

PEARSON

# Math

## Makes Sense

8

WNCP Edition



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8

WNCP Edition

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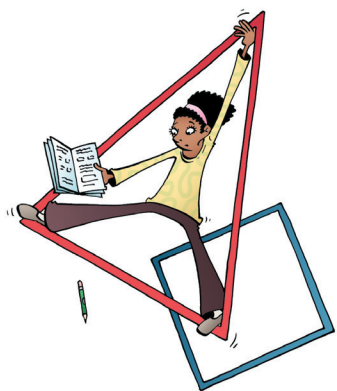
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# Welcome to

## Pearson Math Makes Sense 8

Math helps you understand your world.

This book will help you improve your problem-solving skills and show you how you can use your math now, and in your future career.

The opening pages of **each unit** are designed to help you prepare for success.



**UNIT 8** Geometry

First Nations artists use their artwork to preserve their heritage. Haida artist Don Yeomans is one of the foremost Northwest Coast artists. Look at this print called *The Benefit*, created by Don Yeomans. Describe any translations, reflections, or rotations you see.

What other art have you seen that demonstrates transformations?

**What You'll Learn**

- Draw and recognize different views of objects made from rectangular prisms.
- Identify shapes that will tessellate.
- Create tessellations using transformations.
- Identify tessellations in the environment.

**Why It's Important**

- We learn about the environment by looking at objects from different views. We can combine these views to get a better understanding of these objects.
- Tessellations are found in the environment, in architecture, and in art.

*The Benefit*

Gunarsh and the Whale

**Key Words**

- isometric
- isometric drawing
- axis of rotation
- plane
- tessellate
- tessellation
- composite shape
- conservation of area

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Find out **What You'll Learn** and **Why It's Important**. Check the list of **Key Words**.

# 1.7

## Applying the Pythagorean Theorem

**Focus** Solve problems using the Pythagorean Theorem.

### Investigate

Work with a partner to solve this problem.  
A doorway is 2.0 m high and 1.0 m wide.  
A square piece of plywood has side length 2.2 m.  
Can the plywood fit through the door?  
How do you know?  
Show your work.



### Reflect & Share

Compare your solution with that of another pair of classmates.  
If the solutions are different, find out which solution is correct.  
What strategies did you use to solve the problem?

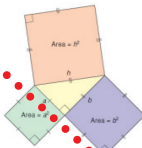
### Connect

Since the Pythagorean Theorem is true for all right triangles, we can use an algebraic equation to describe it.

In the triangle at the right, the hypotenuse has length  $h$ , and the legs have lengths  $a$  and  $b$ .

The area of the square on the hypotenuse is  $h \times h$ , or  $h^2$ .

The area of the squares on the legs are  $a \times a$  and  $b \times b$ , or  $a^2$  and  $b^2$ .



So, we can say:  $h^2 = a^2 + b^2$

When we use this equation, remember that the lengths of the legs are represented by  $a$  and  $b$ , and the length of the hypotenuse by  $h$ .

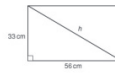
We can use the Pythagorean Theorem to solve problems that involve right triangles.

### Example 1

Marina helped her dad build a square table for her bedroom. The tabletop has length 56 cm and width 33 cm. The diagonal of the tabletop measures 60 cm. Does the tabletop have square corners? How do you know?

#### A Solution

Draw a rectangle to represent the tabletop.



Suppose the diagonal of the tabletop is the hypotenuse,  $h$ , of a right triangle. One leg is 33 cm.

The other leg is 56 cm.

Use the Pythagorean Theorem to find  $h$ .

$$h^2 = a^2 + b^2$$

$$\text{Substitute: } a = 33 \text{ and } b = 56$$

$$h^2 = 33^2 + 56^2$$

$$= 1089 + 3136$$

$$= 4225$$

$$\text{So, } h = \sqrt{4225}$$

$$= 65$$

For the triangle to be a right triangle, the diagonal should measure 65 cm.

