

Glencoe McGraw-Hill

South Carolina

# Math Connects

Course 1

# StudyText

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# Using Your South Carolina StudyText

**South Carolina Math Connects StudyText, Course 1** is a practice workbook designed to help you master the South Carolina Academic Standards for Grade 6 Mathematics. It is divided into three sections.

## ***Prerequisite Skills Check***

This is an assessment of the South Carolina Mathematics Standards from Grade 5. This will help you determine which topics you may need to review before beginning your studies this year.

## ***Chapter Resources***

- Each chapter begins with two activities. The **Anticipation Guide** is an informal assessment of what you may think you know about the topics in the chapter. This can help you determine how well you are prepared for the content of the chapter. The **Family Activity** is a problem-solving opportunity to practice at home. Each question has a full solution to help you check your work.
- The chapter contains four pages for each Key Lesson in your Student Edition of *South Carolina Math Connects, Course 1*. Your teacher may ask you to complete one or more of these worksheets as an assignment.
- Each chapter ends with a two-page **Chapter Test** that assesses the South Carolina Academic Standards in that chapter with questions designed similarly to those you might see on the PASS (Palmetto Assessment of State Standards).

## ***Mastering the PASS***

This section of StudyText is composed of many sections that can help you study for the Grade 6 PASS (Palmetto Assessment of State Standards).

- **Tips for Taking the PASS** tells you about the types of questions you might find on the PASS and how to correctly complete those types of questions.
- The **Diagnostic Test** can help you determine which Academic Standards you might need to review before taking the PASS. Each question lists which standard it is assessing.
- The **Practice by Standard** gives you more practice problems to help you become a better test-taker. The problems are organized by the five standards in your math curriculum: Number and Operations, Algebra, Geometry, Measurement, and Data Analysis and Probability.
- The **Practice Test** can be used to simulate what a PASS test might be like so that you will be better prepared to take the PASS in the spring.





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### Additional Resource

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### Additional Resource

*Math Triumphs*, Grade 6 [Book 2]: Chapter 5 (Multiplication) and Chapter 6 (Division)

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*Math Triumphs*, Grade 6 [Book 2]: Chapter 5 (Multiplication) and Chapter 6 (Division)



## 4 Fractions and Decimals

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*Math Triumphs*, Grade 6 [Book 2]: Chapter 5 (Multiplication) and Chapter 6 (Division)

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*Math Triumphs*, Grade 6 [Book 2]: Chapter 5 (Multiplication) and Chapter 6 (Division)

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*Math Triumphs*, Grade 6 [Book 3]: Chapter 10 (Formulas)

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*Math Triumphs*, Grade 6 [Book 3]: Chapter 10 (Formulas)

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277	Explore Through Reading	6-2.2, 6-1.1	
278	Study Guide	6-2.2, 6-1.1	
279	Homework Practice	6-2.2, 6-1.1	
280	Problem-Solving Practice	6-2.2, 6-1.1	
<b>11-3 Subtracting Integers</b>			582–586
281	Explore Through Reading	6-2.2, 6-1.1	
282	Study Guide	6-2.2, 6-1.1	
283	Homework Practice	6-2.2, 6-1.1	
284	Problem-Solving Practice	6-2.2, 6-1.1	
<b>11-4 Multiplying Integers</b>			587–590
285	Explore Through Reading	6-2.2, 6-1.1	
286	Study Guide	6-2.2, 6-1.1	
287	Homework Practice	6-2.2, 6-1.1	
288	Problem-Solving Practice	6-2.2, 6-1.1	
<b>11-5 Problem-Solving Investigation: Work Backward</b>			592–593
289	Study Guide	6-2.2, 6-1.1	
290	Skills Practice	6-2.2, 6-1.1	
291	Homework Practice	6-2.2, 6-1.1	
292	Problem-Solving Practice	6-2.2, 6-1.1	
<b>11-6 Dividing Integers</b>			594–598
293	Explore Through Reading	6-2.2, 6-1.1	
294	Study Guide	6-2.2, 6-1.1	
295	Homework Practice	6-2.2, 6-1.1	
296	Problem-Solving Practice	6-2.2, 6-1.1	
<b>11-7 The Coordinate Plane</b>			599–603
297	Explore Through Reading	6-4.1, 6-1.7	
298	Study Guide	6-4.1, 6-1.7	
299	Homework Practice	6-4.1, 6-1.7	
300	Mini-Project	6-4.1, 6-1.7	
<b>11-8 Translations</b>			604–609
301	Explore Through Reading	6-4.5, 6-4.6	
302	Study Guide	6-4.5, 6-4.6	
303	Homework Practice	6-4.5, 6-4.6	
304	Problem-Solving Practice	6-4.5, 6-4.6	
<b>11-9 Reflections</b>			610–614
305	Explore Through Reading	6-4.4, 6-4.5	
306	Study Guide	6-4.4, 6-4.5	
307	Homework Practice	6-4.4, 6-4.5	
308	Problem-Solving Practice	6-4.4, 6-4.5	

# 11 Integers and Transformations (continued)

Page	Lesson	Academic Math Standard(s) Focus	Use with <i>Glencoe South Carolina Math Connects, Course 1</i> (pages)
<b>11-10 Rotations</b>			615–619
309	Explore Through Reading	6-4.3, 6-4.5	
310	Study Guide	6-4.3, 6-4.5	
311	Homework Practice	6-4.3, 6-4.5	
312	Problem-Solving Practice	6-4.3, 6-4.5	
313	<b>Chapter 11 Test</b>		

## Additional Resource

*Math Triumphs*, Grade 6 [Book 2]: Chapter 5 (Multiplication) and Chapter 6 (Division)

# 12 Algebra: Properties and Equations

Page	Lesson	Academic Math Standard(s) Focus	Use with <i>Glencoe South Carolina Math Connects, Course 1</i> (pages)
315	<b>Chapter 12 Anticipation Guide</b>		
316	<b>Chapter 12 Family Activity</b>		
<b>12-1 The Distributive Property</b>			632–635
317	Explore Through Reading	6-3.4, 6-1.4	
318	Study Guide	6-3.4, 6-1.4	
319	Homework Practice	6-3.4, 6-1.4	
320	Problem-Solving Practice	6-3.4, 6-1.4	
<b>12-2 Simplifying Algebraic Expressions</b>			636–641
321	Explore Through Reading	6-3.3, 6-3.4	
322	Study Guide	6-3.3, 6-3.4	
323	Homework Practice	6-3.3, 6-3.4	
324	Problem-Solving Practice	6-3.3, 6-3.4	
<b>12-3 Solving Addition Equations</b>			644–648
325	Explore Through Reading	6-3.3, 6-3.5	
326	Study Guide	6-3.3, 6-3.5	
327	Homework Practice	6-3.3, 6-3.5	
328	Problem-Solving Practice	6-3.3, 6-3.5	
<b>12-4 Solving Subtraction Equations</b>			651–654
329	Explore Through Reading	6-3.3, 6-3.5	
330	Study Guide	6-3.3, 6-3.5	
331	Homework Practice	6-3.3, 6-3.5	
332	Mini-Project	6-3.3, 6-3.5	
<b>12-5 Solving Multiplication Equations</b>			657–660
333	Explore Through Reading	6-3.3, 6-3.5	
334	Study Guide	6-3.3, 6-3.5	
335	Homework Practice	6-3.3, 6-3.5	
336	Problem-Solving Practice	6-3.3, 6-3.5	
337	<b>Chapter 12 Test</b>		

## Additional Resources

*Math Triumphs*, Grade 6 [Book 2]: Chapter 5 (Multiplication) and Chapter 6 (Division)

*Math Triumphs*, Grade 6 [Book 3]: Chapter 8 (Properties) and Chapter 10 (Formulas)

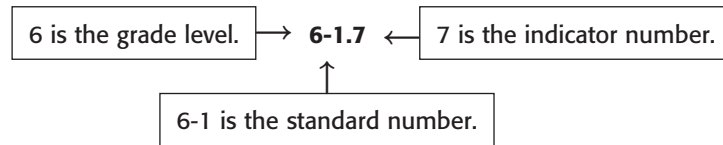




# South Carolina Academic Standards

## Grade 6 Mathematics

This diagram shows what each part of the Indicator number means.



