

## To the Student

This *Study Guide and Intervention Workbook* gives you additional examples and problems for the concept exercises in each lesson. The exercises are designed to aid your study of mathematics by reinforcing important mathematical skills needed to succeed in the everyday world. The materials are organized by chapter and lesson, with one Study Guide and Intervention worksheet for every lesson in *IMPACT Mathematics, Course 1*.

Always keep your workbook handy. Along with your textbook, daily homework, and class notes, the completed Study Guide and Intervention Workbook can help you in reviewing for quizzes and tests.

## To the Teacher

These worksheets are the same ones found in the Chapter Resource Masters for *IMPACT Mathematics, Course 1*. The answers to these worksheets are available at the end of each Chapter Resource Masters Booklet.



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## Lesson 1.1 Study Guide and Intervention

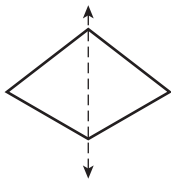
### Patterns in Geometry

#### Lines of Symmetry

If a figure can be folded in half so that the two halves match exactly, the figure has **line symmetry**. The line that separates the figure into two matching halves is a **line of symmetry**.

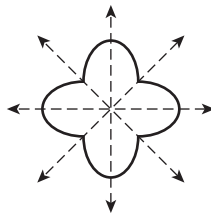
**Example** Draw all lines of symmetry for each figure.

1.



one line of symmetry

2.



four lines of symmetry

3.



no lines of symmetry

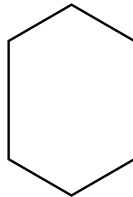
#### Exercises

Draw all lines of symmetry for each figure.

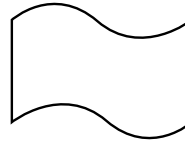
1.



2.



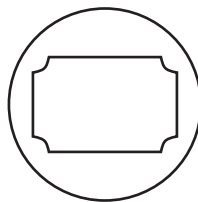
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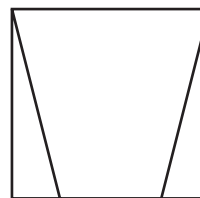
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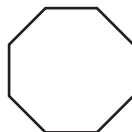
6.



7.



8.



9.





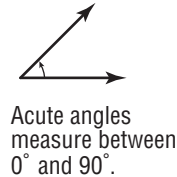
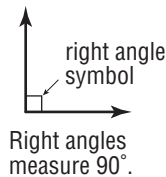
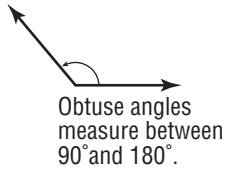
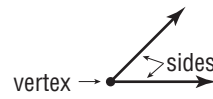
## Lesson 1.2 Study Guide and Intervention

### Angles

Angles have two rays for **sides** that share a common endpoint called the **vertex**.

Angles are measured in **degrees**.

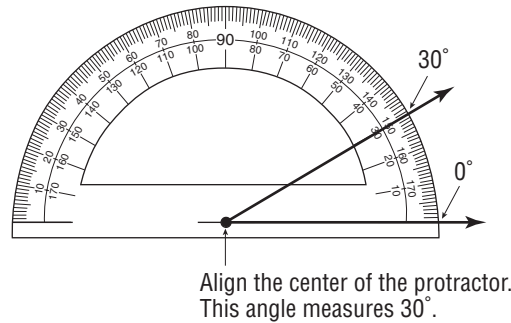
Angles can be classified according to their measure.



#### Example 1

Use a protractor to find the measure of the angle. Then classify the angle as *acute*, *obtuse*, *right*, or *straight*.

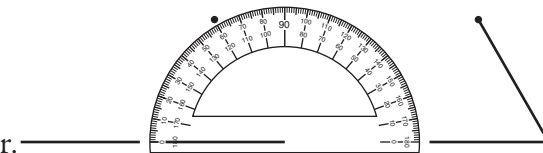
To measure an angle, place the center of a protractor on the vertex of the angle. Place the zero mark of the scale along one side of the angle. Then read the angle measure where the other side of the angle crosses the scale. The angle measures  $30^\circ$ . It is an acute angle.



#### Example 2

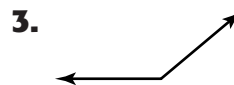
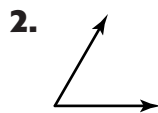
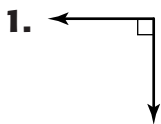
Use a protractor to draw an angle with a given measure.

To create a  $60^\circ$  angle, draw a line segment. Line up the reference line on the protractor with the line segment. Place the center of the protractor at one end of the line segment. This endpoint will be the angle's vertex. Draw a mark next to  $60^\circ$  label on the protractor. Remove the protractor. Draw a line from the vertex through the mark.



#### Exercises

Use a protractor to find the measure of each angle. Then classify each angle as *acute*, *obtuse*, *right*, or *straight*.



4. Draw a  $140^\circ$  angle. Include a curved angle mark to show which angle is  $140^\circ$ .

## Lesson 1.3 Study Guide and Intervention

### Measure Around

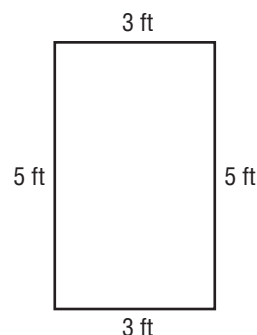
The distance around any closed figure is called its **perimeter**. To find the perimeter, add the measures of all the sides of the figure.

Finding Perimeter		
Figure	Words	Symbols
Rectangle	The perimeter $P$ of a rectangle is the sum of the lengths and widths. It is also two times the length $\ell$ plus two times the width $w$ .	$P = \ell + \ell + w + w$ $P = 2\ell + 2w$
Square	The perimeter $P$ of a square is four times the measure of any of its sides $s$ .	$P = 4s$

**Example 1** Find the perimeter of the rectangle.

**Estimate:**  $5 + 5 + 5 + 5 = 20$

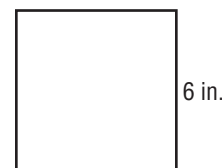
$P = 2\ell + 2w$  Write the formula.  
 $P = 2(5) + 2(3)$  Replace  $\ell$  with 5 and  $w$  with 3.  
 $P = 10 + 6$  Multiply.  
 $P = 16$  Add.



The perimeter of the rectangle is 16 feet. Compared to the estimate, the answer is reasonable.

**Example 2** Find the perimeter of the square.

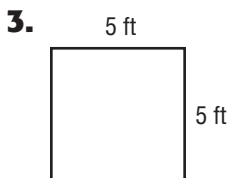
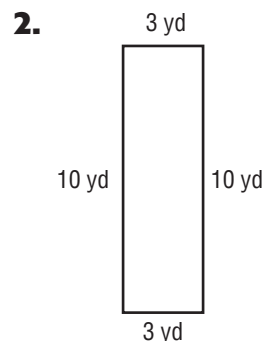
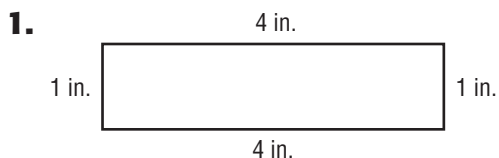
$P = 4s$  Write the formula.  
 $P = 4(6)$  Replace  $s$  with 6.  
 $P = 24$  Multiply.



The perimeter of the square is 24 inches.

### Exercises

Find the perimeter of each figure.



## Lesson 2.1 Study Guide and Intervention

### Patterns in Fractions

Fractions that name the same number are **equivalent fractions**. To find equivalent fractions, you can multiply or divide the numerator and denominator by the same nonzero number.

**Example 1** Find a fraction that is equivalent to  $\frac{5}{10}$ .

Solution: Divide both the numerator and denominator by 5

$$\frac{5 \div 5}{10 \div 5} = \frac{1}{2}$$

A fraction is in lowest terms if its numerator and denominator are relatively prime. Fractions can be grouped into families of equivalent fractions named for the member that is in lowest terms.

**Example 2**  $\frac{12}{30}$  is a member of which fraction family?

$$\frac{12}{30} = \frac{2}{5} \quad \text{Divide the numerator and denominator by 6.}$$

$$\frac{12}{30} \text{ is a member of the fraction family named } \frac{2}{5}.$$

### Exercises

Find a fraction equivalent to the given fraction in lowest terms.

1.  $\frac{5}{15}$

2.  $\frac{12}{18}$

3.  $\frac{27}{42}$

Name the fraction family to which each of the given fractions belongs.