It measures 60 cm. So, the tabletop does not have square corners.

**Examples** show you how to use the ideas and that there may be different ways to approach the question.

**Investigate** an idea or problem, usually with a partner, and often using materials.

**Connect** summarizes the math.

**Discuss the Ideas** invites you to talk about the math.

**Practice** questions reinforce the math.

**Take It Further** questions offer enrichment and extension.

**Reflect** on the big ideas of the lesson. Think about your learning style and strategies.

### Discuss the Ideas

- Why are the square brackets unnecessary in this expression?  $(-3) + [12 + (-4)]$
- In Example 3, why were the numerator and denominator evaluated separately?

### Practice

#### Check

- State which operation you do first.
- $7 + (-1) \times (-3)$
  - $(-18) + (-6) - (-4)$
  - $6 + (-4) - (-2)$
  - $(-2) \div 7 + (-5)$
  - $(-3) \times (-4) + (-1)$
  - $8 - 3 + (-4) + (-1)$

- Evaluate each expression in question 3. Show all steps.

- Elijah evaluated this expression as shown.

$$\begin{aligned} 3 - (-5) + 8(-4) &= 3 - (-5) + (-32) \\ &= 3 - (-37) \\ &= 40 \end{aligned}$$

Is Elijah's solution correct? If your answer is yes, explain the steps Elijah took. If your answer is no, what error did Elijah make? What is the correct answer? Show your work.

- Evaluate.
  - $12 + (2 \times 3) - 2$
  - $12 + 2 \times (3 - 2)$
- Why are the answers different? Explain.

#### Apply

- Evaluate. State which operation you do first.
  - $7(4) - 5$
  - $6(2 + (-5))$
  - $(-3) + 4(7)$
  - $(-6) + 4(-2)$
  - $15 + [10 \div (-2)]$
  - $18 \div 2(-6)$

- Evaluate. Show all steps.
  - $6(5 - 7) - 3$
  - $4 - [5 + (-11)]$
  - $[4 - (-8)] \div 6$
  - $8 - 66 \div (-11)$
  - $(-2) + 12 + (-3)(-4)$
  - $6(-3) + (-8)(-4)$

- Evaluate. Show all steps.
  - $(-2) \times 4 + 8$
  - $4 + (-36) + 3$
  - $(-6) - (-2) - (-4)$
  - $(-3) \div (-18) = 3$

- Evaluate. Show all steps.
  - $(-3) \div (7 - 4)$
  - $[18 - (-5)] \div (-3)$
  - $32 - 4 - (-20) \div 7$
  - $12 \div (-4)$
  - $12 - (6 \div 6)$
  - $[3 - (-3)] \times (-7 - 3)$

- Assessment Focus** Robert, Brenna, and Christian got different answers for this problem:  $(-40) - 2[(-8) \div 2]$  Robert's answer was  $-32$ , Christian's answer was  $-48$ , and Brenna's answer was  $168$ .

- Which student had the correct answer?
- Show and explain how the other two students got their answers. What errors did they make?

- Evaluate each expression. Then insert one pair of square brackets in each expression so it evaluates to  $-2$ .
  - $(-20) \div 2 - (-2)$
  - $(-21) + 6 + 3$
  - $10 + 3 \times 2 - 7$

- Krisha had \$40 in her bank account. In one month, she made 4 withdrawals of \$45 each. What is the balance in her account? Write an integer expression to represent this problem. Solve the problem. How did you decide which operations to use?

### Reflect

Suppose you evaluate an expression that has different operations. How do you know where to begin? How do you know what to do next? Make up an integer expression that has three operations. Explain how you evaluate it.