<b>Mathematical Processes</b>	
<b>Standard 6-1:</b>	The student will understand and utilize the mathematical processes of problem solving, reasoning and proof, communication, connections, and representation.
<b>6-1.1</b>	Generate and solve complex abstract problems that involve modeling physical, social, and/or mathematical phenomena.
<b>6-1.2</b>	Evaluate conjectures and pose follow-up questions to prove or disprove conjectures.
<b>6-1.3</b>	Use inductive and deductive reasoning to formulate mathematical arguments.
<b>6-1.4</b>	Understand equivalent symbolic expressions as distinct symbolic forms that represent the same relationship.
<b>6-1.5</b>	Generalize mathematical statements based on inductive and deductive reasoning.
<b>6-1.6</b>	Use correct and clearly written or spoken words, variables, and notations to communicate about significant mathematical tasks.
<b>6-1.7</b>	Generalize connections among a variety of representational forms and real-world situations.
<b>6-1.8</b>	Use standard and nonstandard representations to convey and support mathematical relationships.
<b>Number and Operations</b>	
<b>Standard 6-2:</b>	The student will demonstrate through the mathematical processes an understanding of the concepts of whole-number percentages, integers, and ratio and rate; the addition and subtraction of fractions; accurate, efficient, and generalizable methods of multiplying and dividing fractions and decimals; and the use of exponential notation to represent whole numbers.
<b>6-2.1</b>	Understand whole-number percentages through 100.
<b>6-2.2</b>	Understand integers.
<b>6-2.3</b>	Compare rational numbers and whole-number percentages through 100 by using the symbols $\leq$ , $\geq$ , $<$ , $>$ , and $=$ .
<b>6-2.4</b>	Apply an algorithm to add and subtract fractions.
<b>6-2.5</b>	Generate strategies to multiply and divide fractions and decimals.
<b>6-2.6</b>	Understand the relationship between ratio/rate and multiplication/division.
<b>6-2.7</b>	Apply strategies and procedures to determine values of powers of 10, up to $10^6$ .
<b>6-2.8</b>	Represent the prime factorization of numbers by using exponents.
<b>6-2.9</b>	Represent whole numbers in exponential form.



# South Carolina Academic Standards

## Grade 6 Mathematics (continued)

### Algebra

**Standard 6-3:** The student will demonstrate through the mathematical processes an understanding of writing, interpreting, and using mathematical expressions, equations, and inequalities.

**6-3.1** Analyze numeric and algebraic patterns and pattern relationships.

**6-3.2** Apply order of operations to simplify whole-number expressions.

**6-3.3** Represent algebraic relationships with variables in expressions, simple equations, and simple inequalities.

**6-3.4** Use the commutative, associative, and distributive properties to show that two expressions are equivalent.

**6-3.5** Use inverse operations to solve one-step equations that have whole-number solutions and variables with whole-number coefficients.

### Geometry

**Standard 6-4:** The student will demonstrate through the mathematical processes an understanding of shape, location, and movement within a coordinate system; similarity, complementary, and supplementary angles; and the relationship between line and rotational symmetry.

**6-4.1** Represent with ordered pairs of integers the location of points in a coordinate grid.

**6-4.2** Apply strategies and procedures to find the coordinates of the missing vertex of a square, rectangle, or right triangle when given the coordinates of the polygon's other vertices.

**6-4.3** Generalize the relationship between line symmetry and rotational symmetry for two-dimensional shapes.

**6-4.4** Construct two-dimensional shapes with line or rotational symmetry.

**6-4.5** Identify the transformation(s) used to move a polygon from one location to another in the coordinate plane.

**6-4.6** Explain how transformations affect the location of the original polygon in the coordinate plane.

**6-4.7** Compare the angles, side lengths, and perimeters of similar shapes.

**6-4.8** Classify shapes as similar.

**6-4.9** Classify pairs of angles as either complementary or supplementary.

### Measurement

**Standard 6-5:** The student will demonstrate through the mathematical processes an understanding of surface area; the perimeter and area of irregular shapes; the relationships among the circumference, diameter, and radius of a circle; the use of proportions to determine unit rates; and the use of scale to determine distance.

**6-5.1** Explain the relationships among the circumference, diameter, and radius of a circle.

**6-5.2** Apply strategies and formulas with an approximation of  $\pi$  (3.14, or  $\frac{22}{7}$ ) to find the circumference and area of a circle.

**6-5.3** Generate strategies to determine the surface area of a rectangular prism and a cylinder.

**6-5.4** Apply strategies and procedures to estimate the perimeters and areas of irregular shapes.

**6-5.5** Apply strategies and procedures of combining and subdividing to find the perimeters and areas of irregular shapes.

**6-5.6** Use proportions to determine unit rates.

**6-5.7** Use a scale to determine distance.



# South Carolina Academic Standards

## Grade 6 Mathematics (continued)

### Data Analysis and Probability

**Standard 6-6:** The student will demonstrate through the mathematical processes an understanding of the relationships within one population or sample.

**6-6.1** Predict the characteristics of one population based on the analysis of sample data.

**6-6.2** Organize data in frequency tables, histograms, or stem-and-leaf plots as appropriate.

**6-6.3** Analyze which measure of central tendency (mean, median, or mode) is the most appropriate for a given purpose.

**6-6.4** Use theoretical probability to determine the sample space and probability for one- and two-stage events such as tree diagrams, models, lists, charts, and pictures.

**6-6.5** Apply procedures to calculate the probability of complementary events.





# Prerequisite Skills Check

- 1** Kenny had a wire that was 13.5 meters long. He used 9.62 meters of the wire. How much wire is left?

(A) 3.88 meters  
 (B) 3.92 meters  
 (C) 4.12 meters  
 (D) 8.33 meters

- 2** The estimated population of South Carolina in 2006 was 4,321,249. What is the value of the 3?

(A) three million  
 (B) three hundred-thousand  
 (C) thirty thousand  
 (D) three thousand

- 3** Shandra spent the following amounts on 6 lunches.

\$4, \$9, \$6, \$7, \$7, \$5

What is the median of these numbers?

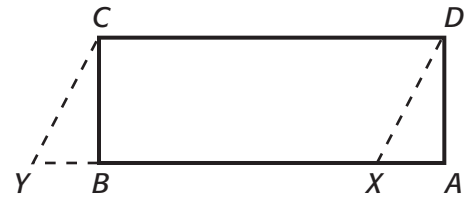
(A) 7  
 (B) 6.5  
 (C) 6.33  
 (D) 5

- 4** Which is closest to the measure of this angle? Use your protractor to measure.



(A)  $115^\circ$                       (C)  $65^\circ$   
 (B)  $75^\circ$                         (D)  $60^\circ$

- 5** In the figure below,  $ABCD$  is a rectangle and  $XYCD$  is a parallelogram.



If the area of rectangle  $ABCD$  is 112 square feet, what is the area of parallelogram  $XYCD$ ?

