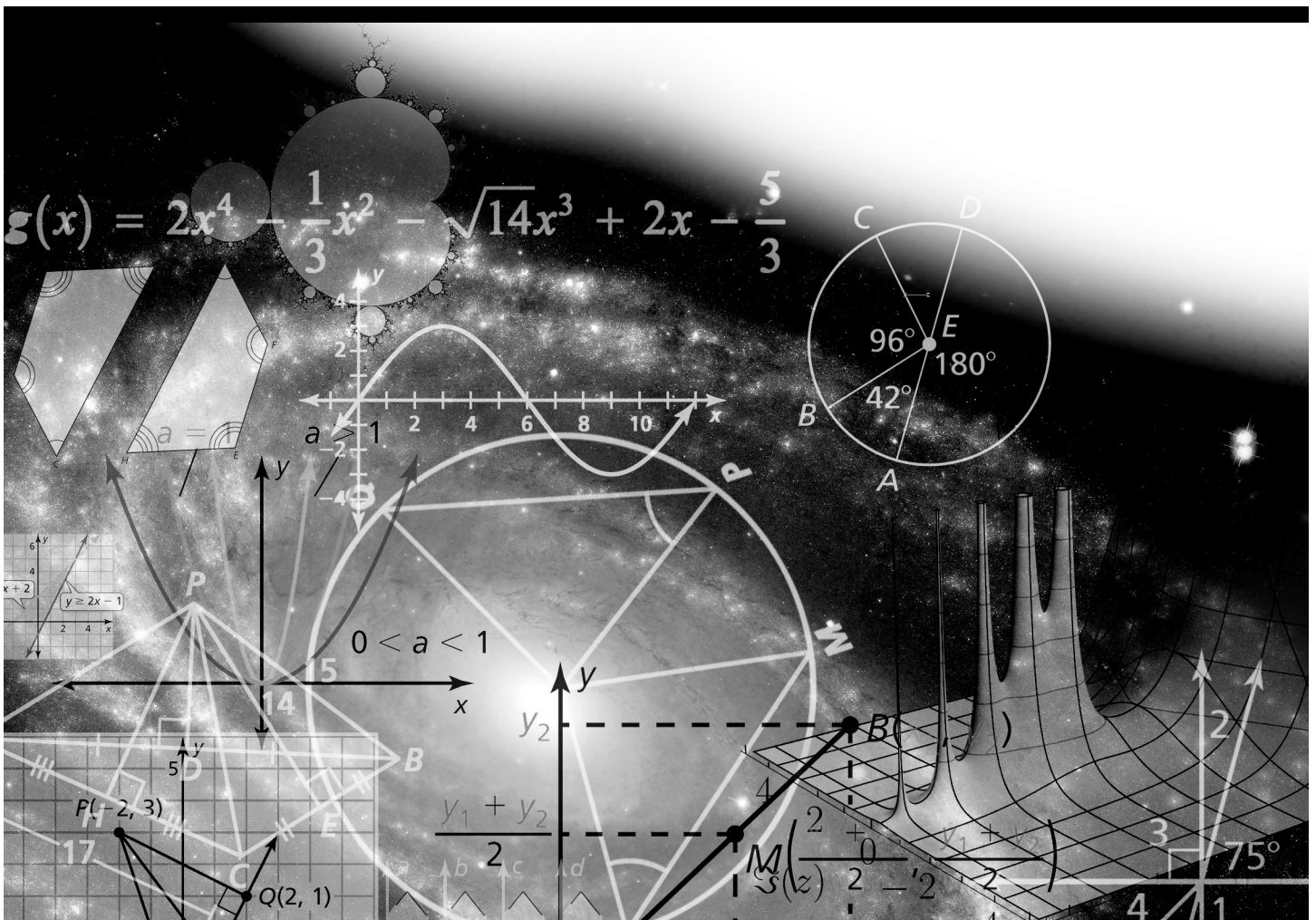


# CHAPTER 1

## Solving Linear Equations

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**Chapter****1****Maintaining Mathematical Proficiency****Add or subtract.**

1.  $-1 + (-3)$

2.  $0 + (-12)$

3.  $5 - (-2)$

4.  $-4 - 7$

5. Find two pairs of integers whose sum is  $-6$ .6. In a city, the record monthly high temperature for March is  $56^{\circ}\text{F}$ . The record monthly low temperature for March is  $-4^{\circ}\text{F}$ . What is the range of temperatures for the month of March?**Multiply or divide.**