- Use three  $-4$ s and any operations or brackets. Write an expression with a value of:
  - $-12$
  - $-4$
  - $0$
  - $-3$
  - $5$
  - $2$

- Take It Further** The daily highest temperatures for one week in February were:  $-2^\circ\text{C}$ ,  $5^\circ\text{C}$ ,  $-8^\circ\text{C}$ ,  $-4^\circ\text{C}$ ,  $-11^\circ\text{C}$ ,  $-10^\circ\text{C}$ ,  $-5^\circ\text{C}$ . Find the mean highest temperature. How did you decide which operations to use?

- Take It Further** Write an expression for each statement. Evaluate each expression.
  - Divide the sum of  $-24$  and  $4$  by  $-5$ .
  - Multiply the sum of  $-4$  and  $10$  by  $-2$ .
  - Subtract  $4$  from  $-10$ , then divide by  $-2$ .

- Take It Further** Copy each equation. Replace each  $\square$  with the correct sign ( $+$ ,  $-$ ,  $\times$ ,  $\div$ ) to make each equation true.
  - $(-10) \square (-2) \square 1 = 21$
  - $(-5) \square (-2) \square 4 = 1$
  - $6 \square (-7) \square 2 = -44$
  - $(-2) \square (-2) \square 8 = -4$

## Mid-Unit Review

### RESCUE

1. Write each multiplication statement as repeated addition. Draw a picture to show each product.

- a)  $4 \times \frac{1}{10}$     b)  $7 \times \frac{3}{8}$   
c)  $\frac{2}{3} \times 3$     d)  $\frac{5}{6} \times 6$

2. Multiply. Draw a number line to show each product.

- a)  $\frac{1}{2} \times 7$     b)  $8 \times \frac{3}{8}$   
c)  $6 \times \frac{7}{10}$     d)  $\frac{5}{12} \times 3$

3. Sasha had 16 tomatoes in his garden. He gave Samira  $\frac{1}{8}$  of the tomatoes; Amandeep  $\frac{1}{4}$  of the tomatoes; and Amina  $\frac{1}{4}$  of the tomatoes.

- a) How many tomatoes did Sasha give away?  
b) How many tomatoes did Sasha have left?  
c) What fraction of the tomatoes did Sasha have left?

4. Draw a rectangle to find each product.

- a)  $\frac{2}{3} \times \frac{1}{2}$     b)  $\frac{3}{5} \times \frac{3}{4}$   
c)  $\frac{1}{2} \times \frac{3}{5}$     d)  $\frac{3}{5} \times \frac{3}{10}$

5. Use counters to find each product. Draw a diagram each time.

- a)  $\frac{1}{2} \times \frac{4}{5}$     b)  $\frac{2}{3} \times \frac{5}{6}$   
c)  $\frac{3}{4} \times \frac{8}{11}$     d)  $\frac{5}{6} \times \frac{10}{12}$

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6. Multiply. Use benchmarks to estimate to check each product.

- a)  $\frac{1}{2} \times \frac{3}{4}$   
b)  $\frac{2}{3} \times \frac{3}{4}$   
c)  $\frac{3}{4} \times \frac{3}{4}$

7. Aiko says the collection of One-fifth of India. What collection do you check the s

8. Use an area each prod

- a)  $2\frac{1}{2} \times 1$   
b)  $4\frac{1}{2} \times \frac{1}{2}$   
c)  $4\frac{1}{2} \times \frac{3}{4}$

9. Multiply. E product is

- a)  $2\frac{1}{2} \times 3$   
b)  $4\frac{1}{2} \times \frac{1}{2}$   
c)  $\frac{3}{4} \times \frac{3}{4}$   
d)  $5\frac{1}{2} \times 2$

10. Alek has a Saturday. T practising is  $3\frac{1}{2}$  times

- a)  $\frac{1}{2} \times \frac{4}{5}$     b)  $\frac{2}{3} \times \frac{5}{6}$   
c)  $\frac{3}{4} \times \frac{8}{11}$     d)  $\frac{5}{6} \times \frac{10}{12}$

Use the **Mid-Unit Review** to refresh your memory of key concepts.

## Choosing the Correct Answer

Have you ever written a multiple-choice test? Many students like multiple-choice tests because they know the correct answer is one of the choices.