(A) 12,554 square feet  
 (B) 224 square feet  
 (C) 112 square feet  
 (D) 56 square feet



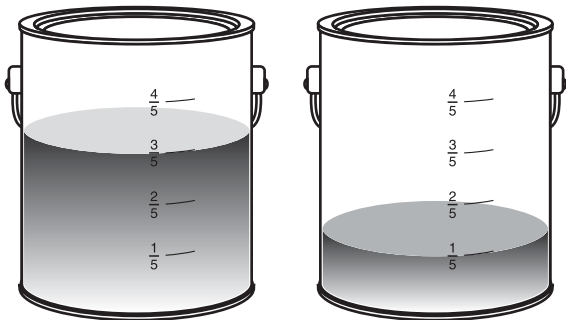


# Prerequisite Skills Check (continued)

- 6** A bag contains 4 red marbles and 5 yellow marbles. Dora pulled out one marble without looking. What is the probability that she pulled out a red marble?

- (A)  $\frac{1}{9}$                       (C)  $\frac{1}{4}$   
 (B)  $\frac{4}{5}$                       (D)  $\frac{4}{9}$

- 7** Peta has  $\frac{3}{5}$  gallon of red paint and  $\frac{1}{5}$  gallon of blue paint as shown in the paint cans below.



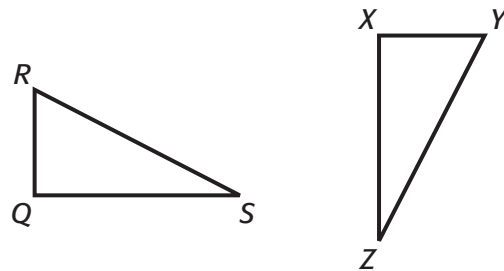
How much more red paint than blue paint does Peta have?

- (A)  $\frac{4}{5}$  gallon                      (C)  $\frac{2}{5}$  gallon  
 (B)  $\frac{3}{5}$  gallon                      (D)  $\frac{1}{5}$  gallon

- 8** Which value below is equivalent to 2 kilograms?

- (A) 50 grams                      (C) 500 grams  
 (B) 200 grams                      (D) 2,000 grams

- 9** Triangle  $QRS$  is congruent to triangle  $XYZ$ .



Based on this information, what can you determine about the relationship of the two triangles?

- (A) Angles  $Q$  and  $Y$  have the same measure.  
 (B) Angles  $S$  and  $Z$  have the same measure.  
 (C) Line segments  $QR$  and  $YZ$  are equal in length.  
 (D) Line segments  $RS$  and  $YZ$  are equal in length.

- 10** Melissa scored 10 points at a basketball game. Isabel scored half as many points as Melissa. Which number sentence can be used to find the number of points  $p$  that Isabel scored?

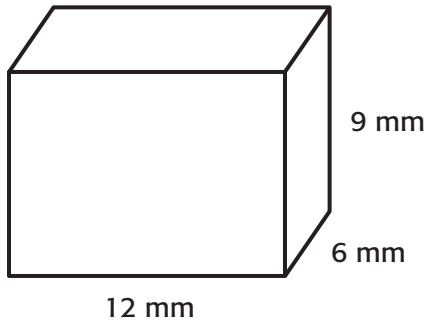
- (A)  $10 \div 2 = p$   
 (B)  $10 \times 2 = p$   
 (C)  $10 + 2 = p$   
 (D)  $10 - 2 = p$





# Prerequisite Skills Check (continued)

- 11** Ms. Lee's art class begins at 5:15 P.M. It takes her 25 minutes to drive to class. What is the latest time she can leave home and arrive on time?
- (A) 4:45 P.M.
  - (B) 4:50 P.M.
  - (C) 4:55 P.M.
  - (D) 5:00 P.M.

**12**

What is the volume of the rectangular prism shown above?

- (A) 648 cubic millimeters
- (B) 108 cubic millimeters
- (C) 72 cubic millimeters
- (D) 27 cubic millimeters

- 13** A concert hall has 1,008 seats. Each row has 16 seats. How many rows of seats are there?
- (A) 603 rows
  - (B) 69 rows
  - (C) 64 rows
  - (D) 63 rows

- 14** Which of the numbers below is **not** divisible by any of the numbers 3, 6, or 9?
- (A) 630
  - (B) 375
  - (C) 315
  - (D) 245

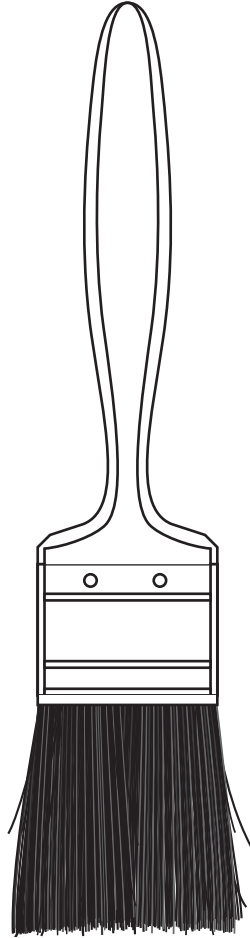
- 15** A triangle has an area of 36 square inches. If its base is 8 inches long, what is the height of the triangle?
- (A) 12 inches
  - (B) 9 inches
  - (C) 6 inches
  - (D) 4.5 inches





# Prerequisite Skills Check (continued)

- 16** What is the length of the paint brush? Use a ruler to measure the length to the nearest eighth of an inch.



- (A)  $5\frac{3}{8}$  inches  
(B)  $5\frac{1}{8}$  inches  
(C)  $4\frac{7}{8}$  inches  
(D)  $4\frac{5}{8}$  inches

- 17** Which of the following is a true statement?

- (A)  $\frac{2}{5} > \frac{3}{5}$   
(B)  $\frac{9}{15} > \frac{3}{5}$   
(C)  $\frac{6}{10} > \frac{3}{5}$   
(D)  $\frac{8}{10} > \frac{3}{5}$

- 18** Which equation describes the relationships of all of the values in the function table below?

x	y
0	0
2	4
7	14
8	16

- (A)  $y = x$   
(B)  $y = \frac{x}{2}$   
(C)  $y = x + 2$   
(D)  $y = 2x$







# Prerequisite Skills Check (continued)

**19** Susan weighed her puppy every month for 8 months. Which of the following would best represent the puppy's change in weight over time?

- (A) circle graph
- (B) line plot
- (C) line graph
- (D) bar graph

**20** Which number says "one and twenty-five thousandths?"

- (A) 1,250,000
- (B) 125,000
- (C) 1.250
- (C) 1.025

**21** Which of the following numbers is a prime number?

- (A) 14
- (B) 36
- (C) 41
- (D) 50

**22** Analyze the pattern. Which number is missing from the table?

x	y
0	1
1	4
2	7
3	
4	13

- (A) 8
- (B) 9
- (C) 10
- (D) 11

**23** The spotted salamander, South Carolina's state amphibian, can be 200 millimeters in length. Which of the following describes its length using an appropriate larger unit?

- (A) 20 meters
- (B) 2 meters
- (C) 20 centimeters
- (D) 20 centigrams





# Prerequisite Skills Check (continued)

**24** A math teacher told the class that the mode of their test scores was 90. What can you conclude about their scores?

- (A) No one failed the test.
- (B) The most frequent score was 90.
- (C) The middle score was 90.
- (D) The highest score was 90.

**25** What is the greatest common factor (GCF) of 28 and 42?

- (A) 28
- (B) 14
- (C) 7
- (D) 3

**26** Pedro ran a 1-mile race in 7.519 minutes. Amada took 0.093 minutes longer to run the same distance. What was Amanda's time?

- (A) 7.426 minutes
- (B) 7.512 minutes
- (C) 7.602 minutes
- (D) 7.612 minutes

**27** Emily used the following shortcut.

$$\begin{aligned} 12 \times 105 &= (12 \times 100) + (12 \times 5) \\ &= 1,200 + 60 = 1,260 \end{aligned}$$

Which property did Emily use?

