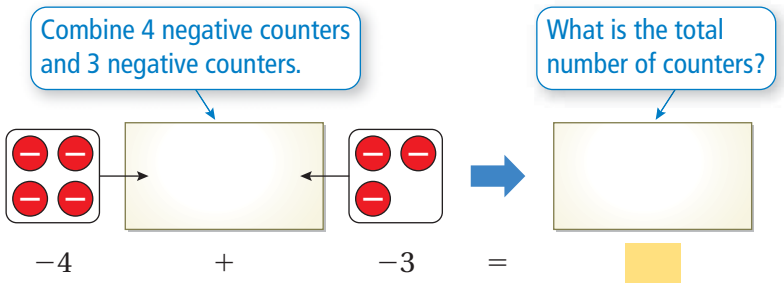
1.2 Adding Integers

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

1 ACTIVITY: Adding Integers with the Same Sign

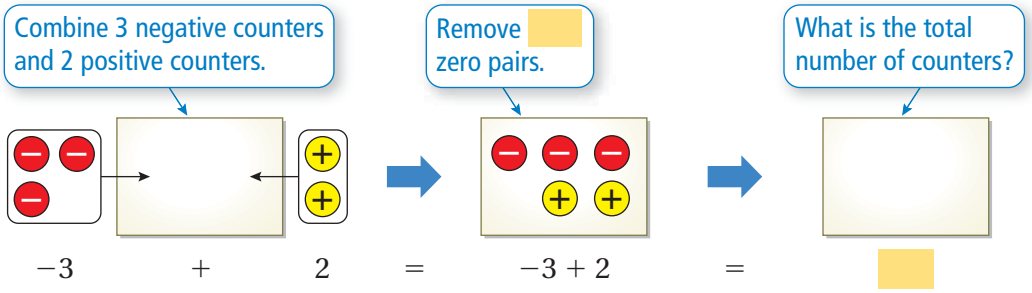
Work with a partner. Use integer counters to find $-4 + (-3)$.



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

2 ACTIVITY: Adding Integers with Different Signs

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



So, $-3 + 2 =$ ____.

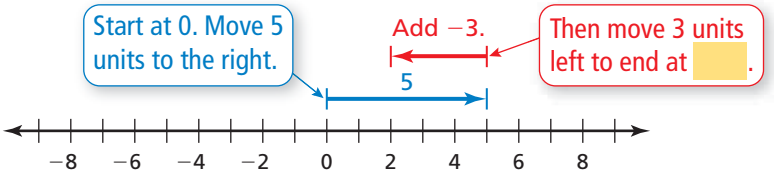
Integers

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 $5 + (-3)$.



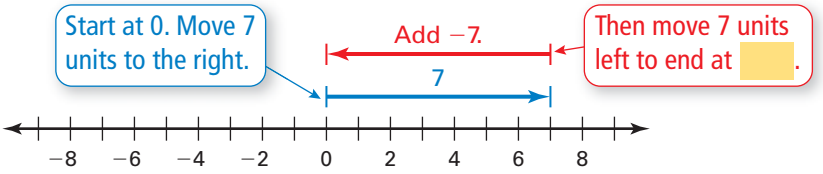
So, $5 + (-3) =$ ____.

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?

16. IN YOUR OWN WORDS Is the sum of two integers *positive*, *negative*, or *zero*? How can you tell?

17. 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.

1.2 Lesson

Check It Out
Lesson Tutorials
BigIdeasMath.com

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 $2 + 5 = 7$ $\quad -2 + (-5) = -7$

EXAMPLE 1 Adding Integers with the Same Sign

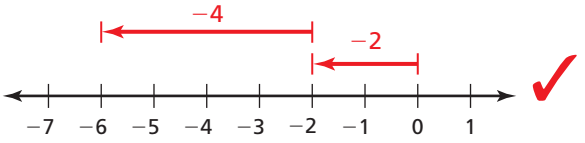
Find $-2 + (-4)$. Use a number line to check your answer.

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

Use the common sign.

The sum is -6.

Check



On Your Own

Add.

