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

1. Place the tail of the arrow on $12$.
2. The length of the arrow is the absolute value of $-3\frac{1}{2}$, $\left|-3\frac{1}{2}\right|=3\frac{1}{2}$.
3. 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

1. 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:

1. Place the tail of the arrow on $1$.
2. The length of the arrow is the absolute value of $-2\frac{1}{4}$ ; $\left|-2\frac{1}{4}\right|=2\frac{1}{4}$.
3. 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.

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

1. $7-(-0.9)$
2. $2.5+\left(-\frac{1}{2}\right)$

1. $-\frac{1}{4}+4$
2. $\frac{1}{2}-\left(-3\right)$

Exercise 5

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

1. Samantha owes her father $\$7$. She just got paid $\$5.50$ for babysitting. If she gives that money to her dad, how much will she still owe him?
2. 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?
3. 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.?

Problem Set

Lesson Summary

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

The sum of two rational numbers (e.g., $-1+4.3$) 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 (e.g., $-5.7-3$), 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 $-8.7$.

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 $0.4$ miles 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 he used his debit card for a $\$317.25$ purchase. What is his checking account balance after the purchase?
6. If the temperature is $-3℉$ at $10:00$ p.m., and the temperature falls four degrees overnight, what is the resulting temperature?