- (A) Commutative Property of Addition
- (B) Commutative Property of Multiplication
- (C) Distributive Property
- (D) Associative Property of Multiplication

**28**



The Eastern Tiger Swallowtail is South Carolina's state butterfly.

What kind of symmetry does the butterfly show?

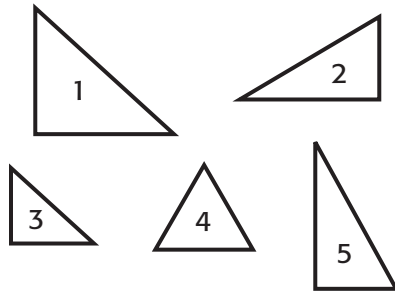
- (A) line symmetry only
- (B) rotational symmetry only
- (C) line and rotational symmetry
- (D) no symmetry





# Prerequisite Skills Check (continued)

29



Which triangles above are congruent?

- (A) triangle 1 and triangle 5
- (B) triangle 1 and triangle 3
- (C) triangle 2 and triangle 5
- (D) none of the triangles

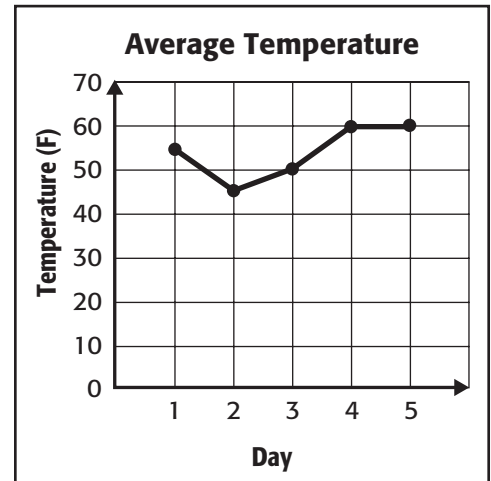
30

The temperature outdoors reads  $36^{\circ}\text{C}$ . Which of the following is most likely true?

- (A) The Fahrenheit temperature is comfortable enough to wear a light sweater.
- (B) The Fahrenheit temperature is just about freezing. It might snow.
- (C) The Fahrenheit temperature is very hot. You can go swimming.
- (D) The Fahrenheit temperature is hot enough to boil water.

31

Doug wants to find the average high temperature in February in Charleston, SC. Can Doug find the average high temperature using the data below?



- (A) Yes, because he collected a sample of February's high temperatures.
- (B) No, because his 5 days of weather data is too small a sample.
- (C) Yes, because weather forecasters say it is a colder than usual February.
- (D) No, because he should have used a line plot.





# Prerequisite Skills Check (continued)

- 32** Dwayne surveys the 320 students in his school to find out the favorite after-school sport. Which of the following would be an appropriate interval for him to use in a graph to display his data?

(A) 1  
(B) 20  
(C) 100  
(D) 320

- 33** Use the ruler to help you solve the problem. What is  $2\frac{1}{4} - \frac{3}{4}$ ?

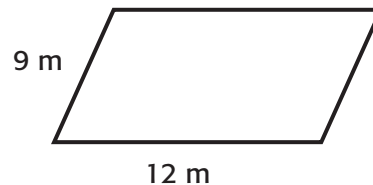


(A) 3  
(B)  $2\frac{1}{2}$   
(C)  $1\frac{1}{2}$   
(D)  $\frac{1}{2}$

- 34** A box contains 5 red balls, 7 green balls, and a number of yellow balls. If you draw out a ball without looking, the probability is  $\frac{5}{15}$  that you draw a red ball and  $\frac{7}{15}$  that you draw a green ball. What is the probability that you will draw a yellow ball?

(A)  $\frac{15}{15}$   
(B)  $\frac{12}{15}$   
(C)  $\frac{3}{15}$   
(D)  $\frac{2}{15}$

**35**



What is the perimeter of the figure above?

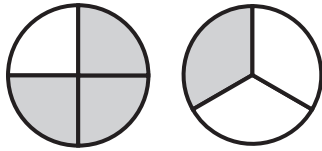
(A) 21 meters  
(B) 42 meters  
(C) 54 meters  
(D) 108 meters





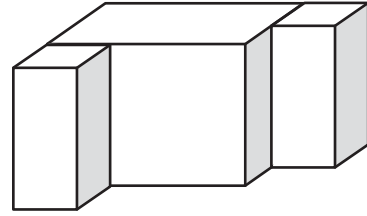
# Prerequisite Skills Check (continued)

- 36** A recipe requires  $\frac{3}{4}$  cup of flour and  $\frac{1}{3}$  cup sugar. What is the total amount of flour and sugar needed?



- (A)  $\frac{5}{12}$  cup  
 (B)  $\frac{4}{7}$  cup  
 (C)  $\frac{10}{12}$  cup  
 (D)  $\frac{13}{12}$  cup
- 
- 37** What is the least common multiple (LCM) of 20 and 30?

- (A) 10  
 (B) 30  
 (C) 60  
 (D) 600

**38**

Which shape shows the bottom view of the figure above?

- (A)
- (B)
- (C)
- (D)





# Prerequisite Skills Check (continued)

- 39** Which table shows the values represented by the equation below?

$$y = 4x + 1$$

(A)

x	y
0	0
1	4
2	8
3	12

(B)

x	y
0	1
1	2
2	3
3	4

(C)

x	y
0	1
1	5
2	9
3	13

(D)

x	y
0	1
1	6
2	11
3	16

- 40** Which table shows the values represented by the equation

$$y = x + 2?$$

(A)

x	y
2	4
4	7
6	9
8	11

(B)

x	y
-3	-5
2	0
7	5
12	10

(C)

x	y
0	2
4	6
8	10
12	14

(D)

x	y
-2	4
4	10
12	18
18	20





# Prerequisite Skills Check (continued)

- 41** Which symbol makes the following expression true?

$$1,945,267 \text{ \_\_\_\_ } 2,045,267$$

- (A)  $>$   
 (B)  $<$   
 (C)  $=$   
 (D)  $+$

- 42** Which of the following statements about the number 36 is true?

- (A) 36 is a prime number.  
 (B) 36 is a composite number.  
 (C) 36 is less than 18.  
 (D) 5 is a factor of 36.

- 43** Which of the following is equivalent to 4 meters?

- (A) 0.4 centimeters  
 (B) 4 centimeters  
 (C) 40 centimeters  
 (D) 400 centimeters

- 44** The following table shows the costs of movie tickets.

Number of tickets	2	5	12
Cost	\$16	\$40	\$76

Which of the following statements about the data in the table is true?

- (A) The cost of 1 ticket is equal to the cost of 2 tickets.  
 (B) The cost of 1 ticket is \$16.  
 (C) The cost of 1 ticket is \$8.  
 (D) The cost of each ticket is different depending on the number of tickets purchased.

- 45** Which of the following expressions is true?

- (A)  $0.018 < 0.118$       (C)  $0.018 = 1.08$   
 (B)  $0.18 > 0.81$       (D)  $0.81 > 0.88$

- 46** Joshua brought 5 liters of juice to the class party. How many milliliters of juice did he bring?

- (A) 50,000 milliliters  
 (B) 5,000 milliliters  
 (C) 500 milliliters  
 (D) 50 milliliters





# Prerequisite Skills Check (continued)

- 47** Which rule best describes the pattern of the numbers shown in the list below?

10, 8, 13, 11, 16, 14, 19

- (A) Subtract 5, then subtract 2.
- (B) Add 2, then subtract 5.
- (C) Add 5, then subtract 2.
- (D) Subtract 2, then add 5.

- 48** Which of the following lists shows all composite numbers?

