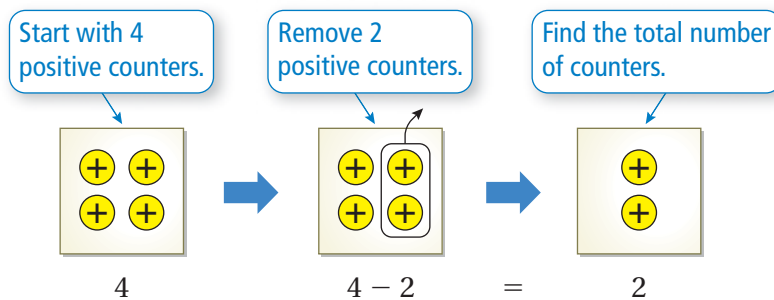


# 1.3 Subtracting Integers

**Essential Question** How are adding integers and subtracting integers related?

## 1 EXAMPLE: Subtracting Integers

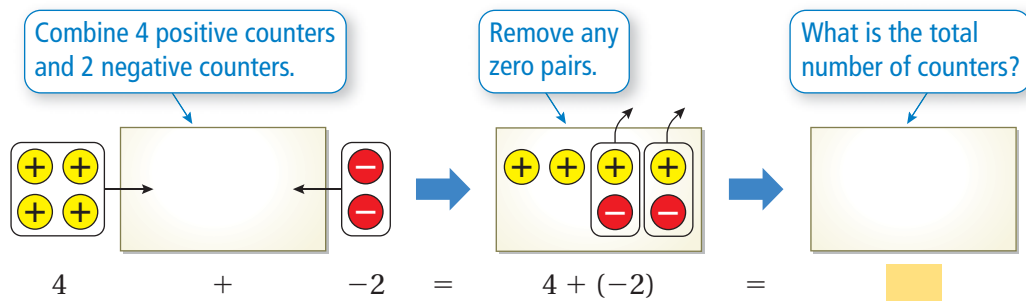
Use integer counters to find  $4 - 2$ .



∴ So,  $4 - 2 = 2$ .

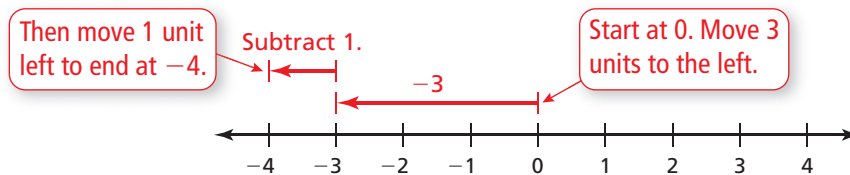
## 2 ACTIVITY: Adding Integers

Work with a partner. Use integer counters to find  $4 + (-2)$ .



## 3 EXAMPLE: Subtracting Integers

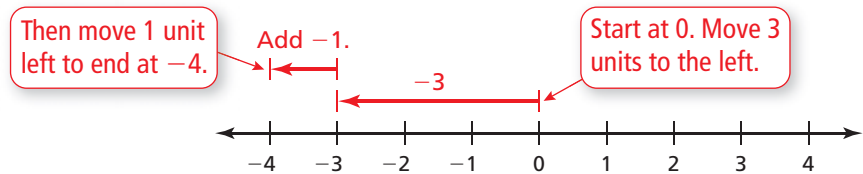
Use a number line to find  $-3 - 1$ .



∴ So,  $-3 - 1 = -4$ .

## 4 ACTIVITY: Adding Integers

Work with a partner. Write the addition expression shown. Then find the sum.



## Inductive Reasoning

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

Exercise	Operation: Add or Subtract	Answer
1 5. $4 - 2$	Subtract 2	2
2 6. $4 + (-2)$	Add $-2$	2
3 7. $-3 - 1$	Subtract 1	$-4$
4 8. $-3 + (-1)$	Add $-1$	$-4$
9. $3 - 8$		
10. $3 + (-8)$		
11. $9 - 13$		
12. $9 + (-13)$		
13. $-6 - (-3)$		
14. $-6 + (3)$		
15. $-5 - (-12)$		
16. $-5 + 12$		

## What Is Your Answer?

- IN YOUR OWN WORDS** How are adding integers and subtracting integers related?
- Write a general rule for subtracting integers.

