

1.2

Solving Multi-Step Equations

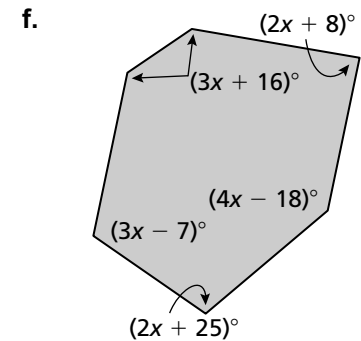
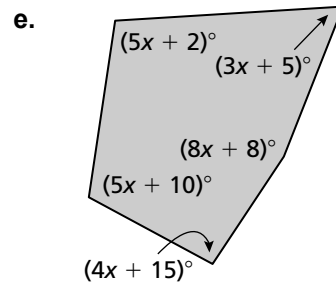
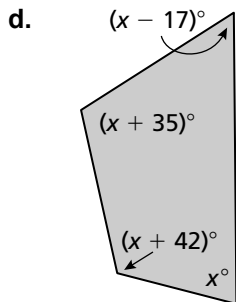
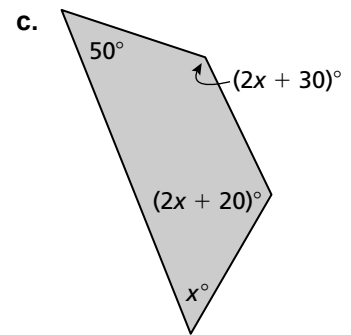
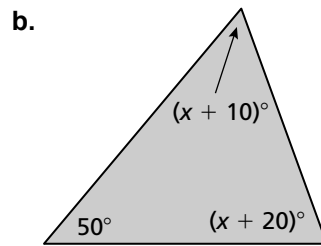
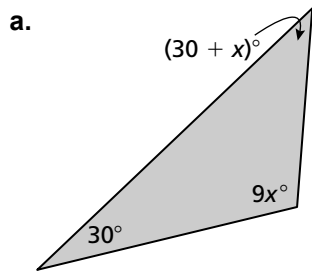
For use with Exploration 1.2

Essential Question How can you use multi-step equations to solve real-life problems?

1 EXPLORATION: Solving for the Angle Measures of a Polygon

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. The sum S of the angle measures of a polygon with n sides can be found using the formula $S = 180(n - 2)$. Write and solve an equation to find each value of x . Justify the steps in your solution. Then find the angle measures of each polygon. How can you check the reasonableness of your answers?



1.2 Solving Multi-Step Equations (continued)**2 EXPLORATION:** Writing a Multi-Step Equation

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner.

- a. Draw an irregular polygon.

- b. Measure the angles of the polygon. Record the measurements on a separate sheet of paper.

- c. Choose a value for x . Then, using this value, work backward to assign a variable expression to each angle measure, as in Exploration 1.

- d. Trade polygons with your partner.

- e. Solve an equation to find the angle measures of the polygon your partner drew. Do your answers seem reasonable? Explain.

Communicate Your Answer

3. How can you use multi-step equations to solve real-life problems?

4. In Exploration 1, you were given the formula for the sum S of the angle measures of a polygon with n sides. Explain why this formula works.

5. The sum of the angle measures of a polygon is 1080° . How many sides does the polygon have? Explain how you found your answer.

1.2**Practice**

For use after Lesson 1.2

Core Concepts**Solving Multi-Step Equations**

To solve a multi-step equation, simplify each side of the equation, if necessary. Then use inverse operations to isolate the variable.