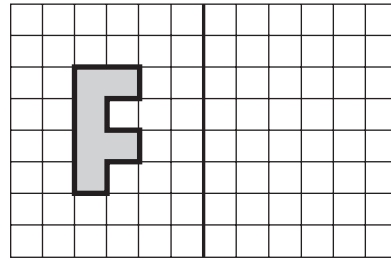
- (A) 0, 1, 3, 5
- (B) 4, 6, 8, 10
- (C) 0, 2, 4, 6
- (D) 3, 6, 9, 12

- 49** Write the term that correctly completes the following sentence.

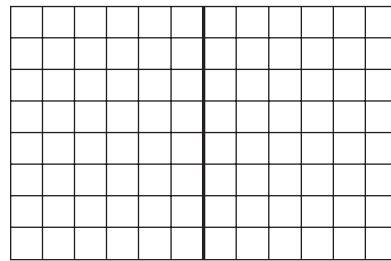
To check the answer to a division problem, you can multiply the \_\_\_\_\_ and the dividend.

- 50** Look at the block letter F on the grid. What will the diagram look like after a reflection over a vertical line followed by a  $90^\circ$  clockwise rotation? Draw the steps.

Step 1: Draw the reflection.



Step 2: Then draw the rotation.



Describe another sequence of transformations that would give you the same result.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_





**1****Anticipation Guide****Algebra: Number Patterns and Functions****STEP 1** *Before you begin Chapter 1*

- Read each statement.
- Decide whether you Agree (A) or Disagree (D) with the statement.
- Write A or D in the first column OR if you are not sure whether you agree or disagree, write NS (Not Sure).

STEP 1 A, D, or NS	Statement	STEP 2 A or D
	1. An estimate is not a good indication of the answer to a problem because an estimate is not the exact answer.	
	2. To determine when an estimate can be used to answer a problem, look for words such as “about” that indicate an exact answer is not needed.	
	3. A prime number is any number with more than two factors.	
	4. $4^1$ and 4 are equivalent.	
	5. A number to the second power, such as $7^2$ , is said to be <i>squared</i> .	
	6. In using the order of operations to simplify an expression, all addition and subtraction should be done first.	
	7. In using the order of operations to simplify an expression, multiply and divide in order from left to right.	
	8. In the expression $3x + 4$ , $x$ is called a <i>variable</i> .	
	9. Using a guess and check strategy to solve a math problem is never a good idea.	
	10. To solve the equation $t - 5 = 12$ , subtract 5 from 12.	
	11. The area of a rectangle is found by multiplying the length by the width.	
	12. The dimensions of a rectangle with an area of 12 square units must be 4 and 3.	

**STEP 2** *After you complete Chapter 1*

- Reread each statement and complete the last column by entering an A (Agree) or a D (Disagree).
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a separate sheet of paper to explain why you disagree. Use examples, if possible.

**1 Family Activity****State Test Practice**

**Fold the page along the dashed line. Work each problem on another piece of paper. Then unfold the page to check your work.**

1. For the table below, find the expression that can be used to find term  $n$  in the sequence. Which expression can be used to find  $n$ ?

Position, $n$	Value of Term
1	6
2	8
3	10
4	12
5	14
$n$	?

- A**  $3n + 2$                       **C**  $2n + 4$   
**B**  $2n - 2$                       **D**  $2n + 3$

**Fold here.**

**Solution**

1. *Hint: Remember to test at least three of the number pairs in the expressions before deciding on an answer. Some expressions may work for one of the pairs, but not all of them.*

While  $3n + 2$  will work for the second pair ( $3 \times 2 + 2 = 8$ ), it does not work with the rest of the number pairs (For example:  $3 \times 1 + 2 \neq 6$ ).

$2n - 2$  and  $2n + 3$  do not work for any of the pairs.

The expression that does work for all of them is  $2n + 4$ . This is modeled below:

$$\begin{aligned} 2 \times 1 + 4 &= 6 \\ 2 \times 2 + 4 &= 8 \\ 2 \times 3 + 4 &= 10 \\ 2 \times 4 + 4 &= 12 \\ 2 \times 5 + 4 &= 14 \end{aligned}$$

The answer is **C**.

2. What is the prime factorization for 125?

- A**  $5 \times 25$   
**B**  $5^3$   
**C**  $12 \times 5$   
**D**  $3^5$

**Solution**

2. *Hint: Prime factorization is the expression of a number as the product of prime numbers. A prime number is a number that is divisible only by one and itself.*

Both **A** and **C** are wrong because they contain numbers that are not prime.

If you find the value of the remaining two choices, you will find that **B** ( $5^3 = 5 \times 5 \times 5$ ) equals 125 while **D** ( $3^5 = 3 \times 3 \times 3 \times 3 \times 3$ ) equals 243.

The answer is **B**.

**1-1****Explore Through Reading**

6-3.1, 6-1.1

**A Plan for Problem Solving****Get Ready for the Lesson**

Read the introduction at the top of page 24 in your textbook.

Write your answers below.

1. How many purple and yellow beads are used to make one necklace?
2. How many purple and yellow beads will be needed to make all eight necklaces?
3. Explain how you found the number of each color of beads needed to make all eight necklaces.

**Read the Lesson**

4. Why do you think understanding the problem is so important to finding the solution?
5. Relate the plan step of the problem solving strategy to preparing for a trip.
6. In the four-step plan for problem solving, think about the term *check*. Does *check* come before or after the solution? (*Hint*: What are you checking?)

**Remember What You Learned**

7. Think about the four steps in the problem-solving plan: Understand, Plan, Solve, Check. Write a sentence about something you like to help you remember the four words. For example, "I understand how to play chess."

**1-1****Study Guide**

6-3.1, 6-1.1

**A Plan for Problem Solving**

When solving problems, it is helpful to have an organized plan to solve the problem. The following four steps can be used to solve any math problem.

- 1 Understand** – Read and get a general understanding of the problem.
- 2 Plan** – Make a plan to solve the problem and estimate the solution.
- 3 Solve** – Use your plan to solve the problem.
- 4 Check** – Check the reasonableness of your solution.

**Example 1** **SPORTS** The table shows the number of field goals made by Henry High School's top three basketball team members during last year's season. How many more field goals did Brad make than Denny?

Name	3-Point Field Goals
Brad	216
Chris	201
Denny	195

- Understand** You know the number of field goals made. You need to find how many more field goals Brad made than Denny.
- Plan** Use only the needed information, the goals made by Brad and Denny. To find the difference, subtract 195 from 216.
- Solve**  $216 - 195 = 21$ ; Brad made 21 more field goals than Denny.
- Check** Check the answer by adding. Since  $195 + 21 = 216$ , the answer is correct.

**Exercises**

1. During which step do you check your work to make sure your answer is correct?
2. Explain what you do during the first step of the problem-solving plan.

**SPORTS** For Exercises 3 and 4, use the field goal table above and the four-step plan.

3. How many more field goals did Chris make than Denny?
4. How many field goals did the three boys make all together?

**1-1**

**Homework Practice**



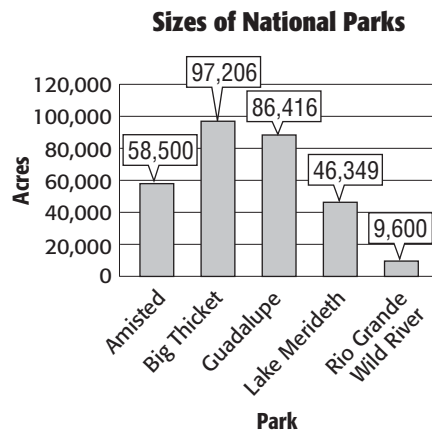
6-3.1, 6-1.1

**A Plan for Problem Solving**

**PATTERNS** Complete each pattern.

- 1. 17, 21, 25, 29, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_,
- 2. 32, 29, 26, 23, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_,
- 3. 1, 2, 4, 7, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_,
- 4. 64, 32, 16, 8, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_,

5. **ANALYZE GRAPHS** Refer to the graph. How many acres smaller is Lake Meredith National Recreation Area than Big Thicket National Preserve?