4.  $\frac{6}{30}$

5.  $\frac{2}{3}$

6.  $\frac{6}{8}$

7.  $\frac{21}{28}$

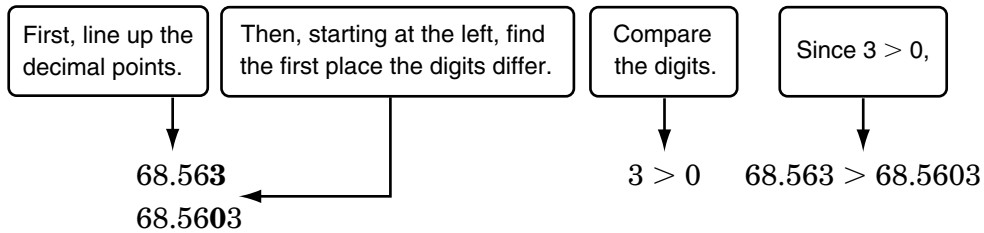
8.  $\frac{15}{30}$

9.  $\frac{7}{10}$

## Lesson 2.2 Study Guide and Intervention

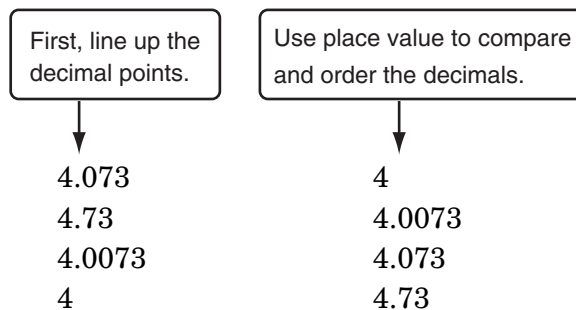
### Patterns in Decimals

**Example 1** Use  $>$  or  $<$  to compare 68.563 and 68.5603.



So, 68.563 is greater than 68.5603.

**Example 2** Order 4.073, 4.73, 4.0073, and 4 from least to greatest.



The order from least to greatest is 4, 4.0073, 4.073, and 4.73.

### Exercises

Use  $>$ ,  $<$ , or  $=$  to compare each pair of decimals.

1.  $4.08 \bigcirc 4.080$       2.  $0.001 \bigcirc 0.01$       3.  $23.659 \bigcirc 22.659$

4.  $50.031 \bigcirc 50.030$       5.  $7 \bigcirc 7.0001$       6.  $18.01 \bigcirc 18.010$

Order each set of decimals from least to greatest.

7. 0.006, 0.6, 0.060, 6

8. 456.73, 465.32, 456.37, 456.23

9. 3.01, 3.009, 3.09, 3.0001

10. 45.333, 45.303, 45.03, 45.003, 45.0003

## Lesson 2.3 Study Guide and Intervention

### Fraction and Decimal Equivalents

Fractions can be written as decimals by dividing the numerator by the denominator. If the division ends, or terminates, when the remainder is 0, it is a terminating decimal. If the decimal number repeats without end, it is a repeating decimal.

**Example 1** Write each decimal as a fraction. Simplify each fraction.

**a.**  $0.8 = \frac{8}{10} = \frac{2 \cdot 2 \cdot 2}{2 \cdot 5} = \frac{4}{5}$       **b.**  $12\frac{10}{25} = 12\frac{2 \cdot 5}{5 \cdot 5} = 12\frac{2}{5}$

**Example 2** Use your calculator to find a decimal for each fraction.

Tell whether each fraction is a terminating or repeating decimal.

**a.**  $\frac{7}{8} = 0.875$

**b.**  $\frac{4}{9}$

0.875 is a terminating decimal.

$0.4\overline{4}$  or  $0.\overline{4}$  is a repeating decimal.

#### Exercises

Write each fraction or mixed number as a decimal. Use a bar to show a repeating decimal.

1.  $\frac{7}{20}$

2.  $\frac{2}{11}$

3.  $\frac{5}{9}$

4.  $\frac{5}{6}$

5.  $\frac{6}{25}$

6.  $\frac{5}{20}$

7.  $8\frac{3}{5}$

8.  $3\frac{7}{25}$

9.  $\frac{4}{15}$

Write each decimal as a fraction. Simplify each fraction.

10. 1.2

11. 71.53

12. 24.6

13. 0.5

14. 103.7

15. 88.66

16. 101.1

17. 0.31

18. 9.4

Use your calculator to find a decimal approximation for each fraction.

Tell whether each fraction is a terminating or a repeating decimal.

19.  $\frac{9}{5}$

20.  $\frac{4}{7}$

21.  $\frac{5}{10}$

## Lesson 3.1 Study Guide and Intervention

### Number Sense

**Example 1**

Write as a repeated multiplication. Then write the product as a whole number.

$$7^5$$

The base is 7. It is a factor 5 times.

$$7^5 = 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7 = 16,807$$

**Example 2**

Write in exponential form. Then write as a whole number.

$$8 \cdot 8 \cdot 8$$

The base is 8. It is a factor 3 times.

$$8 \cdot 8 \cdot 8 = 8^3$$

**Example 3**

The number 800 can be written as the product  $8 \cdot 10 \cdot 10 = 8 \cdot 10^2$ . Write 9,000 in a similar way.

$$9,000 = 9 \cdot 10 \cdot 10 \cdot 10 = 9 \cdot 10^3$$

**Exercises**

Write each as a repeated multiplication. Then write the product as a whole number.

**1.**  $3^4$

**2.**  $9^2$

**3.**  $11^3$

**4.**  $1^7$

**5.**  $2^5$

**6.**  $4^1$

Write each in exponential form. Then write each product as a whole number.

**7.**  $6 \cdot 6 \cdot 6 \cdot 6$

**8.**  $9 \cdot 9$

**9.**  $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$

**10.**  $7 \cdot 7 \cdot 7$

**11.**  $5 \cdot 5 \cdot 5 \cdot 5 \cdot 5$

**12.**  $1 \cdot 1 \cdot 1 \cdot 1 \cdot 1$

Use Example 3 to rewrite each number.

**13.** 7,000

**14.** 80,000

**15.** 1,000,000


## Lesson 3.2 Study Guide and Intervention

### Patterns

A **sequence** is a list of numbers in a specific order that follows a pattern or rule.

**Example 1**

Describe the number pattern in the sequence 41, 37, 33, 29, ... . Then find the next two numbers in the sequence.


$$41, 37, 33, 29, \dots$$


$$- 4 \quad - 4 \quad - 4$$

In this sequence, 4 is subtracted from each number.  
The next two numbers are  $29 - 4$ , or 25, and  $25 - 4$ , or 21.

**Example 2**

Describe the number pattern in the sequence 243, 81, 27, 9, ... . Then find the next two numbers in the sequence.

$$243, 81, 27, 9, \dots$$


$$\div 3 \quad \div 3 \quad \div 3$$

In this sequence, each number is divided by 3.  
The next two numbers are  $9 \div 3$ , or 3, and  $3 \div 3$ , or 1.

**Exercises**

Describe the pattern in each number sequence. Then find the next two numbers in the sequence.

- |   |   |
|---|---|
| <b>1.</b> 72, 77, 82, 87, ...                               | <b>2.</b> 3, 6, 12, 24, ...   |
| <b>3.</b> 32, 29, 26, 23, ...                               | <b>4.</b> $14\frac{1}{2}$ , 14, $13\frac{1}{2}$ , 13, $12\frac{1}{2}$ , ... |
| <b>5.</b> $1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \dots$ | <b>6.</b> $3, 4\frac{1}{2}, 6, 7\frac{1}{2}, \dots$                         |

Find the missing number in each sequence.

- |                                  |  |
|----------------------------------|--|
| <b>7.</b> _____, 75, 50, 25, ... | <b>8.</b> $17\frac{1}{3}$ , $18\frac{2}{3}$ , 20, _____, $22\frac{2}{3}$ , ... |
|----------------------------------|--|

## Lesson 3.3 Study Guide and Intervention

### Variables and Rules

**Example 1** Algebra Write a rule for each table using the given letters to represent the variable.

**a.**

<b>w</b>	1	2	3	4
<b>g</b>	3	6	9	12

$$g = 3 \cdot 1 = 3$$

$$g = 3 \cdot 2 = 6$$

$$g = 3 \cdot 3 = 9$$

$$g = 3 \cdot 4 = 12$$

$$g = 3w$$

**b.**

<b>x</b>	2	4	6	8
<b>z</b>	5	9	13	17

$$z = 2 \cdot 2 + 1 = 5$$

$$z = 2 \cdot 4 + 1 = 9$$

$$z = 2 \cdot 6 + 1 = 13$$

$$z = 2 \cdot 8 + 1 = 17$$

$$z = 2x + 1$$

**Example 2** Algebra Evaluate each expression when  $a = 2$  and  $c = 5$ .

**a.**  $4a + 5$

$$4a + 5 = 4 \cdot 2 + 5 \quad \text{Replace } a \text{ with } 2.$$

$$= 8 + 5 \quad \text{Multiply.}$$

$$= 13 \quad \text{Add.}$$

**b.**  $3(c + 2)$

$$3(c + 2) = 3(5 + 2) \quad \text{Replace } c \text{ with } 5.$$

$$= 3 \cdot 7 \quad \text{Evaluate } ( ).$$

$$= 21 \quad \text{Multiply.}$$

### Exercises

Write a rule for each table using the given letters to represent the variable.

**1.**

<b>m</b>	3	5	7	9
<b>n</b>	8	10	12	14

**2.**

<b>p</b>	1	2	3	4
<b>q</b>	6	10	14	18

Evaluate each expression when  $n = 3$ ,  $p = 4$ , and  $q = 5$ .