### Practice

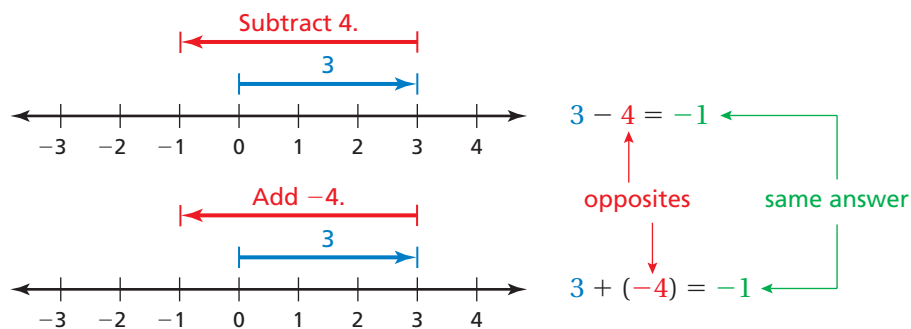
Use what you learned about subtracting integers to complete Exercises 8–15 on page 18.

## Key Idea

### Subtracting Integers

**Words** To subtract an integer, add its opposite.

**Numbers**  $3 - 4 = 3 + (-4) = -1$



## EXAMPLE 1 Subtracting Integers

a. Find  $3 - 12$ .

$$\begin{aligned} 3 - 12 &= 3 + (-12) \\ &= -9 \end{aligned}$$

Add the opposite of 12.

Add.

∴ The difference is  $-9$ .

b. Find  $-8 - (-13)$ .

$$\begin{aligned} -8 - (-13) &= -8 + 13 \\ &= 5 \end{aligned}$$

Add the opposite of  $-13$ .

Add.

∴ The difference is 5.

c. Find  $5 - (-4)$ .

$$\begin{aligned} 5 - (-4) &= 5 + 4 \\ &= 9 \end{aligned}$$

Add the opposite of  $-4$ .

Add.

∴ The difference is 9.

## On Your Own

Subtract.

1.  $8 - 3$

2.  $9 - 17$

3.  $-3 - 3$

4.  $-14 - 9$

5.  $9 - (-8)$

6.  $-12 - (-12)$

Now You're Ready  
Exercises 8–23

## EXAMPLE 2 Subtracting Integers

Evaluate  $-7 - (-12) - 14$ .

$$\begin{aligned} -7 - (-12) - 14 &= -7 + 12 - 14 \\ &= 5 - 14 \\ &= 5 + (-14) \\ &= -9 \end{aligned}$$

Add the opposite of  $-12$ .

Add  $-7$  and  $12$ .

Add the opposite of  $14$ .

Add.

∴ So,  $-7 - (-12) - 14 = -9$ .

### On Your Own

Evaluate the expression.

7.  $-9 - 16 - 8$

8.  $-4 - 20 - 9$

9.  $0 - 9 - (-5)$

10.  $0 - (-6) - 8$

11.  $15 - (-20) - 20$

12.  $13 - 18 - (-18)$

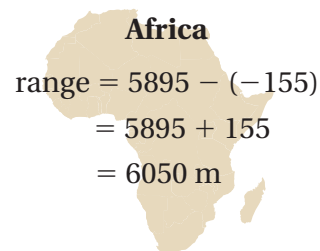
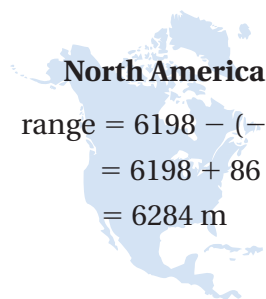
Now You're Ready  
Exercises 27–32

## EXAMPLE 3 Real-Life Application

Which continent has the greater range of elevations?

	North America	Africa
Highest Elevation	6198 m	5895 m
Lowest Elevation	$-86$ m	$-155$ m

To find the range of elevations for each continent, subtract the lowest elevation from the highest elevation.



∴ Because  $6284$  is greater than  $6050$ , North America has the greater range of elevations.

### On Your Own

13. The highest elevation in Mexico is  $5700$  meters, on Pico de Orizaba. The lowest elevation in Mexico is  $-10$  meters, in Laguna Salada. Find the range of elevations in Mexico.

## Vocabulary and Concept Check

- WRITING** How do you subtract one integer from another?
- OPEN-ENDED** Write two integers that are opposites.
- DIFFERENT WORDS, SAME QUESTION** Which is different? Find “both” answers.

Find the difference of 3 and  $-2$ .

What is 3 less than  $-2$ ?

How much less is  $-2$  than 3?

