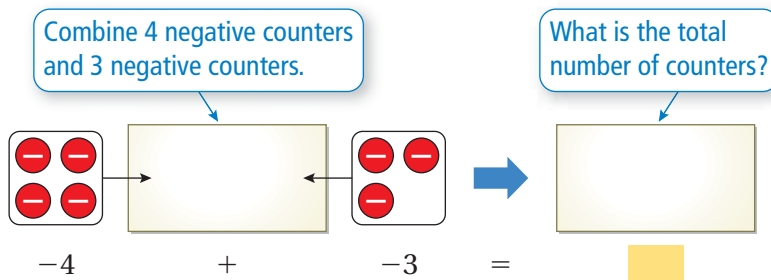


# 1.2 Adding Integers

**Essential Question** Is the sum of two integers *positive, negative, or zero*? How can you tell?

## 1 ACTIVITY: Adding Integers with the Same Sign

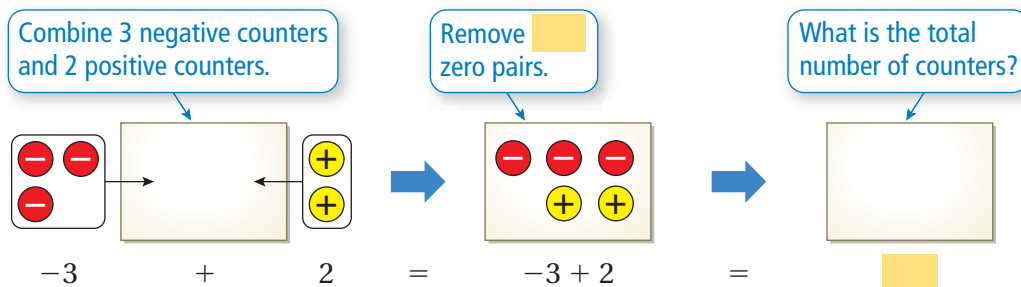
Work with a partner. Use integer counters to find  $-4 + (-3)$ .



So,  $-4 + (-3) =$  .

## 2 ACTIVITY: Adding Integers with Different Signs

Work with a partner. Use integer counters to find  $-3 + 2$ .



So,  $-3 + 2 =$  .

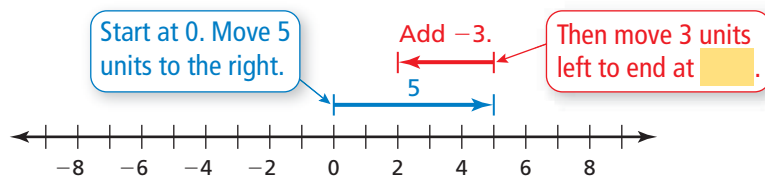
### Integers

In this lesson, you will

- add integers.
- show that the sum of a number and its opposite is 0.
- solve real-life problems.

## 3 ACTIVITY: Adding Integers with Different Signs

Work with a partner. Use a number line to find  $5 + (-3)$ .



So,  $5 + (-3) =$  .

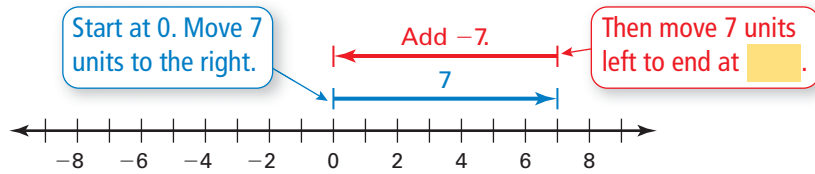
#### 4 ACTIVITY: Adding Integers with Different Signs

### Math Practice

#### Make Conjectures

How can the relationship between the integers help you write a rule?

Work with a partner. Write the addition expression shown. Then find the sum. How are the integers in the expression related to 0 on a number line?



### Inductive Reasoning

Work with a partner. Use integer counters or a number line to complete the table.

	Exercise	Type of Sum	Sum	Sum: Positive, Negative, or Zero
1	5. $-4 + (-3)$	Integers with the same sign		
2	6. $-3 + 2$			
3	7. $5 + (-3)$			
4	8. $7 + (-7)$			
	9. $2 + 4$			
	10. $-6 + (-2)$			
	11. $-5 + 9$			
	12. $15 + (-9)$			
	13. $-10 + 10$			
	14. $-6 + (-6)$			
	15. $13 + (-13)$			

### What Is Your Answer?

- IN YOUR OWN WORDS** Is the sum of two integers *positive*, *negative*, or *zero*? How can you tell?
- STRUCTURE** Write general rules for adding (a) two integers with the same sign, (b) two integers with different signs, and (c) two integers that vary only in sign.

### Practice

Use what you learned about adding integers to complete Exercises 8–15 on page 12.

