

# CHAPTER 6

# Integers and Rational Numbers

## What You've Learned

- In earlier chapters, you learned to add, subtract, multiply, and divide decimals and fractions.
- You wrote and solved equations.
- You graphed positive numbers on a number line.



## Check Your Readiness

### Algebra Solving Equations

Solve each equation.

1.  $a + 13 = 92$

2.  $b + 12 = 43$

3.  $c - 31 = 8$

4.  $d - 23 = 8$

### Algebra Solving Multiplication and Division Equations

Solve each equation.

5.  $7g = 4.2$

6.  $h \div 6 = 11$

7.  $8j = 328$

8.  $k \div 9 = 8$

9.  $16m = 240$

10.  $n \div 14 = 18$

### Find the Least Common Multiple

Find the least common multiple of each set of numbers.

11. 4, 6

12. 9, 21

13. 8, 16

14. 8, 12

15. 5, 20

16. 8, 10

# What You'll Learn Next


- In this chapter, you will use integers, rational numbers, opposites, and absolute values to represent real-world situations.
- You will locate and graph points.
- You will use a number line to compare and order integers, decimals, and fractions.
- You will solve inequalities.

## 6-1

## Exploring Integers

### What You'll Learn

To use integers, opposites, and absolute values to represent real-world situations

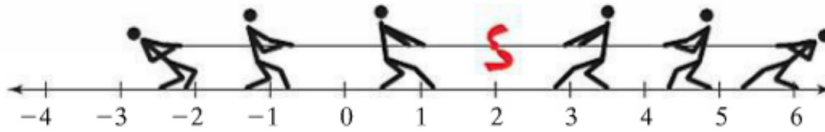
 **New Vocabulary** opposites, integers, absolute value

#### © CONTENT STANDARDS

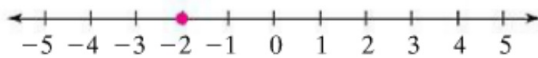
6.NS.5, 6.NS.6, 6.NS.6.a,  
6.NS.6.c, 6.NS.7.c

## Why Learn This?

You can use integers to represent real-world situations. In the tug-of-war below, the team on the right has gained 2 feet. The position of the flag is positive 2, or  $+2$ . You write  $+2$  as 2.



Suppose the team on the right had lost 2 feet instead. The position of the flag would have been negative 2, or  $-2$ .



**Opposites** are two numbers that are the same distance from 0 on a number line but in opposite directions. **Integers** are the set of positive whole numbers, their opposites, and zero. The opposite of 0 is 0.

### EXAMPLE Representing Situations with Integers



The “smoke” that makes a performance exciting is actually from dry ice.

**Multiple Choice** Dry ice is solid carbon dioxide, which freezes at about 109 degrees below zero Fahrenheit. Which integer represents the freezing point of dry ice?

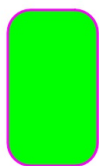
- (A)  $-109$       (B)  $-19$       (C)  $+19$       (D)  $+109$

The freezing point is 109 degrees below zero. Use a negative sign for an integer less than zero:  $-109$ . The answer is choice A.

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**1 EXAMPLE** You are six spaces behind your opponent in a board game. What integer represents your situation?

$-6$  ← An integer less than 0 is represented as negative.

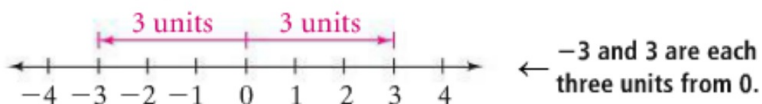


1. The elevation in New Orleans, Louisiana, is 8 feet below sea level. Use an integer to represent this elevation.
  - A.  $-8$
  - B.  $8$
  - C.  $0$
  - D.  $80$

The opposite of a positive number is negative. The opposite of a negative number is positive.

### EXAMPLE Identifying Opposites

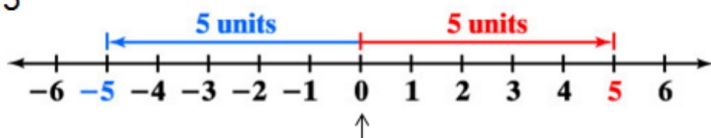
- 2 Write the opposite of 3.



The opposite of 3 is  $-3$ .

- 2 EXAMPLE Name the opposite of each integer.