**3.**  $5n - 3$

**4.**  $1 + 2p$

**5.**  $3(q + 1)$

**6.**  $p + p + p + 2$

**7.**  $9 - n$

**8.**  $p \div 2$

Translate each phrase into an algebraic expression.

**9.** eight inches taller than Mycala's height

**10.** twelve more than four times a number



## Lesson 3.4 Study Guide and Intervention

### Apply Properties

Property	Explanations	Example
Commutative Property of Addition	$a + b = b + a$	$6 + 3 = 3 + 6$ $9 = 9$
Commutative Property of Multiplication	$a \cdot b = b \cdot a$	$4 \cdot 5 = 5 \cdot 4$ $20 = 20$
Associative Property of Addition	$(a + b) + c =$ $a + (b + c)$	$(3 + 4) + 7 = 3 + (4 + 7)$ $14 = 14$
Associative Property of Multiplication	$(a \cdot b) \cdot c =$ $a \cdot (b \cdot c)$	$(2 \cdot 5) \cdot 8 = 2 \cdot (5 \cdot 8)$ $80 = 80$
Distributive Property of Multiplication over Addition	$a(b + c) =$ $a \cdot b + a \cdot c$	$2(5 + 3) = 2 \cdot 5 + 2 \cdot 3$ $2(8) = 10 + 6$ $16 = 16$
Distributive Property of Multiplication over Subtraction	$a(b - c) =$ $ab - ac$	$4(6 - 2) = 4 \cdot 6 - 4 \cdot 2$ $4(4) = 24 - 8$ $16 = 16$

**Example 1** Name the property shown:  $5 \cdot 7 = 7 \cdot 5$ .

Suppose  $a = 5$  and  $b = 7$ .

$$a \cdot b = b \cdot a$$

$$5 \cdot 7 = 7 \cdot 5$$

$$35 = 35$$

#### Exercises

Name the property shown by each statement.

1.  $75 + 25 = 25 + 75$

2.  $2 \cdot (3 \cdot 4) = (2 \cdot 3) \cdot 4$

3.  $5(7 - 3) = 5 \cdot 7 - 5 \cdot 3$

4.  $2(8 + 1) = 2 \cdot 8 + 2 \cdot 1$

5.  $6 + (5 + m) = (6 + 5) + m$

6.  $2 \cdot 6 = 6 \cdot 2$

7.  $(5 \cdot 9) \cdot 2 = 2 \cdot (5 \cdot 9)$

8.  $(9 + 3) \cdot 4 = 9 \cdot 4 + 3 \cdot 4$

## Lesson 4.1 Study Guide and Intervention

### Add and Subtract Fractions

Fractions with the same denominator are called **like fractions**.

- To add like fractions, add the numerators. Use the same denominator in the sum.
- To subtract like fractions, subtract the numerators. Use the same denominator in the difference.

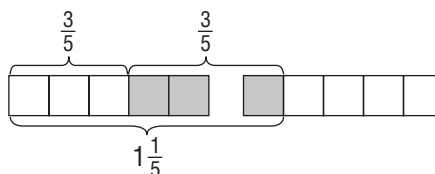
**Example 1** Find the sum of  $\frac{3}{5}$  and  $\frac{3}{5}$ .

**Estimate**  $\frac{1}{2} + \frac{1}{2} = 1$

$$\frac{3}{5} + \frac{3}{5} = \frac{3+3}{5} \quad \text{Add the numerators.}$$

$$= \frac{6}{5} \quad \text{Simplify.}$$

$$= 1\frac{1}{5} \quad \text{Write the improper fraction as a mixed number.}$$



Compared to the estimate, the answer is reasonable.

**Example 2** Find the difference of  $4\frac{1}{2} - 3\frac{1}{4}$ .

**Estimate**  $4\frac{1}{2} - 3\frac{1}{2} = 1$

$$4\frac{1}{2} - 3\frac{1}{4} = \frac{9}{2} - \frac{13}{4} \quad \text{Rewrite as improper fractions.}$$

$$= \frac{18}{4} - \frac{13}{4} \quad \text{Create common denominators.}$$

$$= \frac{18-13}{4} \quad \text{Subtract the numerators.}$$

$$= \frac{5}{4} \quad \text{Simplify.}$$

$$= 1\frac{1}{4} \quad \text{Write the improper fraction as a mixed number.}$$

#### Exercises

Add or subtract. Write in simplest form.

1.  $\frac{1}{9} + \frac{4}{9}$

2.  $\frac{9}{11} - \frac{7}{11}$

3.  $\frac{9}{10} + \frac{5}{10}$

4.  $\frac{11}{12} - \frac{9}{12}$

5.  $\frac{1}{2} - \frac{1}{3}$

6.  $\frac{7}{8} + \frac{3}{4}$

7.  $\frac{5}{4} - \frac{1}{2}$

8.  $\frac{2}{7} + \frac{5}{6}$

9.  $2\frac{1}{5} + 3\frac{2}{5}$

10.  $3\frac{5}{14} - \frac{1}{7}$

11.  $7\frac{3}{8} + 2\frac{1}{4}$

12.  $6\frac{3}{5} - 2\frac{1}{3}$

**Lesson 4.2 Study Guide and Intervention****Multiply and Divide Fractions****Example 1**Find  $\frac{2}{5} \times \frac{3}{8}$ . Estimate:  $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ 

$$\begin{aligned}\frac{2}{5} \times \frac{3}{8} &= \frac{\cancel{2}^1 \times 3}{5 \times \cancel{8}_4} \\ &= \frac{3}{20}\end{aligned}$$

Divide both the numerator and denominator by the common factor, 2.

Simplify. Compare to the estimate.

**Example 2**Find  $2\frac{1}{4} \times 1\frac{2}{3}$ . Estimate:  $2 \times 2 = 4$ .

$$2\frac{1}{4} \times 1\frac{2}{3} = \frac{9}{4} \times \frac{5}{3}$$

Write mixed numbers as improper fractions.

$$= \frac{\cancel{9}^3 \times 5}{4 \times \cancel{3}_1}$$

Divide the numerator and denominator by their common factor, 3.

$$= \frac{15}{4} \text{ or } 3\frac{3}{4}$$

Simplify. Compare to the estimate.

You can use reciprocals to divide fractions. To divide by a fraction, multiply by its reciprocal.

**Example 3**Find  $\frac{2}{3} \div \frac{4}{5}$ .

$$\frac{2}{3} \div \frac{4}{5} = \frac{2}{3} \times \frac{5}{4}$$

Multiply by the reciprocal,  $\frac{5}{4}$ .

$$= \frac{2 \times 5}{3 \times \cancel{4}_2}$$

Divide 2 and 4 by the GCF, 2.

$$= \frac{5}{6}$$

Multiply numerators and denominators.

**Exercises****Multiply or divide. Write in simplest form.**

1.  $\frac{1}{4} \times \frac{5}{6}$

2.  $\frac{3}{7} \times \frac{3}{4}$

3.  $4 \times \frac{1}{5}$

4.  $\frac{5}{12} \times 2$

5.  $9 \times \frac{1}{16}$

6.  $2\frac{4}{9} \times \frac{4}{11}$

7.  $2\frac{1}{2} \times 1\frac{1}{3}$

8.  $1\frac{1}{4} \times \frac{3}{5}$

9.  $\frac{4}{5} \div 2$

10.  $\frac{4}{5} \div \frac{1}{10}$

11.  $\frac{5}{12} \div \frac{5}{6}$

12.  $\frac{9}{10} \div 3$

## Lesson 4.3 Study Guide and Intervention

### Multiply and Divide Decimals

**Example 1** Find  $5.2 \times 6.13$ .

**Estimate:**  $5 \times 6$  or 30

$$\begin{array}{r}
 5.2 \leftarrow \text{one decimal place} \\
 \times 6.13 \leftarrow \text{two decimal places} \\
 \hline
 156 \\
 52 \\
 \hline
 312 \\
 \hline
 31.876 \leftarrow \text{three decimal places}
 \end{array}$$

The product is 31.876. Compared to the estimate, the product is reasonable.

**Example 2** Find  $4.09 \div 0.02$ .

$$\begin{array}{r}
 0.02 \overline{)4.00} \longrightarrow 2 \overline{)409.0} \\
 \underline{-4} \\
 00 \\
 \underline{-0} \\
 09 \\
 \underline{-8} \\
 10 \\
 \underline{-10} \\
 0
 \end{array}$$

Place the decimal point.  
Divide.

Write a zero, in the dividend  
and continue to divide.

$4.09 \div 0.02$  is 204.5.