6. **TRAVEL** The distance between Dallas and Beaumont is about 290 miles. Henry drove from Dallas to Beaumont at 58 miles per hour. How many hours did it take Henry to reach Beaumont?

7. **ANALYZE TABLES** The table lists the times that ferries leave the terminal every day. At what times will the next three ferries leave the terminal?

- 6:36 A.M.
- 7:11 A.M.
- 7:17 A.M.
- 7:52 A.M.
- 7:58 A.M.

8. **MONEY** The Wilsons bought a refrigerator and a stove for a total cost of \$745. They will pay for the purchase in five equal payments. What will be the amount of each payment?

9. **MUSIC** Luanda practices playing the piano for 24 minutes each day. How many hours does she practice in one year?

**1-1**

**Problem-Solving Practice**



6-3.1, 6-1.1

**A Plan for Problem Solving**

Use the four-step plan to solve each problem.

**GEOGRAPHY** For Exercises 1 and 2, use the poster information about Crater Lake National Park in Oregon.

**Visit Crater Lake National Park**

90 miles of trails  
26 miles of shoreline  
Boat tours available  
Open 24 hours

Directions from Klamath Falls: Take U.S. Highway 97 north 21 miles, then go west on S.R. 62 for 29 miles.

<p><b>1.</b> How many more miles of trails are there than miles of shoreline in Crater Lake National Park?</p>	<p><b>2.</b> How many miles is it from Klamath Falls to Crater Lake National Park?</p>
<p><b>3. SPORTS</b> Jasmine swims 12 laps every afternoon, Monday through Friday. How many laps does she swim in one week?</p>	<p><b>4. SPORTS</b> Samantha can run one mile in 8 minutes. At this rate, how long will it take for her to run 5 miles?</p>
<p><b>5. SPORTS</b> On a certain day, 525 people signed up to play softball. If 15 players are assigned to each team, how many teams can be formed?</p>	<p><b>6. PATTERNS</b> Complete the pattern: 5, 7, 10, 14, ____, ____, ____</p>
<p><b>7. SHOPPING</b> Josita received \$50 as a gift. She plans to buy two cassette tapes that cost \$9 each and a headphone set that costs \$25. How much money will she have left?</p>	<p><b>8. BUS SCHEDULE</b> A bus stops at the corner of Elm Street and Oak Street every half hour between 9 A.M. and 3 P.M. and every 15 minutes between 3 P.M. and 6 P.M. How many times will a bus stop at the corner between 9 A.M. and 6 P.M.?</p>

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**1-3****Explore Through Reading**

6-2.8, 6-2.9

***Powers and Exponents*****Get Ready for the Lesson**

Complete the Mini Lab at the top of page 32 in your textbook.  
Write your answers below.

1. What prime factors did you record?
2. How does the number of folds relate to the number of factors in the prime factorization of the number of holes?
3. Write the prime factorization of the number of holes made if you folded it eight times.

**Read the Lesson**

4. Describe the expression  $2^5$ . In your description, use the terms *power*, *base*, and *exponent*.
5. In the power  $3^5$ , what does the exponent 5 indicate?
6. Complete the following table.

Expression	Words
$4^3$	
$7^2$	
$9^6$	
$8 \times 8 \times 8 \times 8$	
$3 \times 3 \times 3 \times 3 \times 3$	

**Remember What You Learned**

7. Explain how to find the value of  $5^4$ .

**1-3****Study Guide**

6-2.8, 6-2.9

**Powers and Exponents**

A product of prime factors can be written using exponents and a base. Numbers expressed using exponents are called **powers**.

Powers	Words	Expression	Value
$4^2$	4 to the second power or 4 squared	$4 \times 4$	16
$5^6$	5 to the sixth power	$5 \times 5 \times 5 \times 5 \times 5 \times 5$	15,625
$7^4$	7 to the fourth power	$7 \times 7 \times 7 \times 7$	2,401
$9^3$	9 to the third power or 9 cubed	$9 \times 9 \times 9$	729

**Example 1** Write  $6 \times 6 \times 6$  using an exponent. Then find the value.

The base is 6. Since 6 is a factor 3 times, the exponent is 3.

$$6 \times 6 \times 6 = 6^3 \text{ or } 216$$

**Example 2** Write  $2^4$  as a product of the same factor. Then find the value.

The base is 2. The exponent is 4. So, 2 is a factor 4 times.

$$2^4 = 2 \times 2 \times 2 \times 2 \text{ or } 16$$

**Example 3** Write the prime factorization of 225 using exponents.

The prime factorization of 225 can be written as  $3 \times 3 \times 5 \times 5$ , or  $3^2 \times 5^2$ .

**Exercises**

Write each product using an exponent. Then find the value.

1.  $2 \times 2 \times 2 \times 2 \times 2$

2.  $9 \times 9$

3.  $3 \times 3 \times 3$

4.  $5 \times 5 \times 5$

5.  $3 \times 3 \times 3 \times 3 \times 3$

6.  $10 \times 10$

Write each power as a product of the same factor. Then find the value.

7.  $7^2$

8.  $4^3$

9.  $8^4$

10.  $5^5$

11.  $2^8$

12.  $7^3$

Write the prime factorization of each number using exponents.

13. 40

14. 75

15. 100

16. 147



**1-3****Homework Practice**

6-2.8, 6-2.9

***Powers and Exponents***

Write each product using an exponent.

1.  $6 \times 6$

2.  $10 \times 10 \times 10 \times 10$

3.  $4 \times 4 \times 4 \times 4 \times 4$

4.  $8 \times 8 \times 8 \times 8 \times 8 \times 8 \times 8 \times 8$

5.  $5 \times 5 \times 5 \times 5 \times 5 \times 5$

6.  $13 \times 13 \times 13$

Write each power as a product of the same factor. Then find the value.

7.  $10^1$

8.  $2^7$

9.  $8^3$

10.  $3^8$

11. nine squared

12. four to the sixth power

Write the prime factorization of each number using exponents.

13. 32

14. 100

15. 63

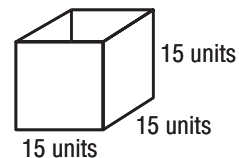
16. 99

17. 52

18. 147

19. **LABELS** A sheet of labels has 8 rows of labels with 8 labels in each row. How many total labels are on the sheet? Write your answer using exponents, and then find the value.

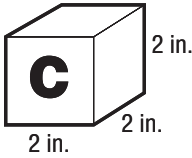
20. **CANDLES** To find how much wax the candle mold holds, use the expression  $s \times s \times s$ , where  $s$  is the length of a side. Write this expression as a power. The amount of wax the mold holds is measured in cubic units. How many cubic units of wax does the mold hold?



