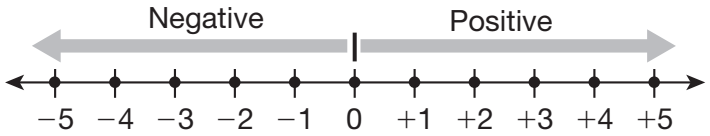
Common Core State Standards:
6.NS.5, 6.NS.6.a, 6.NS.6.c

Integers

Getting the Idea

Integers include the counting numbers (1, 2, 3, …), their opposites (−1, −2, −3, …), and zero. The number line below shows the integers from −5 to 5. **Negative integers** have values less than zero, so they are to the left of zero on the number line. **Positive integers** have values greater than zero, so they are to the right of zero on the number line. Zero is neither negative nor positive.



You can use integers to describe opposite situations. Here are some uses for integers:

Positive integers

- A bank deposit (adding money to an account)
- An elevation above sea level
- A rise in temperature

Negative integers

- A bank withdrawal (taking money out of an account)
- An elevation below sea level
- A drop in temperature

Example 1

A bird is flying 25 feet above sea level and a fish is swimming 10 feet below sea level. Use integers to represent the elevation of the fish and the bird.

Strategy **Use an integer to describe each situation.**

Step 1 What elevation would the number 0 represent?

Zero represents sea level, or the surface of the water.

Step 2 Find a signed number for the elevation of the bird.

The bird is above sea level, so use a positive number (a number greater than 0).

+25 or simply 25

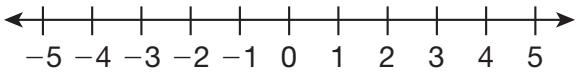
Step 3 Find a signed number for the elevation of the fish.

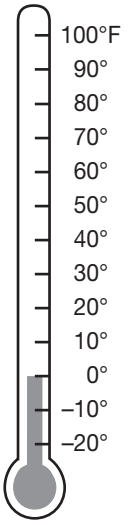
The fish is below sea level, so use a negative number (a number less than 0).

-10

Solution **The elevation of the bird is 25 feet. The elevation of the fish is -10 feet.**

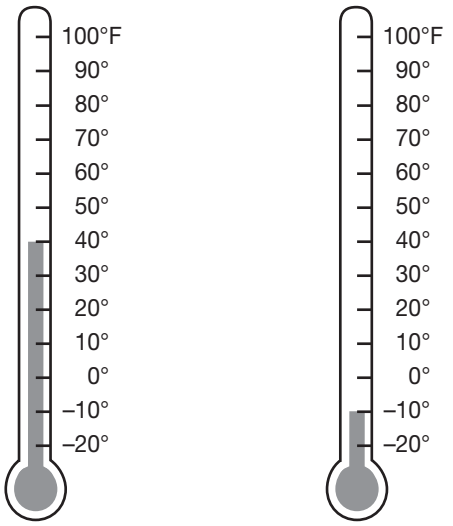
You can show negative integers by extending to the left a number line that shows the numbers (0, 1, 2, 3, . . .). Number lines showing positive and negative integers can be either horizontal or vertical, such as a thermometer.





Example 2

What temperatures are indicated on the Fahrenheit thermometers below?



Thermometer A **Thermometer B**

Strategy **Use integers to describe the temperature.**

Step 1 Find the temperature on thermometer A.

The temperature is above 0, so use a positive number.

Thermometer A shows a temperature of 40° F.

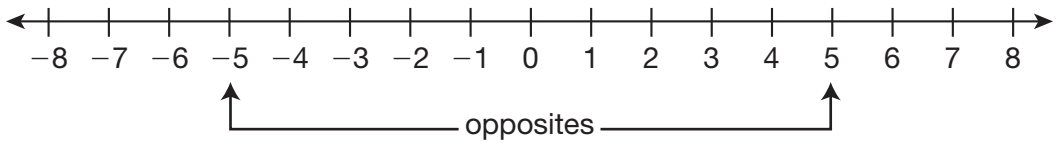
Step 2 Find the temperature on thermometer B.

The temperature is below 0, so use a negative number.

Thermometer B shows a temperature of -10°F.

Solution **The temperature on thermometer A is 40°F. The temperature on thermometer B is -10°F.**

Integers that are the same distance from 0 on a number line are called **opposites**. For example, 5 and -5 are opposites of each other. They are each the same distance from 0 on a number line, as shown below.



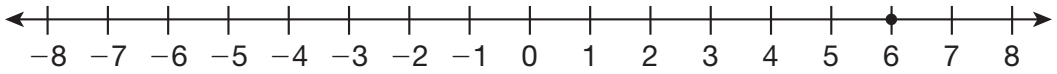
So, the opposite of 5 is -5, and the opposite of -5, written as $-(-5)$, is 5. The opposite of 0 is 0.

Example 3

Find the opposites of 6 and of -2.

Strategy **Use a number line.**

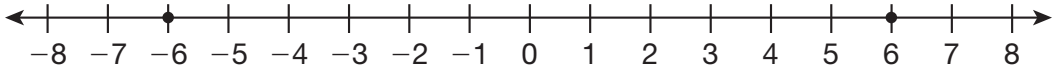
Step 1 Plot a point for 6 on a number line.



Step 2 Find the integer that is the same distance from 0 in the opposite direction.

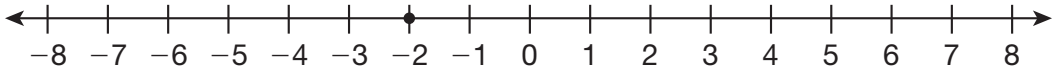
The integer 6 is 6 units to the right of 0.

Count 6 units to the left of 0. Plot a point.



The opposite of 6 is -6.

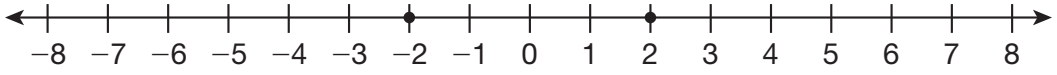
Step 3 Plot a point for -2 on a number line.



Step 4 Find the integer that is the same distance from 0 in the opposite direction.

The integer -2 is 2 units to the left of 0.

Count 2 units to the right of 0. Plot a point.



The opposite of -2 is 2.

Solution **The opposite of 6 is -6. The opposite of -2 is 2.**

Coached Example

On its first play of the game, a football team gained 6 yards. On its next two plays, the team lost 2 yards and then gained 7 yards. Use integers to describe these three plays.

What integer represents a play in which the team neither gains yards nor loses yards? ____

A play that gains yards would be represented by a _____ integer.

A play that loses yards would be represented by a _____ integer.

On the first play, the team gained _____ yards.

A gain of 6 yards is represented by the integer _____.

On the second play, the team lost _____ yards.

A loss of 2 yards is represented by the integer _____.

On the third play, the team gained _____ yards.

A gain of 7 yards is represented by the integer _____.

The three plays can be described by the integers _____, _____, and _____.