Check:  $204.5 \times 0.02 = 4.09$  ✓

#### Exercises

**Multiply.**

**1.**  $7.2 \cdot 2.1$

**2.**  $4.3 \cdot 8.5$

**3.**  $2.64 \cdot 1.4$

**4.**  $14.23 \cdot 8.21$

**5.**  $5.01 \cdot 11.6$

**6.**  $9.001 \cdot 4.2$

**Divide.**

**7.**  $4 \overline{)9.2}$

**8.**  $5 \overline{)4.5}$

**9.**  $8.6 \div 2$

**10.**  $2.89 \div 4$

**11.**  $2.1 \overline{)4.41}$

**12.**  $0.72 \overline{)16.848}$

**13.**  $0.5 \div 0.001$

**14.**  $9.594 \div 0.06$

## Lesson 4.4 Study Guide and Intervention

### What Is Typical

#### Median, Mode, and Range

The **median** is the middle number of the data put in order, or the mean of the middle two numbers. The **mode** is the number or numbers that occur most often.

**Example 1** The table shows the costs of seven different books. Find the mean, median, and mode of the data.

$$\text{mean: } \frac{22 + 13 + 11 + 16 + 14 + 13 + 16}{7} = \frac{105}{7} \text{ or } 15$$

Book Costs (\$)			
22	13	11	16
14	13	16	

To find the median, write the data in order from least to greatest.

median: 11, 13, 13, 14, 16, 16, 22

To find the mode, find the number or numbers that occur most often.

mode: 11, 13, 13, 14, 16, 16, 22

The mean is \$15. The median is \$14. There are two modes, \$13 and \$16.

Whereas the measures of central tendency describe the average of a set of data, the **range** of a set of data describes how the data vary.

**Example 2** Find the range of the data in the table. Then write a sentence describing how the data vary.

Temperature (°F)		
40	32	55
60	63	50

The greatest value is 63. The least value is 32. So, the range is  $63^\circ - 32^\circ$  or  $31^\circ$ . The range is large. It tells us that the data vary greatly in value.

#### Exercises

Find the mean, median, mode, and range of each set of data.

1. 14, 13, 14, 16, 8

2. 29, 31, 14, 21, 31, 22, 20

3.

Quiz Scores		
72	60	80
68	72	86

4.

Snowfall (in.)			
2	6	5	4
3	0	1	

## Lesson 5.1 Study Guide and Intervention

### Ratios and Rates

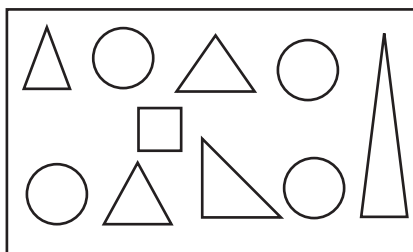
A **ratio** is a comparison of two numbers by division. A common way to express a ratio is as a fraction in simplest form. Ratios can also be written in other ways.

For example, the ratio  $\frac{2}{3}$  can be written as 2 to 3, two to three, or 2:3.

**Example 1** Write the ratio that compares the number of circles to the number of triangles.

circles  $\rightarrow$   $\frac{4}{5}$       The fraction is in lowest terms.  
triangles  $\rightarrow$

So, the ratio of circles to triangles is  $\frac{4}{5}$ , 4 to 5, or 4:5.  
For every 4 circles, there are 5 triangles.



A **rate** is a ratio of two measurements having different kinds of units. In a **unit rate**, one quantity is compared to one unit of another quantity. To find a unit rate, you scale your ratio until the denominator is one.

**Example 2** Write the ratio 20 students to 5 computers as a unit rate.

$$\frac{20 \text{ students}}{5 \text{ computers}} \xrightarrow{\div 5} \frac{4 \text{ students}}{1 \text{ computer}}$$

Divide the numerator and the denominator by 5 to get a denominator of 1.

The ratio written as a unit rate is 4 students to 1 computer, or 4 students per computer.

#### Exercises

Write each ratio as a fraction in simplest form.

1. 2 guppies out of 6 fish

2. 12 puppies to 15 kittens

3. 5 boys out of 10 students

Write each ratio as a unit rate.

4. 6 eggs for 3 people

5. \$12 for 4 pounds

6. 40 pages in 8 days

## Lesson 5.2 Study Guide and Intervention

### Proportions

In a proportional relationship, all pairs of corresponding values are in the same ratio. You can create a table to find the missing value.

**Example 1** Peter rented mountain bikes at BigDrop Mountain.

He paid \$32 for 4 hours of riding. He used the mountain bike for 7 hours. The rental cost is proportional to time. What will be his rental charge?

Create a table. 4 hours will cost \$32

<b>Cost in dollars</b>	8	16	32	x	x
<b>Time in hours</b>	1	2	4	x	7

Complete the table to find the answer.

<b>Cost in dollars</b>	8	16	32	48	56
<b>Time in hours</b>	1	2	4	6	7

The rental cost is \$56 for 7 hours.

Calculating the unit rate can also be used to solve a proportion.

**Example 2** A bathroom measuring 5 feet by 7 feet is being tiled with a 6 in. × 6 in. tile. How many tiles are needed to cover the floor?

Convert square inches to square feet.  $\frac{6in. \times 6in.}{12in. \times 12in.} = 0.25ft^2$       Unit rate.  $\frac{0.25ft^2}{1tile}$

Set up a proportion.  $\frac{0.25ft^2}{1tile} = \frac{35ft^2}{x}$       Solve.  $\frac{0.25ft^2}{1tile} \times \frac{140}{140} = \frac{35ft^2}{140tiles}$

It will take 140 tiles to cover the floor.

### Exercises

Create a table to find the answer.

- A grocery store charges \$2 per pound of trail mix. Antoine was charged \$7 for the trail mix he bought. How many pounds of trail mix did he buy?
- Brooke paid \$16 to rent roller blades for 4 hours. She used the skates for 6 hours. The rental cost is proportional to time. What will be her rental charge?

Use the unit rate to solve the proportion.

- A catalog sells reading award certificates for \$1.25 each. Mr. Heath has \$30 to spend on the certificates. How many certificates can he order?
- The price of Crunchy Muncheroo Cereal is \$3.60 for a 20-ounce box. The price is proportional to the number of ounces in the box. What is the price of a 32-ounce box?

## Lesson 5.3 Study Guide and Intervention

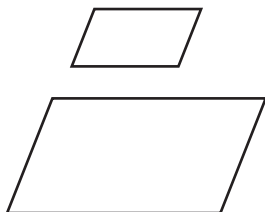
### Similarity and Congruence

#### Similar and Congruent Figures

Figures that have the same shape but not necessarily the same size are **similar figures**. Figures that have the same size and shape are **congruent figures**.

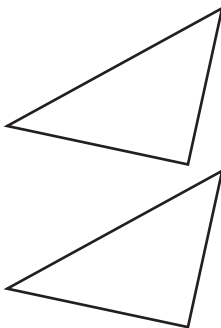
**Examples** Tell whether each pair of figures is *similar*, *congruent*, or *neither*.

1.



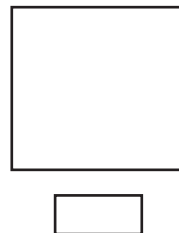
The parallelograms have the same shape but not the same size, so they are similar.

2.



The triangles have the same shape and size, so they are congruent.

3.

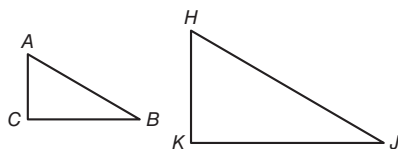


The rectangles are neither the same size nor the same shape, so they are neither congruent nor similar.

Similar figures have **corresponding parts**. Corresponding parts of two similar figures are located in the same place in each figure.

**Example**

The figures in the pair are similar. Identify all pairs of corresponding sides and all pairs of corresponding angles.

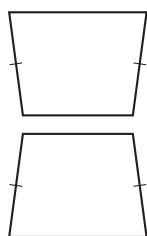


Corresponding Sides:  
 $AC$  and  $HK$ ,  $AB$  and  $HJ$ ,  $CB$  and  $KJ$   
 Corresponding angles:  $A$  and  $H$ ,  $B$  and  $J$ ,  $C$  and  $K$

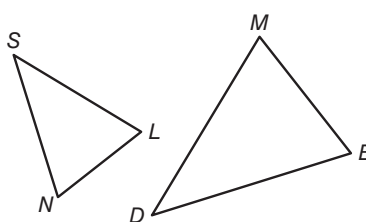
**Exercises**

Tell whether each pair of figures is *congruent*, *similar*, or *neither*.

1.



2.



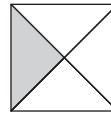


## Lesson 6.1 Study Guide and Intervention

### Use Percents

#### Example 1

Estimate the percent of each square that is shaded. Describe how you made your estimate.

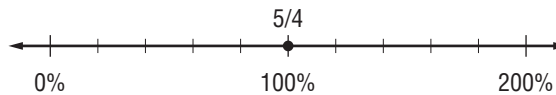


25%; The diagonals of a square divide it into four congruent triangles.

#### Example 2

Write  $\frac{5}{4}$  as a percent.

Solution: Show the location of  $\frac{5}{4}$  on a number line.



Use a benchmark to write the fraction as a percent.

So,  $\frac{5}{4} = 125\%$ .

#### Example 3

Write 15% as a fraction in simplest form.