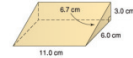
The other choices – called **distractors** – are created by making common mistakes.



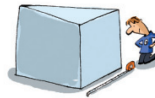
Answer these multiple-choice questions. Try to answer each question before you look at the choices. What mistakes lead to the other choices?

1. A rectangular prism has dimensions 4 m by 6 m by 3 m. What is the surface area of the prism?  
a) 54 m<sup>2</sup>    b) 72 m<sup>2</sup>    c) 108 m<sup>2</sup>    d) 144 m<sup>2</sup>

2. What is the volume of this triangular prism?



- a) 110.6 cm<sup>3</sup>  
b) 99 cm<sup>3</sup>  
c) 190.7 cm<sup>3</sup>  
d) 198 cm<sup>3</sup>



Here are some strategies you can use to help choose the correct answer for a multiple-choice question.

### Before you start

- Make sure you understand what you are supposed to do.
  - Is it okay to guess?
  - Is there only one correct answer?
  - Where should you record your answer?
  - Are you supposed to show your work?

### For each question

- Read the question carefully. Underline the key words.
- Draw a sketch or make a calculation if it helps.
- Try to answer the question before you look at the choices.
- Read all the choices.
- If your answer doesn't appear as a choice, read the question again. Look for any mistakes you might have made.
- If you still have trouble deciding, read each choice again.
  - Cross out any choices you know are not correct.
  - If two choices appear to be similar, identify any differences.

### Organizing your time and checking

- Leave questions that you are unsure of until the end.
- If it is okay to guess, make your best guess. Do so after you have eliminated the choices you know are not correct.
- Read all the questions and your choices. Check that you have not missed any questions.



220 UNIT 6: Measuring Prisms and Cylinders

Strategies for Success: Choosing the Correct Answer 221

**Strategies for Success** sections suggest ways you can help yourself to show your best performance.

## Unit Review

### What Do I Need to Know?

#### ✓ Distributive Property

The product of a number and the sum of two numbers can be written as a sum of two products:  
 $a(b + c) = ab + ac$



The distributive property can be used to solve some algebraic equations.

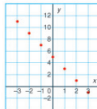
#### ✓ We can represent a linear relation in different ways:

- as a two-variable equation
- as a table of values
- as a graph

$$y = -2x + 5$$

x	y
-3	11
-2	9
-1	7
0	5
1	3
2	1
3	-1

Graph of  $y = -2x + 5$



A related pair of  $x$  and  $y$  values is an **ordered pair**.

When data are **discrete**, the numbers between those given do not make sense in the context of the problem.

When the graph of a relation is a straight line, the relation is **linear**.

370 UNIT 6: Linear Equations and Graphing

### What Should I Be Able to Do?

#### RESCUE

1. Tracey put one coin in the candy machine, and 7 candies were dispensed. When she put 2 coins in the machine, 14 candies were dispensed.

How many coins would Tracey have to put in to have 56 candies dispensed?

- a) Choose a variable to represent the number of coins Tracey would have to put in. Write an equation to describe the situation.  
b) Use a model to solve the equation.  
c) Verify the solution.

2. Use a model to solve each equation. Verify the solution.

- a)  $-6x = -30$   
b)  $11x = -22$   
c)  $4x + 1 = 17$   
d)  $-4x + 1 = 17$   
e)  $11 = 3x - 7$   
f)  $-11 = 3x + 7$

3. Troy is taking care of Mr. Green's property. He is paid \$8 for mowing the lawn, and \$3 for each garden that he weeds. On Saturday, Mr. Green paid Troy \$29.

How many gardens did Troy weed on Saturday?

- a) Write an equation to represent this problem.  
b) Solve the equation.  
c) Verify the solution.