1. $7 + 13$ **2.** $-8 + (-5)$ **3.** $-20 + (-15)$

The Meaning of a Word

Opposite

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

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 $8 + (-10) = -2$ $\quad -13 + 17 = 4$

Additive Inverse Property

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

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

Multi-Language Glossary at BigIdeasMath.com

EXAMPLE 2 Adding Integers with Different Signs

a. Find 5 + (−10).

$5 + (-10) = -5$ — $|-10| > |5|$. So, subtract $|5|$ from $|-10|$.

Use the sign of −10.

The sum is −5.

b. Find −3 + 7.

$-3 + 7 = 4$ — $|7| > |-3|$. So, subtract $|-3|$ from $|7|$.

Use the sign of 7.

The sum is 4.

c. Find −12 + 12.

$-12 + 12 = 0$ — The sum is 0 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

Study Tip

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

Find the sum of the four transactions.

$C = -40 + 50 + 75 + (-50)$	Write the sum.
$= -40 + 75 + 50 + (-50)$	Commutative Property of Addition
$= -40 + 75 + [50 + (-50)]$	Associative Property of Addition
$= -40 + 75 + 0$	Additive Inverse Property
$= 35 + 0$	Add −40 and 75.
$= 35$	Addition Property of Zero

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

On Your Own

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

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.

1.2 Exercises

Check It Out
Help with Homework
BigIdeasMath.com

Vocabulary and Concept Check

1. **WRITING** How do you find the additive inverse of an integer?
2. **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.

3. $-8 + 20$
4. $30 + (-30)$
5. $-10 + (-18)$

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

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

Practice and Problem Solving

Add.

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

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

24. ✗ $9 + (-6) = -3$

25. ✗ $-10 + (-10) = 0$

26. **TEMPERATURE** The temperature is $-3°F$ at 7:00 A.M. During the next 4 hours, the temperature increases 21°F. What is the temperature at 11:00 A.M.?
27. **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.

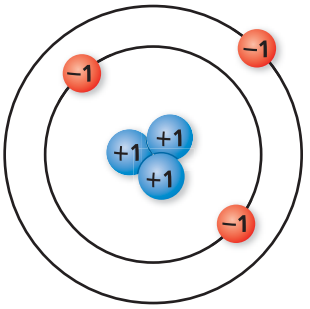
3 28. $9 + 6 + (-6)$
29. $-8 + 13 + (-13)$
30. $9 + (-17) + (-9)$
31. $7 + (-12) + (-7)$
32. $-12 + 25 + (-15)$
33. $6 + (-9) + 14$

Add.

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

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.

Lithium 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.** $|a + b + c|$

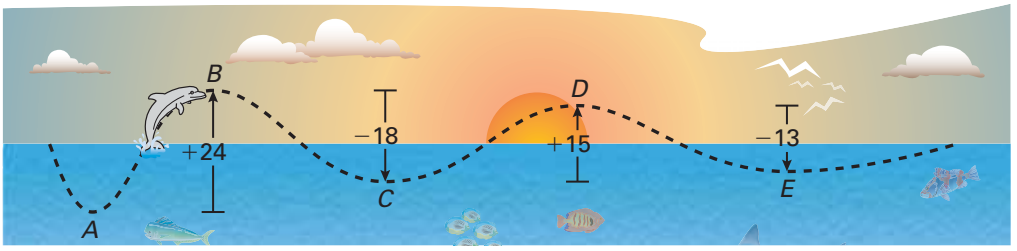
MENTAL MATH **Use mental math to solve the equation.**

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.

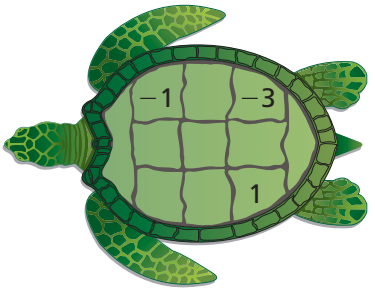
a. Is the dolphin deeper at point C or point E? Explain your reasoning.

b. 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

Ⓐ 12 Ⓑ 15 Ⓒ 18 Ⓓ 22