15% means 15 out of 100.

$$\frac{15}{100} = \frac{3 \times 5}{20 \times 5}$$

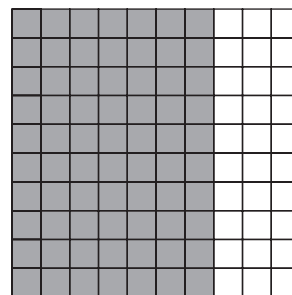
$$= \frac{3}{20}$$

Write the percent as a fraction with a denominator of 100.

Simplify. Divide the numerator and denominator by the GCF 5.

#### Exercises

- Estimate the percent of the square that is shaded. Describe how you made your estimate.



Write each percent as a fraction in simplest form.

2. 20%

3. 35%

4. 225%

Write each fraction as a percent.

5.  $\frac{3}{10}$

6.  $\frac{8}{5}$

7.  $\frac{10}{8}$

## Lesson 6.2 Study Guide and Intervention

### A Percent of a Quantity

**Example 1** Find 70% of 40.

**Method 1** Write the percent as a fraction.

$$70\% = \frac{70}{100} \text{ or } \frac{7}{10}$$

$$\frac{7}{10} \text{ of } 40 = \frac{7}{10} \times 40 \text{ or } 28$$

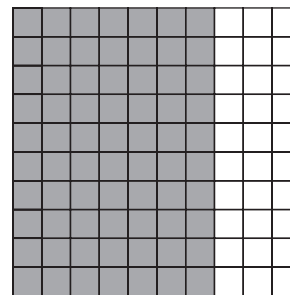
So, 70% of 40 is 28.

Use a model to check the answer. The model confirms that 70% of 40 is 28.

**Method 2** Write the percent as a decimal.

$$70\% = \frac{7}{100} \text{ or } 0.7$$

$$0.7 \text{ of } 40 = 0.7 \times 40 \text{ or } 28$$



**Example 2** Find 120% of 25.

**Method 1** Write the percent as a fraction.

$$120\% = \frac{120}{100} \text{ or } \frac{6}{5}$$

$$\frac{6}{5} \text{ of } 25 = \frac{6}{5} \times 25 \text{ or } 30$$

So, 120% of 25 is 30.

**Method 2** Write the percent as a decimal.

$$120\% = \frac{120}{100} \text{ or } 1.2$$

$$1.2 \text{ of } 25 = 1.2 \times 25 \text{ or } 30$$

### Exercises

Find the percent of each number.

1. 10% of 120

2. 60% of 25

3. 75% of 24

4. 90% of 40

5. 120% of 20

6. 150% of 2

7. 15% of 40

8. 30% of 70

9. 150% of 6

10. 165% of 20

11. 8% of 15

12. 6% of 6

## Lesson 6.3 Study Guide and Intervention

### Percents and Wholes

**Example 1** \_\_\_\_\_ % of 40 is 8

$8 \div 40 = \underline{\hspace{2cm}}$  % Rewrite the sentence as a division sentence.

$0.20 = \underline{\hspace{2cm}}$  % Divide to find the answer. Express the answer in hundredths.

$0.20 \cdot 100 = 20\%$  Change the answer to a percent.

So, 20% of 40 is 8.

**Example 2** 55% of \_\_\_\_\_ = 99

$0.55 \underline{\hspace{2cm}} = 99$  Rewrite the sentence as a multiplication sentence.

$99 \div 0.55 = \underline{\hspace{2cm}}$  Write the equivalent division problem.

$99 \div 0.55 = \underline{\hspace{2cm}}$  Divide to find the answer.

So, 55% of 180 = 99

### Exercises

Fill in each blank. Show your work.

1. \_\_\_\_\_ % of 18 = 9      2. \_\_\_\_\_ % of 50 = 7      3. \_\_\_\_\_ % of 75 = 7.5

4. \_\_\_\_\_ % of 120 = 90      5. \_\_\_\_\_ % of 80 = 16      6. \_\_\_\_\_ % of 78 = 62.4

7. 45% of \_\_\_\_\_ = 27      8. 30% of \_\_\_\_\_ = 12      9. 60% of \_\_\_\_\_ = 84

10. 71% of \_\_\_\_\_ = 142      11. 95% of \_\_\_\_\_ = 114      12. 76% of \_\_\_\_\_ = 38

## Lesson 7.1 Study Guide and Intervention

### Squares

#### Area of Rectangles and Squares

The **area** of a figure is the number of square units needed to cover a surface. You can use a formula to find the area of a rectangle. The formula for finding the area of a rectangle is  $A = l \times w$ . In this formula,  $A$  represents area,  $l$  represents the length of the rectangle, and  $w$  represents the width of the rectangle.

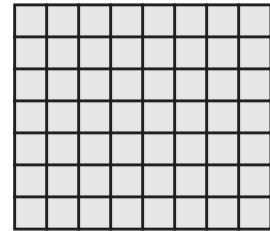
**Example 1** Find the area of a rectangle with length 8 feet and width 7 feet.

$$A = l \times w \quad \text{Area of a rectangle}$$

$$A = 8 \times 7 \quad \text{Replace } l \text{ with 8 and } w \text{ with 7.}$$

$$A = 56$$

The area is 56 square feet.



**Example 2** Find the area of a square with sides that are 11 inches in length.

$$A = l \times w \quad \text{Area of a square}$$

$$A = 11 \times 11 \quad \text{Substitute 11 for both } l \text{ and } w$$

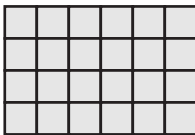
$$A = 121$$

The area is 121 square inches.

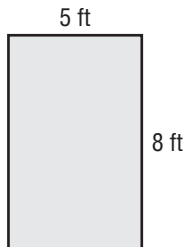
#### Exercises

Find the area of each rectangle.

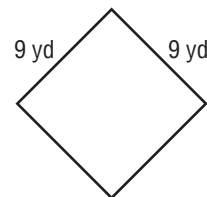
1.



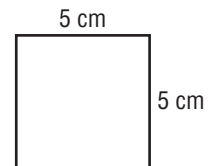
2.



3.



4.

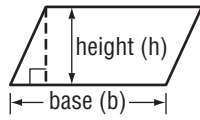


- What is the area of a rectangle with a length of 10 meters and a width of 7 meters?
- What is the area of a square with a side length of 11 inches?

## Lesson 7.2 Study Guide and Intervention

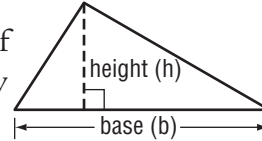
### Calculate Areas

The area of any parallelogram is the product of any base  $b$  and its height  $h$ .



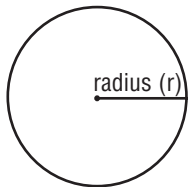
Formula:  $A = b \cdot h$

The area of any triangle is one-half the product of any base  $b$  and its height  $h$ .



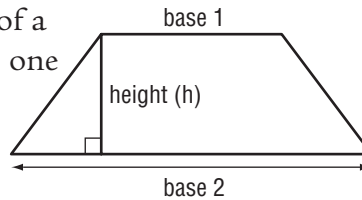
Formula:  $A = \frac{1}{2} b \cdot h$

The area of a circle is the product of  $\pi$  and the square of the radius  $r$ .



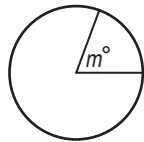
Formula:  $A = \pi \cdot r^2$

The area  $A$  of a trapezoid is one-half the product of the height and the sum of the two bases.



Formula:  $A = \frac{1}{2} h \cdot (\text{base 1} + \text{base 2})$

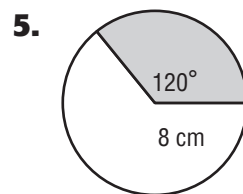
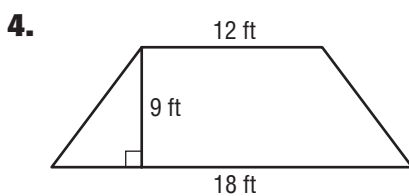
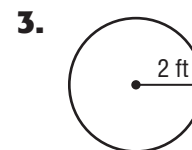
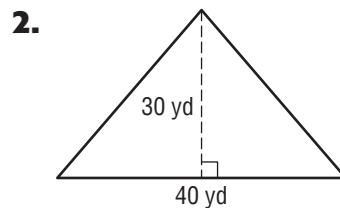
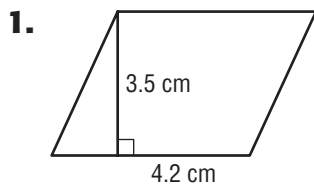
The area of a circle sector is the product of  $\pi$  and the square of the radius  $r$ .



Formula:  $A = \frac{m}{360} \cdot \pi \cdot r^2$

### Exercises

Find the area of each figure to the nearest tenth. For the circles, also give the exact answer in terms of  $\pi$ .



