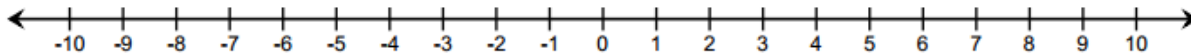


Lesson 4: Efficiently Adding Integers and Other Rational Numbers

Classwork

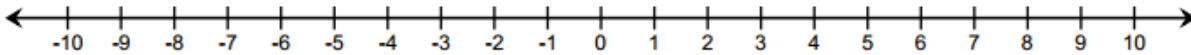
Example 1: Rule for Adding Integers with Same Signs

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



- How long is the arrow that represents 3?
- What direction does it point?
- How long is the arrow that represents 5?
- What direction does it point?
- 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?

- vii. What is the relationship between the arrow representing the number on the number line and the absolute value of the number?
- viii. Do you think that adding two positive numbers will always give you a greater positive number? Why?
- 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 ?
- ii. What direction does it point?
- iii. How long is the arrow that represents -5 ?
- iv. What direction does it point?
- v. What is the sum?

- vi. If you were to represent the sum using an arrow, how long would the arrow be and what direction would it point?
- vii. Do you think that adding two negative numbers will always give you a smaller negative number? Why?
- c. What do both examples have in common?

RULE: Add rational numbers 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. $-20 + (-15)$ _____

b. Find the sum.

i. $15 + 7$

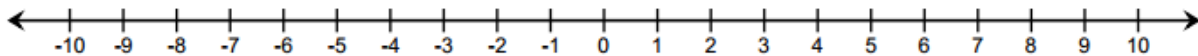
ii. $-4 + (-16)$

iii. $-18 + (-64)$

iv. $-205 + (-123)$

Example 2: Rule for Adding Opposite Signs

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



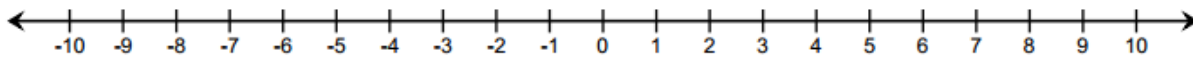
i. How long is the arrow that represents 5?

ii. What direction does it point?

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

iv. What direction does it point?

- v. Which arrow is longer?
- vi. 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?
- b. Represent the $4 + (-7)$ using arrows on the number line.



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

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

Exercise 3

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

i. $-1 + 2$

ii. $5 + (-9)$

iii. $-6 + 3$

iv. $-11 + 1$

- b. Find the sum.

i. $-10 + 7$

ii. $8 + (-16)$

iii. $-12 + (65)$

iv. $105 + (-126)$

Example 3: Applying Integer Addition Rules to Rational Numbers

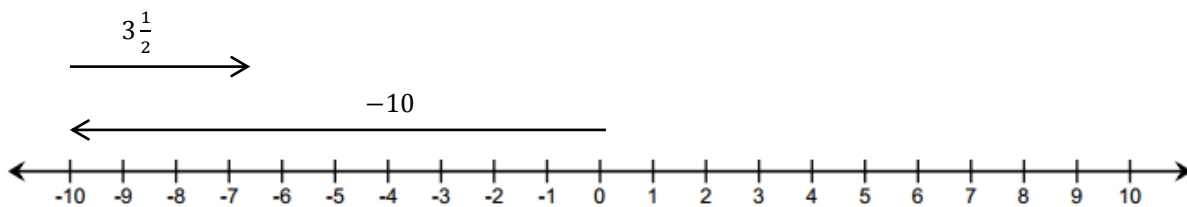
Find the sum of $6 + \left(-2\frac{1}{4}\right)$. The addition of rational numbers follows the same rules of addition for integers.

- Find the absolute values of the numbers.
- Subtract the absolute values.
- The answer will take the sign of the number that has the greater absolute value.

Exercise 4

Solve the following problems. Show your work.

- Find the sum of $-18 + 7$.
- If the temperature outside was 73 degrees at 5:00 p.m., but it fell 19 degrees by 10:00 p.m., what is the temperature at 10:00 p.m.? Write an equation and solve.
- Write an addition sentence, and find the sum using the diagram below.



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 integer that has the greater absolute value.
- To add rational numbers, follow the same rules used to add integers.

Problem Set

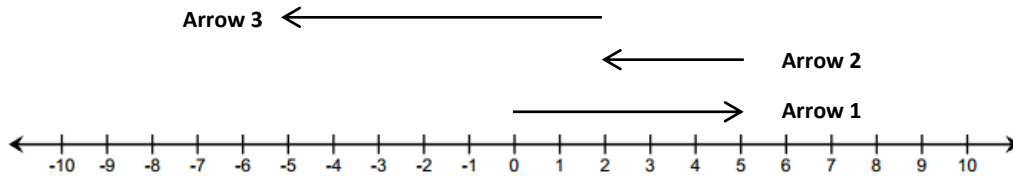
1. Find the sum. Show your work to justify your answer.
 - a. $4 + 17$
 - b. $-6 + (-12)$
 - c. $2.2 + (-3.7)$
 - d. $-3 + (-5) + 8$
 - e. $\frac{1}{3} + (-2\frac{1}{4})$
2. Which of these story problems describes the sum $19 + (-12)$? Check all that apply. Show your work to justify your answer.

_____ 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?

_____ 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?

3. Use the diagram below to complete each part.



- a. Label each arrow with the number the arrow represents.
- b. How long is each arrow? What direction does each arrow point?

Arrow	Length	Direction
1		
2		
3		

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

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



- 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.