4. Solve each equation. Verify the solution.

- a)  $-6x + 8 = -16$   
b)  $11x - 5 = 28$   
c)  $3x + 5 = 7$   
d)  $-4x - 9 = 19$   
e)  $13 = 3x + 12$   
f)  $7x - 19 = -5$

5. The high temperature today is 6°C higher than three times the high temperature yesterday. The high temperature today is 3°C. What was the high temperature yesterday?

- a) Write an equation you can use to solve the problem.  
b) Solve the equation.  
c) Verify the solution.

6. Solve each equation. Verify the solution.

- a)  $\frac{7}{10} + 11 = 8$   
b)  $\frac{1}{10} + 12 = 3$   
c)  $-21 + \frac{2}{5} = -30$   
d)  $-12 + \frac{2}{5} = -1$

7. Check this student's work. Rewrite a correct and complete algebraic solution if necessary.

$$\begin{aligned} \frac{2}{3} &= -7 \\ \frac{2}{3} \times 2 &= -7 \times 2 \\ \frac{4}{3} &= -14 \\ \frac{2}{3} &= -14 \end{aligned}$$

**What Do I Need to Know?** summarizes key ideas from the unit.

**What Should I Be Able to Do?** allows you to find out if you are ready to move on. The *Practice and Homework Book* provides additional support.

## Practice Test

1. This table shows the student population of H. I. Cambie Secondary School in 2007.
- | Grade | Number of Students |
|-------|--------------------|
| 8     | 125                |
| 9     | 155                |
| 10    | 162                |
| 11    | 200                |
| 12    | 185                |
- a) What are the limitations of graphing these data with:
- a bar graph?
  - a circle graph?
- b) Would a pictograph be a good choice? Would a line graph be a good choice? Why or why not?
- c) Which graph is most appropriate to display these data? Justify your choice.
2. The new manager of a company created these two graphs to show shareholders how much better the company is doing since she took over in 2003.
- Sales, 1999–2002

Sales, 2003–2006
- a) What impressions do these graphs create?
- b) Describe how the graphs create a false impression. What features of the graphs cause this impression?
- c) How could the graphs be changed to present the data accurately?
- d) Is the company doing better since the new manager was hired? Explain.

428 UNIT 7: Data Analysis and Probability

The **Practice Test** models the kind of test your teacher might give.

## Units 1–6 Cumulative Review

1. Find.
- $\sqrt{1}$
  - $16^2$
  - $\sqrt{43}$
  - the square of 11
2. Copy each square on 1-cm grid paper. Find its area, then write the side length of the square.
- -
3. A watch loses 3 s per hour for 24 h. Use integers to find the total number of seconds the watch lost over 24 h.
4. Evaluate.
- $(-15) \times (+4)$
  - $(-8) \times (-10)$
  - $(+57) + (-3)$
  - $-\frac{38}{2}$
5. Use an area model to find each product.
- $\frac{2}{3} \times \frac{1}{4}$
  - $2\frac{2}{3} \times \frac{1}{3}$
  - $\frac{21}{2} \times \frac{2}{3}$
  - $1\frac{1}{2} \times 3\frac{1}{3}$
6. A dental hygienist takes  $1\frac{1}{8}$  h to clean a patient's teeth.
- Estimate the number of patients the hygienist can see in  $5\frac{1}{4}$  h.
  - Calculate the number of patients the hygienist can see in  $5\frac{1}{4}$  h.
  - What assumptions do you make?
7. a) Predict the object this net will form.  
  
 b) Fold the net to verify your prediction.  
 c) Describe the object.
8. Find the surface area of the object.
9. A triangular prism has a base that is a right triangle. The side lengths of the triangle are 5 cm, 12 cm, and 13 cm. The prism is 20 cm high.
- What is the volume of the prism?
  - Sketch a net for the prism. Label the net with the dimensions of the prism.
  - What is the surface area of the prism?
10. There were 25 people in Sebastian's Tae Kwon Doe class. Then, three people dropped out. Write this decrease as a percent. Illustrate the percent on a number line.