## Lesson 7.3 Study Guide and Intervention

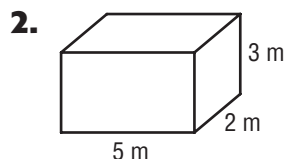
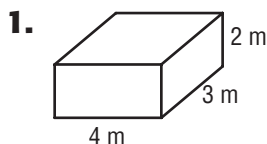
### Surface Area and Volume

The **surface area** of a three-dimensional object is the area of the region covering the object's surface. Surface area is measured in square units. The **volume** of a rectangular prism is the space inside the object measured in cubic units. The volume of a rectangular prism can be found using the formulas below.

$$\text{Volume} = h \cdot (l \cdot w) \quad \text{or} \quad \text{Volume} = h \cdot (A)$$

In these formulas,  $h$  represents height,  $l$  represents length,  $w$  represents the width and  $A$  represents the area of the base..

**Examples** Each cube in a block structure measures one unit on a side.



**Area** is the sum of the areas of the six faces.

Area of each face = length · width

$$\text{Surface area} = 8\text{m}^2 + 8\text{m}^2 + 6\text{m}^2 + 6\text{m}^2 + 12\text{m}^2 + 12\text{m}^2$$

$$\text{Surface Area} = 52\text{m}^2$$

$$\text{Volume} = h(l \cdot w)$$

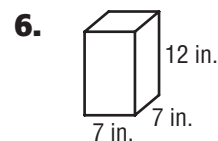
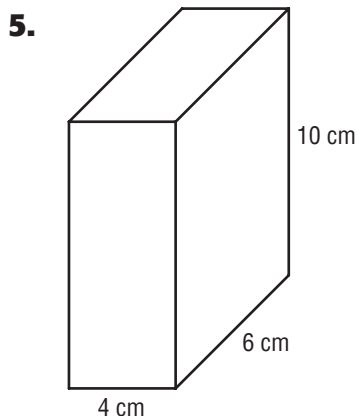
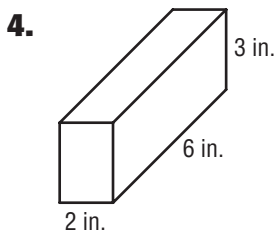
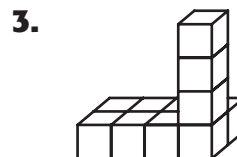
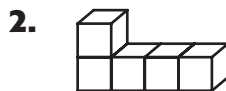
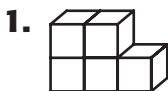
$$\text{Volume} = 3(5 \cdot 2)$$

Substitute values for  $l$ ,  $w$  and  $h$ .

$$\text{Volume} = 3(10)$$

$$\text{Volume} = 30\text{m}^3$$

**Exercises** Find the surface area and volume of each figure.



## Lesson 7.4 Study Guide and Intervention

### Capacity

**Capacity** is the amount of liquid a container can hold. Metric capacity is usually expressed in liters or milliliters (thousandths of a liter).

$$1 \text{ liter} = 1,000 \text{ mL}$$

$$1 \text{ cm}^3 = 1 \text{ mL}$$

**Example 1** Find the equivalent metric measurement in milliliters.

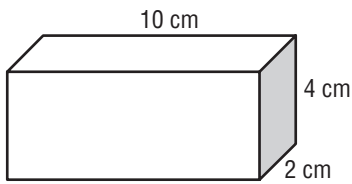
How many milliliters are in 3.5 liters?

The milliliter measurement can be found using a ratio table.

<b>liters</b>	1	2	3	3.5	4
<b>milliliters</b>	1000	2000	3000	3500	4000

There are 3,500 milliliters in 3.5 liters.

**Example 2** Find the capacity of the rectangular prism.



$$\text{Volume} = \text{length} \cdot \text{width} \cdot \text{height}$$

$$\text{Volume} = 10 \text{ cm} \cdot 2 \text{ cm} \cdot 4 \text{ cm}$$

$$\text{Volume} = 80 \text{ cm}^3$$

$$1 \text{ cm}^3 = 1 \text{ mL}$$

$$80 \text{ cm}^3 = 80 \text{ mL}$$

The capacity is 80 mL.

**Example 3** Find the equivalent customary measurement.

How many quarts are in 20 cups?

Cups to pints

$$2 \text{ cups} = 1 \text{ pint}$$

$$20 \text{ cups} = 10 \text{ pints}$$

Pints to Quarts

$$2 \text{ pints} = 1 \text{ quart}$$

$$10 \text{ pints} = 5 \text{ quarts}$$

Answer

$$5 \text{ quarts} = 20 \text{ cups}$$

### Exercises

Find the equivalent measurement.

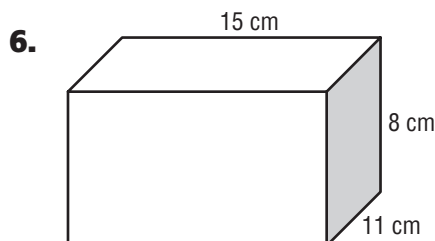
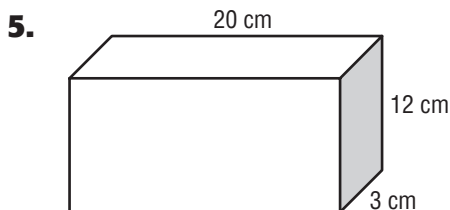
1. 6 liters = \_\_\_\_\_ mL

2. 4,600 mL = \_\_\_\_\_ L

3. 8 cups = \_\_\_\_\_ pints

4. 12 quarts = \_\_\_\_\_ cups

Find the capacity of the rectangular prism.

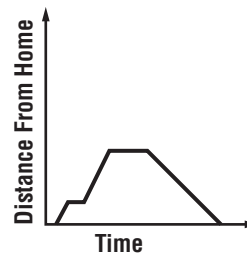


# Lesson 8.1 Study Guide and Intervention

## Interpret Graphs

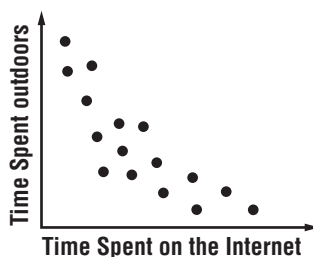
### Coordinate Plane

**Example 1** Rhondall went on a bicycle ride. The graph shows how far from home he was at various times during the day. Create a story about his trip which fits the graph.



Solution: Rhondall left home traveling at a brisk pace and then takes a short break. After resting, he continues his trip at a similar pace, but he rides for a longer period of time. He again takes a break, somewhat longer than before, and heads home, riding at a pace somewhat slower than the first part of his trip.

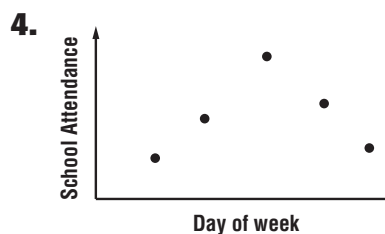
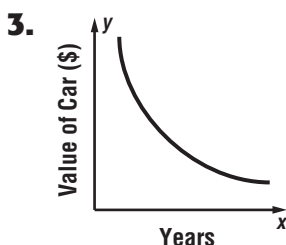
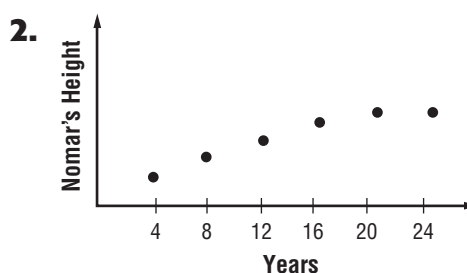
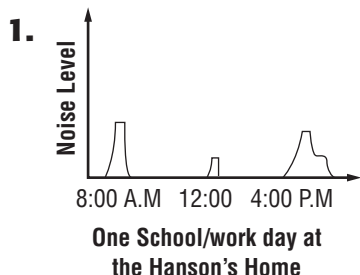
**Example 2** Misty surveyed her classmates to see how much time they each spent on the Internet and on outdoor activities last Sunday. She graphed the results of her survey below. What observation can you make from looking at the graph of the data?



Solution: The more time a student spends on the Internet, the less time they spend outdoors. The more time they spend outdoors, the less time they spend on the Internet.

### Exercises

Write a sentence or two that might describe the information in each graph.





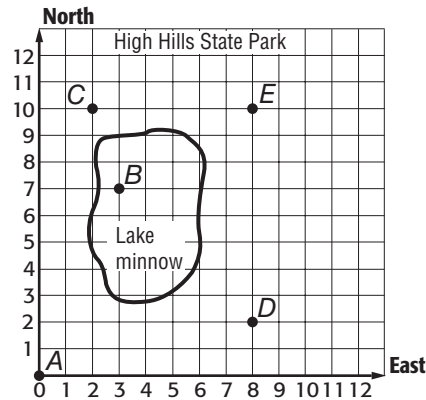
## Lesson 8.2 Study Guide and Intervention

### Draw and Label Graphs

#### Coordinate Plane

**Example** The graph shows a map of Lake Minnow located in High Hills State Park. The distance between the graph lines represents one mile.

The point labeled *A* is the location of the entrance to the park, point *B* is the location of a raft in the lake, point *C* is the location of Max's cabin, point *D* is the location of Trixie's cottage, and point *E* is location of the park ranger's office.