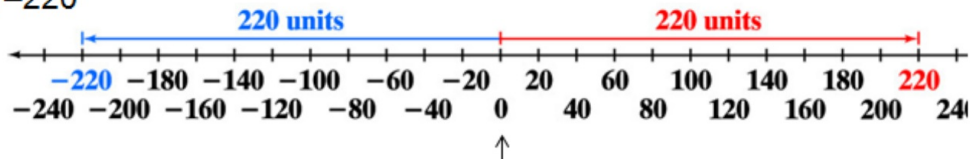
a. 5



$-5$  and  $5$  are both five units from 0.

The opposite of 5 is  $-5$ .

b.  $-220$



$-220$  and  $220$  are both 220 units from 0.

The opposite of  $-220$  is 220.

## ✓ Quick Check

2. Write the opposite of  $-5$ .



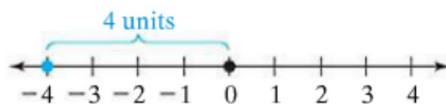
## Interesting fact:

The opposite of the opposite of any positive or negative number is the number itself.

The **absolute value** of a number is its distance from 0 on a number line. The symbol for the absolute value of a number  $n$  is  $|n|$ . Opposite numbers have the same absolute value.

### EXAMPLE Finding Absolute Value

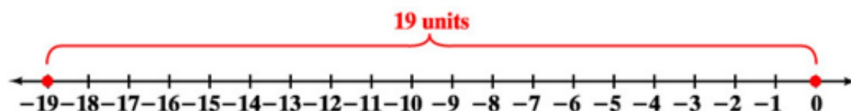
- 3 A student withdraws \$4 from a savings account. This can be represented by  $-4$ . Find  $|-4|$  and explain its meaning.



Since  $-4$  is 4 units from 0,  $|-4| = 4$ .  $|-4|$  represents the amount of the withdrawal.

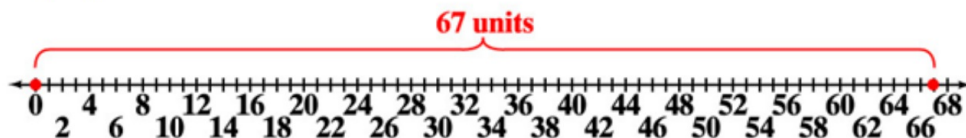
**3 EXAMPLE** Find each absolute value.

a.  $|-19|$

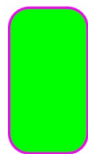


Since  $-19$  is 19 units from 0,  $|-19| = 19$ .

b.  $|67|$

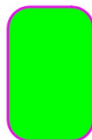


Since 67 is 67 units from 0,  $|67| = 67$ .



1. Find  $|-1|$ .

- A.  $-1$
- B.  $10$
- C.  $1$
- D.  $0$



2. Find  $|7|$ .

- A.  $0$
- B.  $70$
- C.  $-7$
- D.  $7$



1. The surface of the Dead Sea is about 1,300 feet below the sea level. Use an integer to represent this elevation.

2. Write the opposite of  $-12$ .

Find each value.

3.  $|6|$

4.  $|-3|$

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

**Practice 6-1 Exploring Integers** \_\_\_\_\_ /22 points total

Use an integer to represent each situation.

1. spent \$23 \_\_\_\_\_ 2. deposit of \$58 \_\_\_\_\_

Write the opposite of each integer.

3. 16 \_\_\_\_\_ 4.  $-12$  \_\_\_\_\_  
 5. What is the opposite of the opposite of  $-7$  \_\_\_\_\_

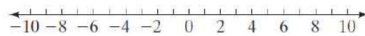
Find each absolute value.

6.  $|-5|$  \_\_\_\_\_ 7.  $|13|$  \_\_\_\_\_

8. The temperature in Fargo, North Dakota, was  $6^{\circ}\text{F}$  at noon. By 4 P.M. the temperature dropped to  $-10^{\circ}\text{F}$ . What integer represents the change in temperature?  
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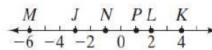
9. A snail climbs 3 inches up a wall. Then it slides 6 inches down the wall. What integer represents the distance the snail traveled from its original position?  
 \_\_\_\_\_

10. Graph these integers on the number line:  $-4, 9, 1, -2, 3$



Write an integer for each point on the number line.

11.  $J$  \_\_\_\_\_ 12.  $K$  \_\_\_\_\_



Write two numbers that have the given absolute value.

13. 4 \_\_\_\_\_ and \_\_\_\_\_ 14. 38 \_\_\_\_\_ and \_\_\_\_\_

Think of the days of a week as integers. Let today be 0, and let days in the past be negative and days in the future be positive.

15. If today is Tuesday, what integer stands for last Sunday? \_\_\_\_\_

16. If today is Wednesday, what integer stands for next Saturday? \_\_\_\_\_