378 UNITS 1–6

Keep your skills sharp with **Cumulative Review**.

## Unit Problem Creating Tessellating Designs

M.C. Escher was a famous Dutch graphic artist. He designed many different tessellations.



You will create two designs in the Escher style. The first design is in the style of *Knights on Horseback*, on page 477.

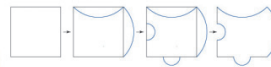
### Part 1

Use square dot paper or grid paper. Tessellate with a shape of your choice. Sketch a design on one shape. Repeat the sketch until every shape in the plane has the design. Use transformations to describe how to create the tessellation beginning with one shape.

**Instead, you could start with a rectangle, parallelogram, or regular hexagon.**

### Part 2

Start with a square. Draw congruent curves on 2 sides. A curve that goes "in" on one side must go "out" on the other side. Draw different congruent curves on the other two sides.



### Check List

Your work should show:

- ✓ the initial shape you created for each tessellation
- ✓ the tessellations you created
- ✓ how you used transformations to create the tessellations
- ✓ the correct use of mathematical language

Trace the new shape on cardboard. Cut out the shape. Use it to tessellate.

Add details to your shape so it represents an animal or an object of your choice.



### Reflect on Your Learning

You have worked in three dimensions with objects and in two dimensions with shapes. Which do you prefer? Give reasons for your choice. Include a paragraph about what you have learned.

428 UNIT 8: Geometry

Unit Problem: Creating Tessellating Designs 429

Explore some interesting math when you do the **Investigations**.


### Investigation A Population Simulation

Work with a partner.

An animal population changes from year to year depending on the rates of birth and death, and on the movement of the animals. A **simulation** is a model of a real situation. You will use a simulation to investigate how an animal population might decline. As you complete this *Investigation*, include your completed table, graph, and written answers to the questions. You will hand these in.

**Materials:**

- a paper cup
- 30 to 40 two-sided counters
- 0.5-cm grid paper



► The counters are the animals in your population. Count the number of animals. Record that number for Year 0 in the *Population* table.

► Put the counters in the cup. Choose which colour will be “face up.” Pour the counters from the cup. Counters that land face up represent animals that died or moved away during the first year. Set them aside. Count the number of animals left.


490 Investigation

### Spinning Fractions

**Game**

**HOW TO PLAY**

Your teacher will give you a copy of the spinner. Use an open paper clip as the pointer. Use a sharp pencil to keep the pointer in place. Record the scores in a chart.



1. Player A spins the pointer twice. Player A adds the fractions. Player B multiplies the fractions. The player with the greater result gets one point.
2. Player B spins the pointer twice. Player A adds the fractions. Player B multiplies the fractions. The player with the greater result gets one point.
3. Players continue to take turns spinning the pointer. The first person to get 12 points wins.

**YOU WILL NEED**

- A copy of the spinner;
- an open paper clip;
- a sharp pencil

**NUMBER OF PLAYERS**

2

**GOAL OF THE GAME**

To be the first to get 12 points

**REFLECT**

- Do you think this game is fair? How many games do you need to play to find out?
  - a) If this game is fair, explain how you know.
  - b) If this game is not fair, how could you make the game a fair game?
- Without playing the game many times, how else could you find out if the game is fair?

Game: Spinning Fractions 137

Play a **Game** with your classmates or at home to reinforce your skills.

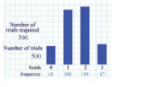
Icons remind you to use **technology**. Follow the instructions for using a computer or calculator to do math.

### Using Technology to Investigate Probability

**Focus** Use virtual manipulatives to investigate the probability of independent events.

You have used manipulatives, such as spinners, dice, and coins. Many Web sites offer virtual manipulatives. These Web sites imitate, or *simulate*, spinning pointers, rolling dice, or tossing coins.