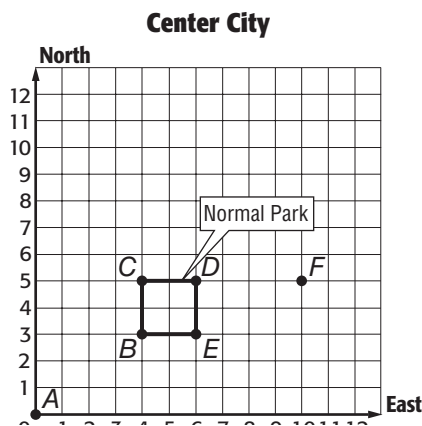


1. What are the coordinates of the raft? Answer:  $B(3, 7)$
2. What are the coordinates of a point *F* that is 3 miles east and one mile north of Max's cabin? Answer:  $(5, 11)$
3. Trevor wants to build a home halfway between Trixie's cottage and the park ranger's office. What are the coordinates of the location where Trevor wants to build? Answer:  $(8, 6)$

#### Exercises

The graph shows a map of Normal Park located in Center City. The distance between graph lines represents one city block.

The point labeled *A* is the location of Center City's town hall, points *B*, *C*, *D*, and *E* are the locations of the corners of Normal Park, and point *F* is the location of Center City's post office.



1. If you leave the town hall and walk one block east and two blocks north, will you be in the park? Explain your answer.
2. If the citizens of Center City want to place a water fountain in the center of Normal Park, what would be the coordinates of its location?
3. If the park manager wants to plant a tree halfway between the post office and point *D*, what would be the coordinates of the location of the tree?

## Lesson 8.3 Study Guide and Intervention

### Graph in Four Quadrants

A **coordinate** system is a grid used to locate points. The horizontal number line is the  **$x$ -axis**; the vertical number line is the  **$y$ -axis**.

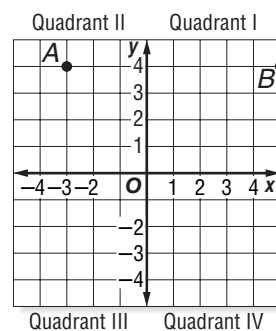
The  **$x$ -axis** and  **$y$ -axis** separate the **coordinate system** into four regions called **quadrants**.

An ordered pair helps you locate any point on the coordinate plane. The first number is the  **$x$ -coordinate**. The second number is the  **$y$ -coordinate**.

**Example 1** Identify the ordered pair that names point **A**.

**Step 1** Move left on the  $x$ -axis to find the  $x$ -coordinate of point **A**, which is  $-3$ .

**Step 2** Move up the  $y$ -axis to find the  $y$ -coordinate, which is  $4$ . Point **A** is named by  $(-3, 4)$ .



**Example 2** Graph point **B** at  $(5, 4)$ .

Use the coordinate plane shown above. Start at 0. The  $x$ -coordinate is  $5$ , so move  $5$  units to the right.

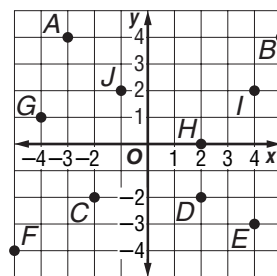
Since the  $y$ -coordinate is  $4$ , move  $4$  units up.

Draw a dot. Label the dot **B**.

#### Exercises

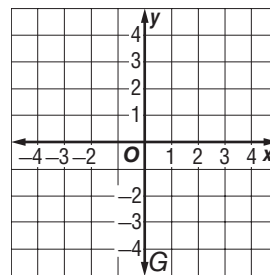
Use the coordinate plane at the right. Write the ordered pair that names each point.

- |      |      |
|------|------|
| 1. C | 2. D |
| 3. E | 4. F |
| 5. G | 6. H |
| 7. I | 8. J |



Graph and label each point using the coordinate plane at the right.

- |                 |                |
|-----------------|----------------|
| 9. $A(-5, 5)$   | 10. $M(2, 4)$  |
| 11. $G(0, -5)$  | 12. $D(3, 0)$  |
| 13. $N(-4, -3)$ | 14. $I(2, -3)$ |



## Lesson 9.1 Study Guide and Intervention

### Understand Equations

#### Solving Equations

Finding the values of a variable that make an equation true is called *solving* the equation. The variable that makes the equation true is called a *solution*. The solution of an equation can be found by using a table.

**Example 1** Solve  $2 \cdot x + 4 = 10$  using a table.

Try several values for  $x$ .

$x$	$2 \cdot x + 4$	Test	Solution?
0	4	$2 \cdot x + 4 < 10$	no
1	6	$2 \cdot x + 4 < 10$	no
2	8	$2 \cdot x + 4 < 10$	no
3	10	$2 \cdot x + 4 = 10$	yes
4	12	$2 \cdot x + 4 > 10$	no
5	14	$2 \cdot x + 4 > 10$	no

A value of 3 for  $x$  is the solution to  $2 \cdot x + 4 = 10$  since  $2 \cdot 3 + 4 = 10$ . The values increase as  $x$  increases, so 3 is the only solution.

**Example 2** Solve  $c + 6 = 2c$  using a table.

Try several values for  $c$ .

$c$	$c + 6$	$2c$	Test	Solution?
3	9	6	$c + 6 > 2c$	no
4	10	8	$c + 6 > 2c$	no
5	11	10	$c + 6 > 2c$	no
6	12	12	$c + 6 = 2c$	yes
7	13	14	$c + 6 < 2c$	no
8	14	16	$c + 6 < 2c$	no

A value of 6 for  $c$  is the solution to  $c + 6 = 2c$  since  $6 + 6 = 2 \cdot 6$ .

**Exercises** Solve each equation. Use tables if necessary.

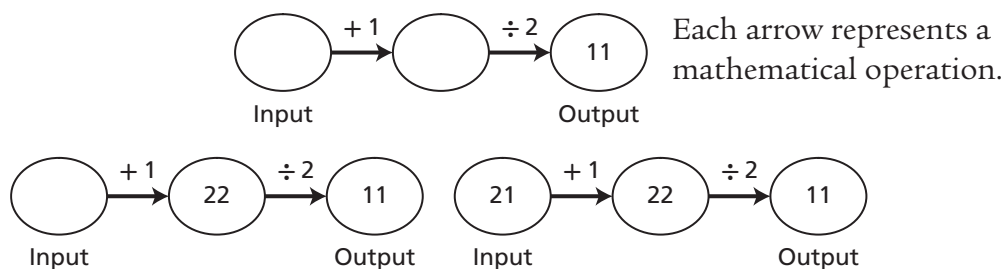
- $4m + 5 = 9$
- $3n + 4 = 13$
- $4x + 8 = 16$
- $19 = 2s + 11$
- $c + 10 = 3c$
- $5 \cdot y + 10 = 25$
- One more than four times a number is 13. What is the number?
- Three is seven less than two times a number. What is the number?

## Lesson 9.2 Study Guide and Intervention

### Backtracking

A process called backtracking can be used to solve equations. In backtracking, an output is given and flowcharts are used to undo each operation to find the input.

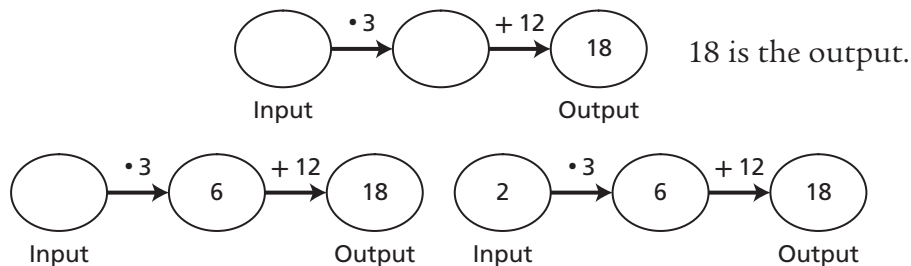
**Example 1** Use backtracking to find the input.



The input is 21.

**Example 2** Use backtracking to find the solution of the equation.

Equation  $3x + 12 = 18$



The input is 2.

### Exercises

Draw a flowchart to represent the equation.

1.  $5x + 20 = 60$

2.  $\frac{2v + 4}{8} = 2$

Use a flowchart and backtracking to find the solution to each equation.

3.  $\frac{6v + 20}{5} = 10$

4.  $\frac{2v + 6}{4} + 12 = 18$

## Lesson 9.3 Study Guide and Intervention

### Guess-Check-and-Improve

With certain equations, the process of backtracking does not always work. Another method called **guess-check-and-improve** is helpful with equations that are more advanced. This is how the process works.

- **Guess** the solution.
- **Check** the solution by substituting it into the equation.
- Use the result to **improve** the next guess.

**Example 1** Solve  $y \cdot (y + 3) = 180$  using guess-check-and-improve.

The guesses and results can be recorded in a table.

$y$	$y \cdot (y + 3)$	Comment
5	40	too low
10	130	too low but closer
20	460	too high

Based on the guesses, the solution is between 10 and 20. The table below shows the next two guesses.