**1-3****Problem-Solving Practice**

6-2.8, 6-2.9

**Powers and Exponents**

<p><b>1. SPACE</b> The Sun is about <math>10 \cdot 10</math> million miles away from Earth. Write <math>10 \cdot 10</math> using an exponent. Then find the value of the power. How many miles away is the Sun?</p>	<p><b>2. WEIGHT</b> A 100-pound person on Earth would weigh about <math>4 \cdot 4 \cdot 4 \cdot 4</math> pounds on Jupiter. Write <math>4 \cdot 4 \cdot 4 \cdot 4</math> using an exponent. Then find the value of the power. How much would a 100-pound person weigh on Jupiter?</p>
<p><b>3. ELECTIONS</b> In the year 2000, the governor of Washington, Gary Locke, received about <math>10^6</math> votes to win the election. Write this as a product. How many votes did Gary Locke receive?</p>	<p><b>4. SPACE</b> The diameter of Mars is about <math>9^4</math> kilometers. Write <math>9^4</math> as a product. Then find the value of the product.</p>
<p><b>5. SPACE</b> The length of one day on Venus is <math>3^5</math> Earth days. Express this exponent as a product. Then find the value of the product:</p>	<p><b>6. GEOGRAPHY</b> The area of San Bernardino County, California, the largest county in the U.S., is about 39 square miles. Write this as a product. What is the area of San Bernardino County?</p>
<p><b>7. GEOMETRY</b> The volume of the block shown can be found by multiplying the width, length, and height. Write the volume using an exponent. Find the volume.</p> 	<p><b>8. SPACE</b> A day on Jupiter lasts about 10 hours. Write a product and an exponent to show how many hours are in 10 Jupiter days. Then find the value of the power.</p>

**1-4****Explore Through Reading****Order of Operations****Get Ready for the Lesson**

Read the introduction at the top of page 37 in your textbook.

Write your answers below.

1. How much would 3 boxes of popcorn cost? 4 sandwiches?
2. Find the total cost of buying 3 boxes of popcorn and 4 sandwiches.
3. What two operations did you use in Questions 1 and 2? Explain how to find the answer to Question 2 using these operations.

**Read the Lesson**

4. The steps for finding the value of a numerical expression are listed below. Number the steps in the correct order.  
\_\_\_\_ Find the value of all powers.  
\_\_\_\_ Add and subtract in order from left to right.  
\_\_\_\_ Simplify the expressions inside grouping symbols.  
\_\_\_\_ Multiply and divide in order from left to right.
5. Using the order of operations, explain how you would find the value of  $(7 + 5) \div 2^2 + 8$ .
6. How would the value of  $(7 + 5) \div 2^2 + 8$  differ if you added the 8 before you divided by 4?

**Remember What You Learned**

7. Using only operation symbols and grouping symbols, write the order of operations.

**1-4****Study Guide**

SCAS 6-3.2

**Order of Operations****Order of Operations**

1. Simplify the expressions inside grouping symbols, like parentheses.
2. Find the value of all powers.
3. Multiply and divide in order from left to right.
4. Add and subtract in order from left to right.

**Example 1** Find the value of  $48 \div (3 + 3) - 2^2$ .

$$\begin{aligned}
 48 \div (3 + 3) - 2^2 &= 48 \div 6 - 2^2 && \text{Simplify the expression inside the parentheses.} \\
 &= 48 \div 6 - 4 && \text{Find } 2^2. \\
 &= 8 - 4 && \text{Divide 48 by 6.} \\
 &= 4 && \text{Subtract 4 from 8.}
 \end{aligned}$$

**Example 2** Write and solve an expression to find the total cost of planting flowers in the garden.

Item	Cost Per Item	Number of Items Needed
pack of flowers	\$4	5
bag of dirt	\$3	1
bottle of fertilizer	\$4	1

<b>Words</b>	cost of 5 flower packs	plus	cost of dirt	plus	cost of fertilizer
<b>Expression</b>	$5 \times \$4$	+	\$3	+	\$4

$$\begin{aligned}
 5 \times \$4 + \$3 + \$4 &= \$20 + \$3 + \$4 \\
 &= \$23 + \$4 \\
 &= \$27
 \end{aligned}$$

The total cost of planting flowers in the garden is \$27.

**Exercises****Find the value of each expression.**

1.  $7 + 2 \times 3$
2.  $12 \div 3 + 5$
3.  $16 - (4 + 5)$
4.  $8 \times 8 \div 4$
5.  $10 + 14 \div 2$
6.  $3 \times 3 + 2 \times 4$
7.  $80 - 8 \times 3^2$
8.  $11 \times (9 - 2^2)$
9.  $25 \div 5 + 6 \times (12 - 4)$

10. **GARDENING** Refer to Example 2 above. Suppose that the gardener did not buy enough flowers and goes back to the store to purchase four more packs. She also purchases a hoe for \$16. Write an expression that shows the total amount she spent to plant flowers in her garden.

**1-4****Homework Practice****Order of Operations**

Find the value of each expression.

1.  $34 + 17 - 5$

2.  $25 - 14 + 3$

3.  $42 + 6 \div 2$

4.  $39 \times (15 \div 3) - 16$

5.  $48 \div 8 + 5 \times (7 - 2)$

6.  $64 \div (15 - 7) \times 2 - 9$

7.  $(3 + 7) \times 6 + 4$

8.  $9 + 8 \times 3 - (5 \times 2)$

9.  $7^2 + 6 \times 2$

10.  $34 - 8^2 \div 4$

11.  $45 \div 3 \times 2^3$

12.  $4 \times (5^2 - 12) - 6$

13.  $78 - 2^4 \div (14 - 6) \times 2$

14.  $9 + 7 \times (15 + 3) \div 3^2$

15.  $13 + (4^3 \div 2) \times 5 - 17$

16. Using symbols, write the product of 18 and 7 plus 5.

**ART** For Exercises 17 and 18, use the following information.

An art supply store sells posters for \$9 each and picture frames for \$15 each.

17. Write an expression for the total cost of 6 posters and 6 frames.

18. What is the total cost for 6 framed posters?

19. **SCIENCE** There are 24 students in a science class. Mr. Sato will give each pair of students 3 magnets. So far, Mr. Sato has given 9 pairs of students their 3 magnets. How many more magnets does Mr. Sato need so that each pair of students has exactly 3 magnets?

**1-4****Problem-Solving Practice**

6-3.2

**Order of Operations**

**MONEY** For Exercises 1–3, use the table that shows the price of admission to a movie theater.

Movie Theater Admission
Adults: \$8
Children (under 13): \$5
Matinee (before 6 P.M.): \$3

<p><b>1.</b> Janelle (age 12) and her cousin, Marquita (age 14), go to a 7:00 P.M. show. Write an expression for the total cost of admission. What is the total cost?</p>	<p><b>2.</b> Jan takes her three children and two neighbor's children to a matinee. All of the children are under age 13. Write an expression for the total cost of admission. How much in all did Jan pay for admission?</p>
<p><b>3.</b> Connor (age 13), his sister (age 7), and Connor's parents go to a movie on Saturday night. Write an expression for the total cost. What is the total cost?</p>	<p><b>4. SOCCER</b> Eduardo is 16. Eduardo's dad takes him and his younger sister to a soccer match. Tickets are \$17 for adults and \$13 for children (18 and under). Write an expression for the total cost of the tickets. What is the total cost of the tickets?</p>
<p><b>5. MONEY</b> Frankie orders two hamburgers and a soda for lunch. A hamburger is \$3 and a soda is \$1.00. Write an expression to show how much he paid for lunch. Then find the value of the expression.</p>	<p><b>6. MONEY</b> A store sells barrettes for \$2 each and combs for \$1. Shelby buys 3 barrettes and a comb. Kendra buys 2 barrettes and 4 combs. Write an expression for the amount the two girls spent all together. Find the total amount spent.</p>

**1-5****Explore Through Reading**6-3.3, 6-1.6,  
6-3.2**Algebra: Variables and Expressions****Get Ready for the Lesson**

Read the introduction at the top of page 42 in your textbook.  
Write your answers below.

1. What does *some number* represent?
2. Find the value of the expression *the sum of two and some number* if *some number* is 14.
3. Assume you have two boxes of crayons each with the same number of crayons inside. Write an expression that represents the total number of pieces of crayons in both boxes.

**Read the Lesson**

4. Look up the word *variable* in a dictionary. What definition of the word matches its use in this lesson? If classmates use different dictionaries, compare the meanings among the dictionaries.
5. The introduction uses the expression *some number*, which can also be read as "some unknown value." In the expression *some unknown value*, would the expression *value of the variable* mean the same thing?