Subtract  $-2$  from 3.

**MATCHING** Match the subtraction expression with the corresponding addition expression.

4.  $9 - (-5)$

5.  $-9 - 5$

6.  $-9 - (-5)$

7.  $9 - 5$

A.  $-9 + 5$

B.  $9 + (-5)$

C.  $-9 + (-5)$

D.  $9 + 5$

## Practice and Problem Solving

**Subtract.**

1 8.  $4 - 7$

9.  $8 - (-5)$

10.  $-6 - (-7)$

11.  $-2 - 3$

12.  $5 - 8$

13.  $-4 - 6$

14.  $-8 - (-3)$

15.  $10 - 7$

16.  $-8 - 13$

17.  $15 - (-2)$

18.  $-9 - (-13)$

19.  $-7 - (-8)$

20.  $-6 - (-6)$

21.  $-10 - 12$

22.  $32 - (-6)$

23.  $0 - (20)$

24. **ERROR ANALYSIS** Describe and correct the error in finding the difference  $7 - (-12)$ .

**X**  $7 - (-12) = 7 + (-12) = -5$

25. **SWIMMING POOL** The floor of the shallow end of a swimming pool is at  $-3$  feet. The floor of the deep end is 9 feet deeper. Which expression can be used to find the depth of the deep end?

$-3 + 9$

$-3 - 9$

$9 - 3$

26. **SHARKS** A shark is at  $-80$  feet. It swims up and jumps out of the water to a height of 15 feet. Write a subtraction expression for the vertical distance the shark travels.

**Evaluate the expression.**

2 27.  $-2 - 7 + 15$

28.  $-9 + 6 - (-2)$

29.  $12 - (-5) - 8$

30.  $8 + 14 - (-4)$

31.  $-6 - (-8) + 5$

32.  $-15 - 7 - (-11)$

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

33.  $m - 5 = 9$

34.  $w - (-3) = 7$

35.  $6 - c = -9$

**ALGEBRA** Evaluate the expression when  $k = -3$ ,  $m = -6$ , and  $n = 9$ .

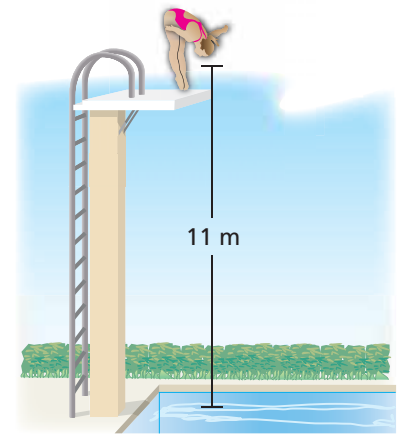
36.  $4 - n$

37.  $m - (-8)$

38.  $-5 + k - n$

39.  $|m - k|$

40. **PLATFORM DIVING** The figure shows a diver diving from a platform. The diver reaches a depth of 4 meters. What is the change in elevation of the dive?



41. **OPEN-ENDED** Write two different pairs of negative integers,  $x$  and  $y$ , that make the statement  $x - y = -1$  true.
42. **TEMPERATURE** The table shows the record monthly high and low temperatures in Anchorage, AK.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High (°F)	56	57	56	72	82	92	84	85	73	64	62	53
Low (°F)	-35	-38	-24	-15	1	29	34	31	19	-6	-21	-36

- a. Find the range of temperatures for each month.
- b. What are the all-time high and all-time low temperatures?
- c. What is the range of the temperatures in part (b)?

**REASONING** Tell whether the difference between the two integers is *always*, *sometimes*, or *never* positive. Explain your reasoning.

43. Two positive integers
44. Two negative integers
45. A positive integer and a negative integer
46. A negative integer and a positive integer

**Number Sense** For what values of  $a$  and  $b$  is the statement true?

47.  $|a - b| = |b - a|$
48.  $|a + b| = |a| + |b|$
49.  $|a - b| = |a| - |b|$



**Fair Game Review** What you learned in previous grades & lessons

Add.

50.  $-5 + (-5) + (-5) + (-5)$

51.  $-9 + (-9) + (-9) + (-9) + (-9)$

Multiply.

52.  $8 \times 5$

53.  $6 \times 78$

54.  $36 \times 41$

55.  $82 \times 29$

56. **MULTIPLE CHOICE** Which value of  $n$  makes the value of the expression  $4n + 3$  a composite number?

(A) 1

(B) 2

(C) 3

(D) 4