$y$	$y \cdot (y + 3)$	Comment
11	154	too low but close
12	180	12 is the solution

The solution to  $y \cdot (y + 3) = 180$  is 12.

**Example 2** Solve  $4x = x + 18$  using guess-check-and-improve.

$x$	$4x$	$x + 18$	Comment
1	4	19	not the same
2	8	20	closer
5	20	23	very close
6	24	24	equal

The solution to  $4x = x + 18$  is 6.

### Exercises

Use guess-check-and-improve to solve the equations.

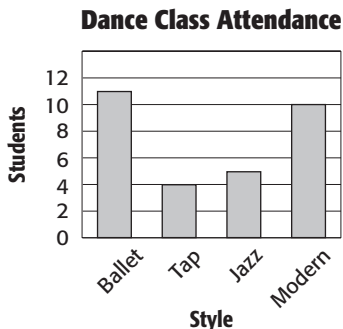
- $4x + 12 = 76$
- $5c = 3c + 12$
- $n \cdot (n + 6) = 216$
- $7h + 3 = 2h + 28$
- $6k + 9 = 8k$
- $m^2 + m = 6$

# Lesson 10.1 Study Guide and Intervention

## Data Displays

A **graph** is a visual way to display data. A **bar graph** is used to compare data. A **line graph** is used to show how data changes over a period of time.

**Example 1** Use the bar graph to compare the number of students in jazz class with the number in ballet class.

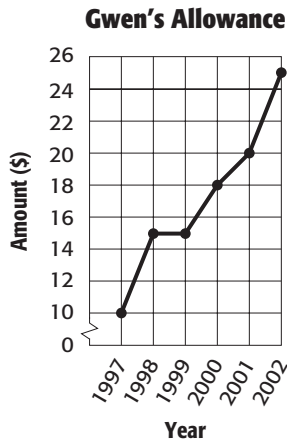


The bar graph shows that 11 students are in ballet class and 5 students are in jazz class.

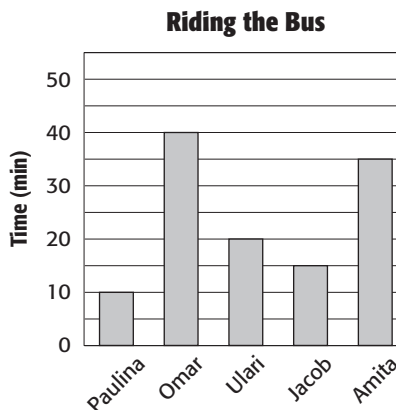
About twice as many students take ballet as take jazz.

### Exercises

1. Use the line graph to describe the change in Gwen's allowance from 1998 to 2002.



2. Use the bar graph to compare the time Paulina rides the bus to the time Omar rides the bus.



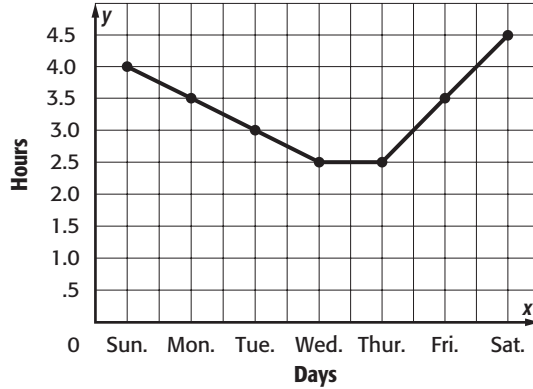
## Lesson 10.2 Study Guide and Intervention

### Collect and Analyze Data

**Example 1**

The table shows the amount of time Parker spends watching television during typical week.

- a. Create a line graph of the data.



Day	Hours
Sun.	4
Mon.	3.5
Tue.	3
Wed.	2.5
Thur.	2.5
Fri.	3.5
Sat.	4.5

- b. What conclusion can you make about Parker's television watching habits?

Since the number of hours are greater near the weekend, one can conclude that Parker watches more television on the weekend.

**Exercises**

1. Palka owns stock in AutoParts. The table shows the value of a share of her stock during the first four days of last week.

- a. Create a line graph of the data.
- b. What does the graph tell you about the value of her stock?
- c. If the trend continues, what might be the value of a share of her stock on Friday?

AutoParts	
Day	Share Value (\$)
Mon.	4.5
Tues.	3.75
Wed.	3.5
Thurs.	3.25
Fri.	?

## Lesson 10.3 Study Guide and Intervention

### The Language of Chance

The probability that an event will happen can be described by a number greater than or equal to 0 but less than or equal to 1. A probability of 0, or 0%, means the event can not happen, a probability of  $\frac{1}{2}$ , or 50%, means the event is just as likely to happen as to not happen, and a probability of 1, or 100%, means the event is certain to happen. In a situation where all outcomes have the same probability, the **theoretical probability** of an event happening is the ratio of the number favorable outcomes divided by the number of possible outcomes.

**Example 1**

**Suppose a number cube is tossed. What is the probability of obtaining an even number?**

There are 6 outcomes 1, 2, 3, 4, 5, and 6. Only 2, 4, and 6 are even. The probability of obtaining an even number is the ratio of the number of favorable outcomes, 3, and the total number of outcomes, 6.

$$\frac{\text{number of favorable outcomes}}{\text{total number of outcomes}} = \frac{3}{6} = \frac{1}{2} = 50\%$$

**Example 2**

**Suppose Annie, Abdullah, Ora, and Abigail each want to pass back yesterday's homework assignment. If one person is chosen, what is the probability that**

- a. The person's name starts with the letter A?  $\frac{3}{4} = 75\%$   
b. The person's name does not start with the letter A?  $\frac{1}{4} = 25\%$

**Exercises**

**Find the probability for each. Write each answer as a fraction and as a percent.**

- In your dresser drawer you have a red, white, and black pair of socks. If you reach into your drawer and remove one pair of socks, what is the probability that you get the black pair?
- A jar contains 3 green jelly beans, 3 black jelly beans, 3 yellow jelly beans, and 3 red jelly beans. What is the probability of getting a red jelly bean if you reach into the bag and take one out?
- The diagonals of a square dart board divide the square up into four congruent triangles. These triangles are numbered 1, 2, 3, and 4. If you toss a dart, what is the probability that your dart lands on a triangle with a number smaller than 4?



## Lesson 10.4 Study Guide and Intervention

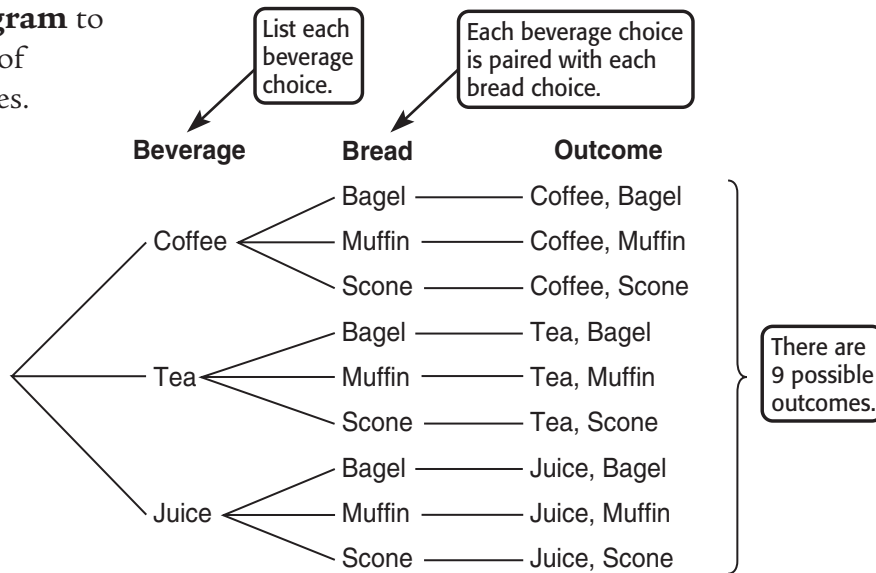
### Make Matches

**Example 1**

Suppose you go to breakfast and have 3 choices for a beverage and 3 choices for bread.

- What is the probability that you choose to have coffee and a bagel?
- What is the probability that you have tea and any bread choice?
- What is the probability that you have a muffin or a scone?

Draw a **tree diagram** to find the number of different outcomes.



There are 9 possible outcomes.

- Since 1 outcome consists of coffee and a bagel, the probability is  $\frac{1}{9}$ .
- Since 3 outcomes consist of tea, the probability is  $\frac{3}{9} = \frac{1}{3}$ .
- Since 6 outcomes consist of a muffin or scone, the probability is  $\frac{6}{9} = \frac{2}{3}$ .

**Exercises**

For each problem draw a **tree diagram** to help find the probability.

- Jim has a choice of going to the movies, the carnival, or a ball game. Wherever he goes, he intends to have a bag of popcorn or a pop. What is the probability that he goes to the carnival and has a pop?
- Tamika is ordering a pizza. She has two choices of crust, crispy or soft, two choices of meat, pepperoni or sausage, and two choices of vegetable, mushroom or onions. What is the probability that she orders a pizza with a crispy crust, sausage, and onion?