7.  $-2(13)$

8.  $-8 \cdot (-5)$

9.  $\frac{14}{2}$

10.  $-30 \div (-3)$

11. Find two pairs of integers whose product is  $-20$ .

12. A football team loses 3 yards in 3 consecutive plays. What is the total yardage gained?

# 1.1

## Solving Simple Equations

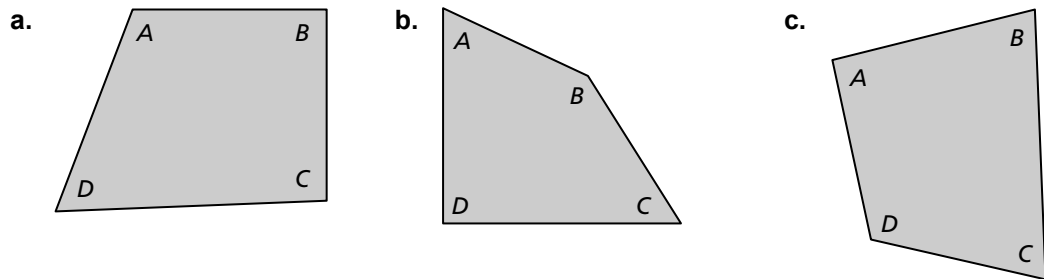
For use with Exploration 1.1

**Essential Question** How can you use simple equations to solve real-life problems?

### 1 EXPLORATION: Measuring Angles

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

**Work with a partner.** Use a protractor to measure the angles of each quadrilateral. Complete the table to organize your results. (The notation  $m\angle A$  denotes the measure of angle  $A$ .) How precise are your measurements?



Quadrilateral	$m\angle A$ (degrees)	$m\angle B$ (degrees)	$m\angle C$ (degrees)	$m\angle D$ (degrees)	$m\angle A + m\angle B + m\angle C + m\angle D$
a.					
b.					
c.					

### 2 EXPLORATION: Making a Conjecture

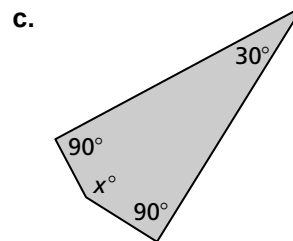
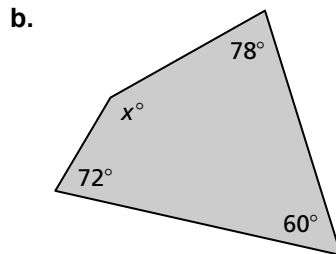
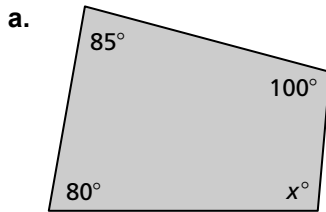
Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

**Work with a partner.** Use the completed table in Exploration 1 to write a conjecture about the sum of the angle measures of a quadrilateral. Draw three quadrilaterals that are different from those in Exploration 1 and use them to justify your conjecture.

**1.1 Solving Simple Equations (continued)****3 EXPLORATION: Applying Your Conjecture**

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

**Work with a partner.** Use the conjecture you wrote in Exploration 2 to write an equation for each quadrilateral. Then solve the equation to find the value of  $x$ . Use a protractor to check the reasonableness of your answer.

**Communicate Your Answer**

- How can you use simple equations to solve real-life problems?
- Draw your own quadrilateral and cut it out. Tear off the four corners of the quadrilateral and rearrange them to affirm the conjecture you wrote in Exploration 2. Explain how this affirms the conjecture.

**1.1****Practice**  
For use after Lesson 1.1**Core Concepts****Addition Property of Equality**

Let  $a$ ,  $b$ , and  $c$  be real numbers.

$$\text{If } a = b, \text{ then } a + c = b + c.$$

**Notes:**

**Subtraction Property of Equality**

Let  $a$ ,  $b$ , and  $c$  be real numbers.

$$\text{If } a = b, \text{ then } a - c = b - c.$$

**Notes:**

**Substitution Property of Equality**

Let  $a$ ,  $b$ , and  $c$  be real numbers.

If  $a = b$ , then  $a$  can be substituted for  $b$  (or  $b$  for  $a$ ) in any equation or expression.

**Notes:**

**Multiplication Property of Equality**

Let  $a$ ,  $b$ , and  $c$  be real numbers.

$$\text{If } a = b, \text{ then } a \cdot c = b \cdot c, c \neq 0.$$

**Notes:**

**Division Property of Equality**

Let  $a$ ,  $b$ , and  $c$  be real numbers.

$$\text{If } a = b, \text{ then } \frac{a}{c} = \frac{b}{c}, c \neq 0.$$

**Notes:**

**1.1 Practice (continued)****Four Step Approach to Problem Solving**

- 1. Understand the Problem** What is the unknown? What information is being given?  
What is being asked?
- 2. Make a Plan** This plan might involve one or more of the problem-solving strategies shown on the following page.
- 3. Solve the Problem** Carry out your plan. Check that each step is correct.
- 4. Look Back** Examine your solution. Check that your solution makes sense in the original statement of the problem.