### Key Vocabulary

opposites, p. 10  
additive inverse, p. 10

## Key Idea

### Adding Integers with the Same Sign

**Words** Add the absolute values of the integers. Then use the common sign.

**Numbers**  $2 + 5 = 7$        $-2 + (-5) = -7$

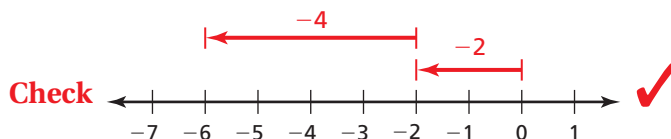
## EXAMPLE 1 Adding Integers with the Same Sign

Find  $-2 + (-4)$ . Use a number line to check your answer.

$-2 + (-4) = -6$       Add  $|-2|$  and  $|-4|$ .

Use the common sign.

∴ The sum is  $-6$ .



### The Meaning of a Word

#### Opposite

When you walk across a street, you are moving to the **opposite** side of the street.

### On Your Own

Add.

1.  $7 + 13$

2.  $-8 + (-5)$

3.  $-20 + (-15)$

Two numbers that are the same distance from 0, but on opposite sides of 0, are called **opposites**. For example,  $-3$  and  $3$  are opposites.

## Key Ideas

### Adding Integers with Different Signs

**Words** Subtract the lesser absolute value from the greater absolute value. Then use the sign of the integer with the greater absolute value.

**Numbers**  $8 + (-10) = -2$        $-13 + 17 = 4$

### Additive Inverse Property

**Words** The sum of an integer and its **additive inverse**, or opposite, is 0.

**Numbers**  $6 + (-6) = 0$        $-25 + 25 = 0$       **Algebra**  $a + (-a) = 0$

## EXAMPLE 2 Adding Integers with Different Signs

a. Find  $5 + (-10)$ .

$$5 + (-10) = -5 \quad | -10 | > | 5 |. \text{ So, subtract } | 5 | \text{ from } | -10 |.$$

Use the sign of  $-10$ .

∴ The sum is  $-5$ .

b. Find  $-3 + 7$ .

$$-3 + 7 = 4 \quad | 7 | > | -3 |. \text{ So, subtract } | -3 | \text{ from } | 7 |.$$

Use the sign of  $7$ .

∴ The sum is  $4$ .

c. Find  $-12 + 12$ .

$$-12 + 12 = 0 \quad \text{The sum is } 0 \text{ by the Additive Inverse Property.}$$

$-12$  and  $12$  are opposites.

∴ The sum is  $0$ .

## EXAMPLE 3 Adding More Than Two Integers

The list shows four bank account transactions in July. Find the change  $C$  in the account balance.

JULY TRANSACTIONS	
Withdrawal	-\$40
Deposit	\$50
Deposit	\$75
Withdrawal	-\$50

Find the sum of the four transactions.

$$\begin{aligned} C &= -40 + 50 + 75 + (-50) \\ &= -40 + 75 + 50 + (-50) \\ &= -40 + 75 + [50 + (-50)] \\ &= -40 + 75 + 0 \\ &= 35 + 0 \\ &= 35 \end{aligned}$$

Write the sum.

Commutative Property of Addition

Associative Property of Addition

Additive Inverse Property

Add  $-40$  and  $75$ .

Addition Property of Zero

∴ Because  $C = 35$ , the account balance increased \$35 in July.

### Study Tip

A deposit of \$50 and a withdrawal of \$50 represent opposite quantities,  $+50$  and  $-50$ , which have a sum of 0.

### On Your Own

Add.

4.  $-2 + 11$

5.  $9 + (-10)$

6.  $-31 + 31$

7. **WHAT IF?** In Example 3, the deposit amounts are \$30 and \$40. Find the change  $C$  in the account balance.

Now You're Ready  
Exercises 8–23  
and 28–39

## Vocabulary and Concept Check

- WRITING** How do you find the additive inverse of an integer?
- NUMBER SENSE** Is  $3 + (-4)$  the same as  $-4 + 3$ ? Explain.

Tell whether the sum is *positive*, *negative*, or *zero* without adding. Explain your reasoning.

- $-8 + 20$
- $30 + (-30)$
- $-10 + (-18)$

Tell whether the statement is *true* or *false*. Explain your reasoning.

- The sum of two negative integers is always negative.
- An integer and its absolute value are always opposites.

## Practice and Problem Solving

Add.

- |          |          |                          |                        |                         |                         |
|----------|----------|--------------------------|------------------------|-------------------------|-------------------------|
| <b>1</b> | <b>2</b> | <b>8.</b> $6 + 4$        | <b>9.</b> $-4 + (-6)$  | <b>10.</b> $-2 + (-3)$  | <b>11.</b> $-5 + 12$    |
|          |          | <b>12.</b> $5 + (-7)$    | <b>13.</b> $8 + (-8)$  | <b>14.</b> $9 + (-11)$  | <b>15.</b> $-3 + 13$    |
|          |          | <b>16.</b> $-4 + (-16)$  | <b>17.</b> $-3 + (-1)$ | <b>18.</b> $14 + (-5)$  | <b>19.</b> $0 + (-11)$  |
|          |          | <b>20.</b> $-10 + (-15)$ | <b>21.</b> $-13 + 9$   | <b>22.</b> $18 + (-18)$ | <b>23.</b> $-25 + (-9)$ |

**ERROR ANALYSIS** Describe and correct the error in finding the sum.

24.   $9 + (-6) = -3$

25.   $-10 + (-10) = 0$

- TEMPERATURE** The temperature is  $-3^{\circ}\text{F}$  at 7:00 A.M. During the next 4 hours, the temperature increases  $21^{\circ}\text{F}$ . What is the temperature at 11:00 A.M.?
- BANKING** Your bank account has a balance of  $-\$12$ . You deposit  $\$60$ . What is your new balance?

