Lesson 7: Addition and Subtraction of Rational Numbers

Classwork

Exercise 1: Real-World Connection to Adding and Subtracting Rational Numbers

Suppose a 7th grader's birthday is today, and she is 12 years old. How old was she $3\frac{1}{2}$ years ago? Write an equation and use a number line to model your answer.

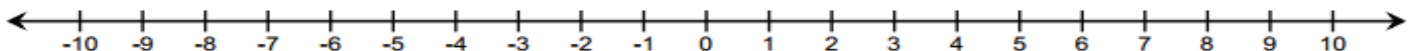### Example 1: Representing Sums of Rational Numbers on a Number Line

a.   Place the tail of the arrow on 12.

b.   The length of the arrow is the absolute value of $-3\frac{1}{2}$. $\left|-3\frac{1}{2}\right| = 3\frac{1}{2}$

c.   The direction of the arrow is to the *left* since you are adding a negative number to 12.

Draw the number line model in the space below:

Exercise 2

Find the following sum using a number line diagram. $-2\frac{1}{2} + 5$.

Example 2: Representing Differences of Rational Numbers on a Number Line

a. Rewrite the difference $1 - 2\frac{1}{4}$ as a sum: $1 + \left(-2\frac{1}{4}\right)$.

Now follow the steps to represent the sum:

b. Place the tail of the arrow on 1.

c. The length of the arrow is the absolute value of $-2\frac{1}{4}$; $\left|-2\frac{1}{4}\right| = 2\frac{1}{4}$.

d. The direction of the arrow is to the *left* since you are adding a negative number to 1.

Draw the number line model in the space below:

Exercise 3

Find the following difference, and represent it on a number line. $-5\frac{1}{2} - (-8)$.
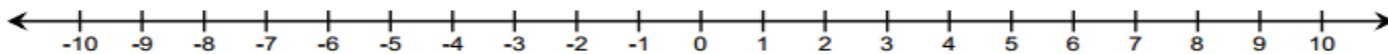
Exercise 4

Find the following sums and differences using a number line model.

a. $-6 + 5\frac{1}{4}$

b. $7 - (-0.9)$

c. $2.5 + \left(-\frac{1}{2}\right)$

d. $-\frac{1}{4} + 4$

e. $\frac{1}{2} - (-3)$

Exercise 5

Create an equation and number line diagram to model each answer.

a. Samantha owes her farther $7.00. She just got paid $5.50 for babysitting. If she gives that money to her dad, how much will she still owe him?

b. At the start of a trip, a car's gas tank contains 12 gallons of gasoline. During the trip, the car consumes $10\frac{1}{8}$ gallons of gasoline. How much gasoline is left in the tank?

c. A fish was swimming $3\frac{1}{2}$ feet below the water's surface at 7:00 a.m. Four hours later, the fish was at a depth that is $5\frac{1}{4}$ feet below where it was at 7:00 a.m. What rational number represents the position of the fish with respect to the water's surface at 11:00 a.m.?

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Lesson Summary

The rules for adding and subtracting integers apply to all rational numbers.

The sum of two rational numbers (for example, $-1 + 4.3$) can be found on the number line by placing the tail of an arrow at -1 and locating the head of the arrow 4.3 units to the right to arrive at the sum, which is 3.3.

To model the difference of two rational numbers on a number line (for example, $-5.7 - 3$), first rewrite the difference as a sum, $-5.7 + (-3)$, and then follow the steps for locating a sum. Place a single arrow with its tail at -5.7 and the head of the arrow 3 units to the left to arrive at -8.7.

Problem Set

Represent each of the following problems using both a number line diagram and an equation.

1. A bird that was perched atop a $15\frac{1}{2}$-foot tree dives down six feet to a branch below. How far above the ground is the bird's new location?

2. Mariah had owed her grandfather $2.25 but was recently able to pay him back $1.50. How much does Mariah currently owe her grandfather?

3. Jake is hiking a trail that leads to the top of a canyon. The trail is 4.2 miles long, and Jake plans to stop for lunch after he completes 1.6 miles. How far from the top of the canyon will Jake be when he stops for lunch?

4. Sonji and her friend Rachel are competing in a running race. When Sonji is 0.4 mile from the finish line, she notices that her friend Rachel has fallen. If Sonji runs one tenth of a mile back to help her friend, how far will she be from the finish line?

5. Mr. Henderson did not realize his checking account had a balance of $200 when used his debit card for a $317.25 purchase. What is his checking account balance after the purchase?

6. If the temperature is $-3°F$ at $10\ p.m.$, and the temperature falls four degrees overnight, what is the resulting temperature?