Notes:**Worked-Out Examples****Example #1**

Solve the equation. Check your solution.

$$\begin{aligned}
 5 &= \frac{z}{-4} - 3 \\
 +3 &\quad +3 \\
 8 &= \frac{z}{-4} \\
 -4 \cdot 8 &= -4 \cdot \left(\frac{z}{-4}\right) \\
 -32 &= z
 \end{aligned}$$

$$\begin{aligned}
 \text{Check: } 5 &= \frac{z}{-4} - 3 \\
 5 &\stackrel{?}{=} \frac{-32}{-4} - 3 \\
 5 &\stackrel{?}{=} 8 - 3 \\
 5 &= 5 \checkmark \\
 \text{The solution is } z &= -32.
 \end{aligned}$$

Example #2

Solve the equation. Check your solution.

$$\begin{aligned}
 -2(4g - 3) &= 30 \\
 -2(4g) - 2(-3) &= 30 \\
 -8g + 6 &= 30 \\
 \frac{-6}{-8} &\quad \frac{-6}{-8} \\
 -8g &= 24 \\
 \frac{-8g}{-8} &= \frac{24}{-8} \\
 g &= -3
 \end{aligned}$$

$$\begin{aligned}
 \text{Check: } -2(4g - 3) &= 30 \\
 -2[4(-3) - 3] &\stackrel{?}{=} 30 \\
 -2(-12 - 3) &\stackrel{?}{=} 30 \\
 -2(-15) &\stackrel{?}{=} 30 \\
 30 &= 30 \checkmark \\
 \text{The solution is } g &= -3.
 \end{aligned}$$

1.2 Practice (continued)**Practice A**

In Exercises 1–14, solve the equation. Check your solution.

1. $3x + 4 = 19$

2. $5z - 13 = -3$

3. $17 = z - (-9)$

4. $15 = 2 + 4 - d$

5. $\frac{f}{4} - 5 = -9$

6. $\frac{q + (-5)}{3} = 8$

7. $5x + 3x = 28$

8. $5z - 2z - 4 = -7$

9. $12x + 4 + 2x = 39$

10. $9z - 5 - 4z = -5$

1.2 Practice (continued)

11. $3(z + 7) = 21$

12. $-4(z - 12) = 42$

13. $33 = 12r - 3(9 - r)$

14. $7 + 3(2g - 6) = -29$

15. You can represent an odd integer with the expression $2n + 1$, where n is any integer. Write and solve an equation to find three consecutive odd integers that have a sum of 63.

16. One angle of a triangle has a measure of 66° . The measure of the third angle is 57° more than $\frac{1}{2}$ the measure of the second angle. The sum of the angle measures of a triangle is 180° . What is the measure of the second angle? What is the measure of the third angle?

17. Your cousin is 8 years older than your brother. Three years ago, your cousin was twice as old as your brother. How old is your cousin now? How old is your brother now?

Practice B**In Exercises 1–6, solve the equation. Check your solution.**

1. $8 = \frac{t}{-3} + 4$

2. $\frac{p+5}{-2} = 9$

3. $3k + 2k = 60$

4. $-43 = 12 - 6p + p$

5. $28 = 8b + 13b - 35$

6. $-11j - 6 + 3j = -30$

7. A bill to landscape your yard is \$720. The materials cost \$375 and the labor is \$34.50 per hour. Write and solve an equation to find the number of hours of labor spent landscaping your yard.

In Exercises 8–11, solve the equation. Check your solution.

8. $12 - 5(3r + 2) = 17$

9. $3(x - 2) + 5(2 - x) = 16$

10. $3 = -1(v - 4) + 4(2v - 9)$

11. $6(q - 7) - 3(4 - q) = 0$

In Exercises 12–14, write and solve an equation to find the number.12. Seven plus the quotient of a number and 5 is -12 .

13. The difference of three times a number and half the number is 60.

14. Eight times the difference of a number and 3 is 40.

15. Justify each step of the solution.

$7 - 2(x - 10) = 15$	Write the equation.
$7 - 2(x) - 2(-10) = 15$	
$7 - 2x + 20 = 15$	
$-2x + 27 = 15$	
$-2x = -12$	
$x = 6$	

16. An odd integer can be represented by the expression $n + 2$, where n is any odd integer. Find three consecutive odd integers that have a sum of -51 .