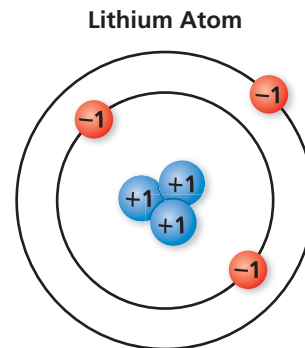
Tell how the Commutative and Associative Properties of Addition can help you find the sum mentally. Then find the sum.

- |          |                               |                               |                               |
|----------|-------------------------------|-------------------------------|-------------------------------|
| <b>3</b> | <b>28.</b> $9 + 6 + (-6)$     | <b>29.</b> $-8 + 13 + (-13)$  | <b>30.</b> $9 + (-17) + (-9)$ |
|          | <b>31.</b> $7 + (-12) + (-7)$ | <b>32.</b> $-12 + 25 + (-15)$ | <b>33.</b> $6 + (-9) + 14$    |

Add.

- |                              |                                 |                                  |
|------------------------------|---------------------------------|----------------------------------|
| <b>34.</b> $13 + (-21) + 16$ | <b>35.</b> $22 + (-14) + (-35)$ | <b>36.</b> $-13 + 27 + (-18)$    |
| <b>37.</b> $-19 + 26 + 14$   | <b>38.</b> $-32 + (-17) + 42$   | <b>39.</b> $-41 + (-15) + (-29)$ |

40. **SCIENCE** A lithium atom has positively charged protons and negatively charged electrons. The sum of the charges represents the charge of the lithium atom. Find the charge of the atom.



41. **OPEN-ENDED** Write two integers with different signs that have a sum of  $-25$ . Write two integers with the same sign that have a sum of  $-25$ .

**ALGEBRA** Evaluate the expression when  $a = 4$ ,  $b = -5$ , and  $c = -8$ .

42.  $a + b$

43.  $-b + c$

44.  $|a + b + c|$

**MENTAL MATH** Use mental math to solve the equation.

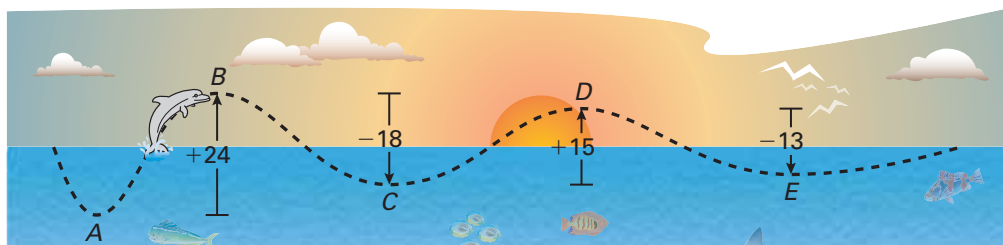
45.  $d + 12 = 2$

46.  $b + (-2) = 0$

47.  $-8 + m = -15$

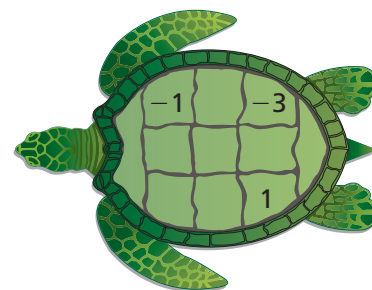
48. **PROBLEM SOLVING** Starting at point A, the path of a dolphin jumping out of the water is shown.

- Is the dolphin deeper at point C or point E? Explain your reasoning.
- Is the dolphin higher at point B or point D? Explain your reasoning.



49. **Puzzle** According to a legend, the Chinese Emperor Yu-Huang saw a magic square on the back of a turtle. In a *magic square*, the numbers in each row and in each column have the same sum. This sum is called the *magic sum*.

Copy and complete the magic square so that each row and each column has a magic sum of 0. Use each integer from  $-4$  to  $4$  exactly once.



## Fair Game Review what you learned in previous grades & lessons

**Subtract.** (*Skills Review Handbook*)

50.  $69 - 38$

51.  $82 - 74$

52.  $177 - 63$

53.  $451 - 268$

54. **MULTIPLE CHOICE** What is the range of the numbers below? (*Skills Review Handbook*)

12, 8, 17, 12, 15, 18, 30

(A) 12

(B) 15

(C) 18

(D) 22