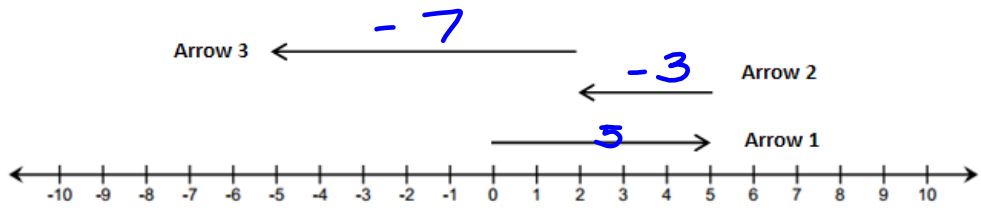
3. Use the diagram below to complete each part.



a. Label each arrow with the number the arrow represents.

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b. How long is each arrow? What direction does each arrow point?

Arrow	Length	Direction
1	5	right
2	3	left
3	7	left

c. Write an equation that represents the sum of the numbers. Find the sum.

$5+(-3)+(-7)=-5$

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4. Jennifer and Katie were playing the Integer Game in class. Their hands are represented below.

Jennifer's Hand: 5, -8 → -3

Katie's Hand: -9, 7 → -2

$5+(-8)=-3$ $\quad -9+7=-2$

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a. What is the value of each of their hands? Show your work to support your answer.

b. If Jennifer drew two more cards, is it possible for the value of her hand not to change? Explain why or why not.

c. If Katie wanted to win the game by getting a score of 0, what card would she need? Explain.

d. If Jennifer drew a -1 and a -2, what would be her new score? Show your work to support your answer.

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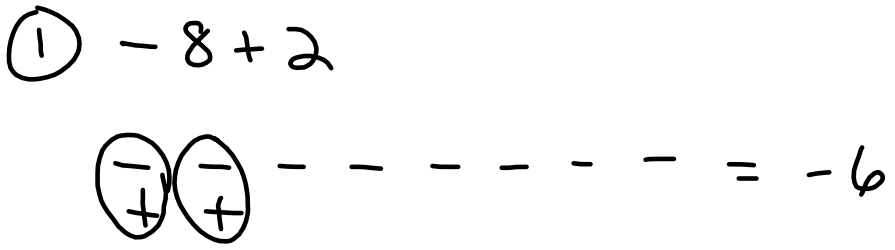

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-13, -12 ... -10, -9, -8, -7, -6, -5 ..... 0 ... 9 ... 11, 12, 13

1. $-6+(-3)=$
2. $-4+(-2)=$
3. $-8+7=$
4. $5+(-3)=$
5. $16+(-4)=$
6. $-1+6=$
7. $12+(-3)=$
8. $3+(-3)=$
9. $-2+(-1)=$
10. $-8+3=$
11. $(-6)+(-2)=$

Nov 10-10:52 AM