**Notes:****Common Problem-Solving Strategies**

Use a verbal model.	Guess, check, and revise.
Draw a diagram.	Sketch a graph or number line.
Write an equation.	Make a table.
Look for a pattern.	Make a list.
Work backward.	Break the problem into parts.

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

**Solve the equation. Justify each step. Check your solution.**

$$t - (-5) = 9 \quad \text{Write the equation.}$$

$$t + 5 = 9 \quad \text{Rewrite subtraction.}$$

$$\begin{array}{r} -5 \\ -5 \\ \hline t = 4 \end{array} \quad \text{Subtract 5 from each side.}$$

$$t = 4 \quad \text{Simplify.}$$

**Check:**  $t - (-5) = 9$

$$4 - (-5) \stackrel{?}{=} 9$$

$$4 + 5 \stackrel{?}{=} 9$$

$$9 = 9 \checkmark$$

The solution is  $t = 4$ .

**1.1 Practice (continued)****Example #2**

Solve the equation. Check your solution.

$$\frac{3}{2} + t = \frac{1}{2}$$

$$\underline{-\frac{3}{2}} \quad \underline{-\frac{3}{2}}$$

$$t = -\frac{2}{2}, \text{ or } -1$$

**Check:**  $\frac{3}{2} + t = \frac{1}{2}$

$$\frac{3}{2} + \left(-\frac{2}{2}\right) \stackrel{?}{=} \frac{1}{2}$$

$$\frac{1}{2} = \frac{1}{2} \checkmark$$

The solution is  $t = -1$ .**Practice A**

In Exercises 1–9, solve the equation. Justify each step. Check your solution.

1.  $w + 4 = 16$

2.  $x + 7 = -12$

3.  $-15 + w = 6$

4.  $z - 5 = 8$

5.  $-2 = y - 9$

6.  $7q = 35$

7.  $4b = -52$

8.  $3 = \frac{q}{11}$

9.  $\frac{n}{-2} = -15$

10. A coupon subtracts \$17.95 from the price  $p$  of a pair of headphones. You pay \$71.80 for the headphones after using the coupon. Write and solve an equation to find the original price of the headphones.

11. After a party, you have  $\frac{2}{5}$  of the brownies you made left over. There are 16 brownies left. How many brownies did you make for the party?

## Practice B

In Exercises 1–6, solve the equation. Justify each step. Check your solution.

1.  $p + 7 = -9$

2.  $0 = k - 2$

3.  $-10 = w + 1$

4.  $g + (-3) = 4$

5.  $-14 = -9 + q$

6.  $s - (-12) = 15$

7. Shopping online, you find a skateboard that costs \$124.99, which is \$42.50 less than the price at a local store. Write and solve an equation to find the local price.

In Exercises 8–13, solve the equation. Justify each step. Check your solutions.

8.  $-32 = 4y$

9.  $r \div (-8) = 5$

10.  $\frac{k}{3} = 4$

11.  $\frac{z}{-2} = 7$

12.  $9 = b \div (-1)$

13.  $-100 = \frac{p}{10}$

In Exercises 14–19, solve the equation. Check your solution.

14.  $k - \frac{4}{7} = \frac{2}{7}$

15.  $-\frac{2}{9}d = 18$

16.  $h + \frac{\pi}{2} = \frac{3\pi}{2}$

17.  $5t = -7.5$

18.  $4 + 12 \div 2 = -5v$

19.  $a + 8 = 9 \times 3 - 10$

20. Describe and correct the error in solving the equation.

$\times$	$-\frac{2}{3}p = 4$
	$-\frac{2}{3}p + \frac{2}{3} = 4 + \frac{2}{3}$
	$p = 4\frac{2}{3}$

21. As  $c$  decreases, does the value of  $x$  *increase*, *decrease*, or *stay the same* for each equation? Assume  $c$  is positive.

Equation	Value of $x$
$x + c = 0$	
$-cx = -c$	
$\frac{x}{c} = 1$	

22. One-fifth of the plants in a garden are grape tomato plants. Two-ninths of the plants in the garden are cherry tomato plants. The garden has 18 grape tomato plants and 20 cherry tomato plants. How many other plants are in the garden? Explain.