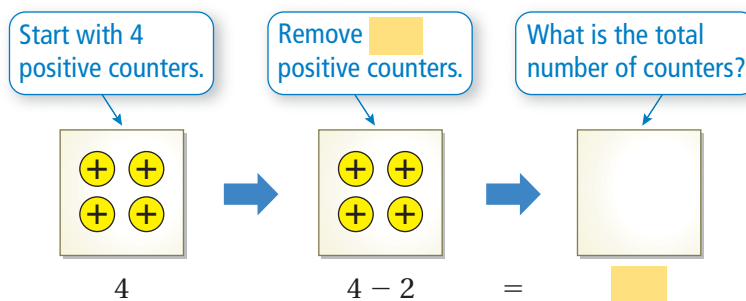


1.3 Subtracting Integers

Essential Question How are adding integers and subtracting integers related?

1 ACTIVITY: Subtracting Integers

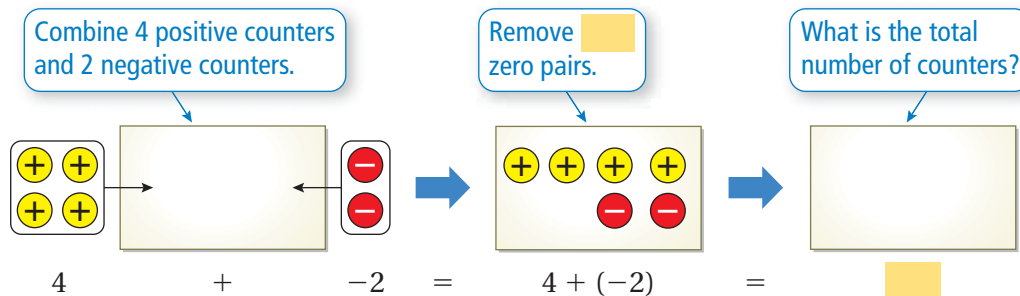
Work with a partner. Use integer counters to find $4 - 2$.



So, $4 - 2 = 2$.

2 ACTIVITY: Adding Integers

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



So, $4 + (-2) = 2$.

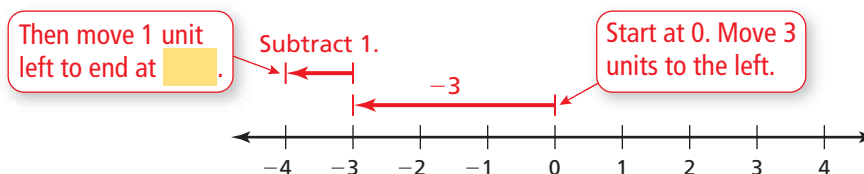
Integers

In this lesson, you will

- subtract integers.
- solve real-life problems.

3 ACTIVITY: Subtracting Integers

Work with a partner. Use a number line to find $-3 - 1$.



So, $-3 - 1 = -4$.

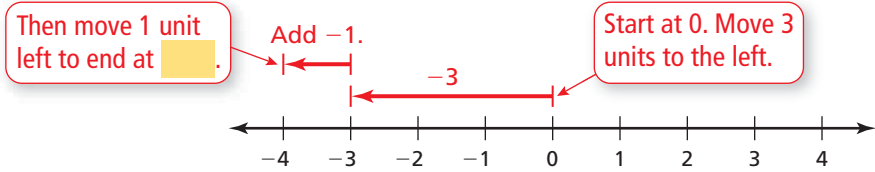
4 ACTIVITY: Adding Integers

Math Practice

Make Sense of Quantities

What integers will you use in your addition expression?

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	6. $4 + (-2)$		
3	7. $-3 - 1$		
4	8. $-3 + (-1)$		
	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?
- STRUCTURE** Write a general rule for subtracting integers.
- Use a number line to find the value of the expression $-4 + 4 - 9$. What property can you use to make your calculation easier? Explain.

Practice

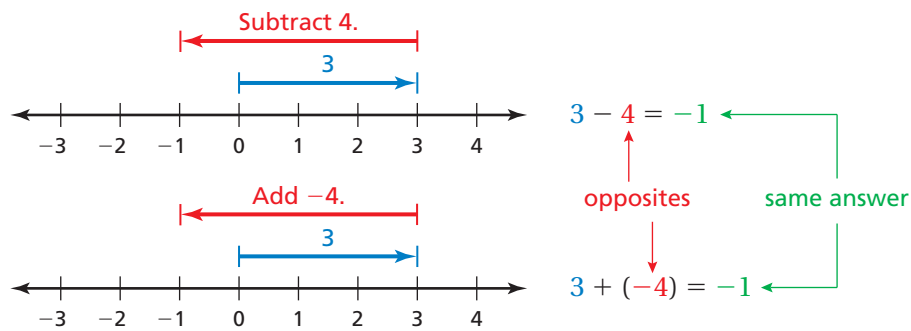
Use what you learned about subtracting integers to complete Exercises 8–15 on page 18.

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

Now You're Ready
Exercises 27–32

Evaluate the expression.

7. $-9 - 16 - 8$

8. $-4 - 20 - 9$

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

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

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

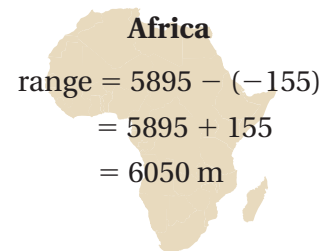
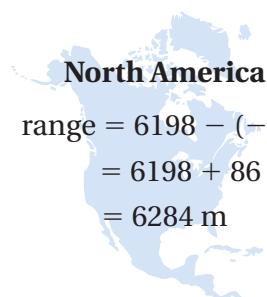
12. $-14 - 9 - 36$

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. $-87 - 5 - 13$ | 31. $-6 - (-8) + 6$ | 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 $n = 9$.

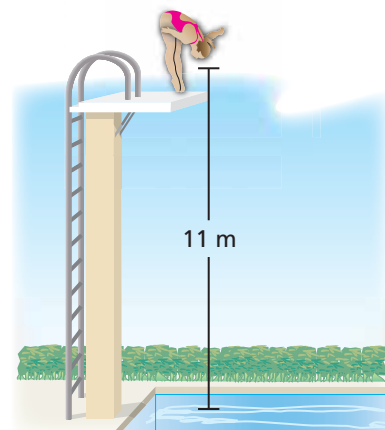
36. $4 - n$

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 diver?



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 for a city in Alaska.

	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

- Find the range of temperatures for each month.
- What are the all-time high and all-time low temperatures?
- 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. (Section 1.2)

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

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

Multiply. (Skills Review Handbook)

52. 8×5

53. 6×78

54. 36×41

55. 82×29

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

Ⓐ 1

Ⓑ 2

Ⓒ 3

Ⓓ 4