Your teacher will give you a Web address. Use the Web site to simulate tossing 3 coins 500 times. This is what you might see:



The theoretical probability of tossing 3 tails is:  $P(T \text{ and } T \text{ and } T) = P(T) \times P(T) \times P(T) = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$ , or 0.125

**Recall:** The probability of tossing tails on the first coin is  $\frac{1}{2}$ , on the second coin is  $\frac{1}{2}$ , and on the third coin is  $\frac{1}{2}$ .

From the graph in this simulation, the experimental probability of tossing 3 tails (or 0 heads) is  $\frac{75}{500} = 0.122$ . This experimental probability, 0.122, is very close to the theoretical probability, 0.125.

**If you have forgotten the difference between experimental and theoretical probability, turn to the Glossary.**

Combine your experimental results with those of 9 classmates. Find the experimental probability of tossing 3 tails. How do the experimental and theoretical probabilities compare?

**Check**

1. Use a Web site to simulate spinning 2 identical spinners 500 times. Each spinner has 4 congruent sectors coloured red, blue, green, and yellow. Combine your experimental results with those of 9 classmates.
  - a) What is the experimental probability of each event?
    - i) red and yellow
    - ii) blue and green or yellow
  - b) Use the rule for the probability of independent events to find the probability of each event in part a.
  - c) How do your results in parts a and b compare? Explain.

Your teacher will give you the Web address.

Technology: Using Technology to Investigate Probability 423

### Illustrated Glossary

**acute angle:** an angle measuring less than 90°

**acute triangle:** a triangle with three acute angles

**algebraic expression:** a mathematical expression containing a variable; for example,  $6x - 4$  is an algebraic expression

**approximate:** a number close to the exact value of an expression; the symbol  $\approx$  means “is approximately equal to”

**area:** the number of square units needed to cover a region

**array:** an arrangement in rows and columns

**average:** a single number that represents a set of numbers (see mean, median, and mode)

**axis of rotation:** the straight line around which an object is turned

**bar graph:** a graph that displays data by using horizontal or vertical bars

**bar notation:** the use of a horizontal bar over a decimal digit to indicate that it repeats; for example,  $1.3$  means 1.333 333 ...

**base:** the side of a polygon or the face of an object from which the height is measured

**bisector:** a line that divides a line segment or an angle into two equal parts

**capacity:** the amount a container can hold

**Cartesian Plane:** another name for a coordinate grid (see coordinate grid)

**central angle:** the angle between the two radii that form a sector of a circle; also called sector angle

**certain event:** an event with probability 1, or 100%

**chance:** a description of a probability expressed as a percent

**circle graph:** a diagram that uses sectors of a circle to display data

**circumference:** the distance around a circle, also known as the perimeter of the circle

**common denominator:** a number that is a multiple of each of the given denominators; for example, 12 is a common denominator for the fractions  $\frac{1}{3}$ ,  $\frac{1}{4}$ ,  $\frac{1}{6}$

**common factor:** a number that is a factor of each of the given numbers; for example, 3 is a common factor of 15, 9, and 21

**commutative property:** the property of addition and multiplication that states that numbers can be added or multiplied in any order; for example,  $3 + 5 = 5 + 3$ ;  $3 \times 5 = 5 \times 3$

**composite number:** a number with three or more factors; for example, 6 is a composite number because its factors are 1, 2, 4, and 6

**composite shape:** the result of combining one or more shapes to make a new shape

**convex polygon:** has at least one angle greater than 180°

**congruent:** shapes that match exactly, but do not necessarily have the same orientation

**consecutive numbers:** integers that come one after the other without any integers missing; for example, 34, 35, 36 are consecutive numbers, so are  $-2$ ,  $-1$ , 0, and 1

**conservation of area:** under a transformation, the area of a shape does not change

**constant term:** the number in an expression or equation that does not change; for example, in the expression  $4x + 3$ , 3 is the constant term

**convex polygon:** has all angles less than 180°

**coordinate axes:** the horizontal and vertical axes on a grid

538 Illustrated Glossary

The **Illustrated Glossary** is a dictionary of important math words.