**Remember What You Learned**

6. Explain the difference between a numerical expression and an algebraic expression.

**1-5****Study Guide**6-3.3, 6-1.6,  
6-3.2**Algebra: Variables and Expressions**

- A **variable** is a symbol, usually a letter, used to represent a number.
- Multiplication in algebra can be shown as  $4n$ ,  $4 \cdot n$ , or  $4 \times n$ .
- **Algebraic expressions** are combinations of variables, numbers, and at least one operation.

**Example 1** Evaluate  $35 + x$  if  $x = 6$ .

$$\begin{aligned} 35 + x &= 35 + 6 && \text{Replace } x \text{ with } 6. \\ &= 41 && \text{Add } 35 \text{ and } 6. \end{aligned}$$

**Example 2** Evaluate  $y + x$  if  $x = 21$  and  $y = 35$ .

$$\begin{aligned} y + x &= 35 + 21 && \text{Replace } x \text{ with } 21 \text{ and } y \text{ with } 35. \\ &= 56 && \text{Add } 35 \text{ and } 21. \end{aligned}$$

**Example 3** Evaluate  $4n + 3$  if  $n = 2$ .

$$\begin{aligned} 4n + 3 &= 4 \times 2 + 3 && \text{Replace } n \text{ with } 2. \\ &= 8 + 3 && \text{Find the product of } 4 \text{ and } 2. \\ &= 11 && \text{Add } 8 \text{ and } 3. \end{aligned}$$

**Example 4** Evaluate  $4n - 2$  if  $n = 5$ .

$$\begin{aligned} 4n - 2 &= 4 \times 5 - 2 && \text{Replace } n \text{ with } 5. \\ &= 20 - 2 && \text{Find the product of } 4 \text{ and } 5. \\ &= 18 && \text{Subtract } 2 \text{ from } 20. \end{aligned}$$

**Exercises**Evaluate each expression if  $y = 4$ .

- |            |               |                       |
|------------|---------------|-----------------------|
| 1. $3 + y$ | 2. $y + 8$    | 3. $4 \times y$       |
| 4. $9y$    | 5. $15y$      | 6. $300y$             |
| 7. $y^2$   | 8. $y^2 + 18$ | 9. $y^2 + 3 \times 7$ |

Evaluate each expression if  $m = 3$  and  $k = 10$ .

- |                  |                  |                        |
|------------------|------------------|------------------------|
| 10. $16 + m$     | 11. $4k$         | 12. $m \times k$       |
| 13. $m + k$      | 14. $7m + k$     | 15. $6k + m$           |
| 16. $3k - 4m$    | 17. $2mk$        | 18. $5k - 6m$          |
| 19. $20m \div k$ | 20. $m^3 + 2k^2$ | 21. $k^2 \div (2 + m)$ |



**1-5****Homework Practice**6-3.3, 6-1.6,  
6-3.2**Algebra: Variables and Expressions**Evaluate each expression if  $m = 6$  and  $n = 12$ .

1.  $m + 5$

2.  $n - 7$

3.  $m \cdot 4$

4.  $m + n$

5.  $n - m$

6.  $12 \div n$

7.  $9 \cdot n$

8.  $n \div m$

9.  $2m + 5$

10.  $4m - 17$

11.  $36 - 6m$

12.  $3n + 8$

Evaluate each expression if  $a = 9$ ,  $b = 3$ , and  $c = 12$ .

13.  $4a - 17$

14.  $14 + 2c$

15.  $c \div 2$

16.  $ac$

17.  $c \div b$

18.  $2ac$

19.  $b^3 + c$

20.  $19 + 6a \div 2$

21.  $4b^2 \cdot 3$

22.  $3c \div (2b^2)$

23.  $c^2 - (3a)$

24.  $ac \div (2b)$

**25. ANIMALS** A Gentoo penguin can swim at a rate of 17 miles per hour. How many miles can a penguin swim in 4 hours? Use the expression  $rt$ , where  $r$  represents rate and  $t$  represents time.


**26. CLOTHING** A company charges \$6 to make a pattern for an order of T-shirts and \$11 for each T-shirt it produces from the pattern. The expression  $\$11n + \$6$  represents the cost of  $n$  T-shirts with the same pattern. Find the total cost for 5 T-shirts with the same pattern.

**1-5****Problem-Solving Practice**6-3.3, 6-1.6,  
6-3.2**Algebra: Variables and Expressions**

**TRAVEL** For Exercises 1 and 2, use the table that shows the distance between cities in Arizona.

**Arizona Mileage Chart**

	<b>Flagstaff</b>	<b>Phoenix</b>	<b>Tucson</b>	<b>Nogales</b>
<b>Phoenix</b>	136 miles		117 miles	181 miles
<b>Tucson</b>	253 miles	117 miles		64 miles
<b>Nogales</b>	317 miles	181 miles	64 miles	

<p><b>1.</b> To find the speed of a car, use the expression <math>d \div t</math> where <math>d</math> represents the distance and <math>t</math> represents time. Find the speed of a car that travels from Phoenix to Flagstaff in 2 hours.</p>	<p><b>2.</b> To find the time it will take for a bicyclist to travel from Nogales to Tucson, use the expression <math>\frac{d}{s}</math> where <math>d</math> represents distance and <math>s</math> represents speed. Find the time if the bicyclist travels at a speed of 16 miles per hour.</p>
<p><b>3. PERIMETER</b> The perimeter of a rectangle can be found using the formula <math>2\ell + 2w</math>, where <math>\ell</math> represents the length and <math>w</math> represents the width. Find the perimeter if <math>\ell = 6</math> units and <math>w = 3</math> units.</p> <div style="text-align: center;">  </div>	<p><b>4. PERIMETER</b> Another formula for perimeter is <math>2(\ell + w)</math>. Find the perimeter of the rectangle in Exercise 3 using this formula. How do the answers compare? Explain how you used order of operations using this formula.</p>
<p><b>5. SHOPPING</b> Write an expression using a variable that shows how much 3 pairs of jeans will cost if you do not know the price of the jeans. Assume each pair costs the same amount.</p>	<p><b>6. SHOPPING</b> Write an expression using variables to show how much 3 plain T-shirts and 2 printed T-shirts will cost, assuming that the prices of plain and printed T-shirts are not the same.</p>

**1-6****Explore Through Reading**

6-3.3, 6-1.8

**Algebra: Functions****Get Ready for the Lesson**

Read the introduction at the top of page 49 in your textbook.

Write your answers below.

1. Write an expression to represent the number of times a hummingbird beats its wings in 2 seconds; in 6 seconds; and in  $s$  seconds.

**Read the Lesson**

2. If you look up the word *function* in a dictionary, you might find a definition like the following: a quantity whose value depends on that of another quantity or quantities. In the function  $600t$ , what does the value of  $600t$  depend on?
3. Find the function rule for the table below. \_\_\_\_\_

Input ( $x$ )	Output ( $y$ )
0	3
2	5
4	7

**Remember What You Learned**

4. Work with a partner. Each of you should create a table like the one in Exercise 3 above. Decide on a function rule to use for the output quantities, but do not write the rule. Exchange tables with your partner. Identify the function rule that expresses the relationship between the input quantity and the output quantity.

## 1-6

## Study Guide



6-3.3, 6-1.8

## Algebra: Functions

A **function rule** describes the relationship between the input and output of a **function**. The inputs and outputs can be organized in a **function table**.

**Example 1** Complete the function table.

Input ( $x$ )	Output ( $x - 3$ )
9	■
8	■
6	■

The function rule is  $n - 7$ . Subtract 7 from each input.

Input		Output		Input ( $x$ )	Output ( $x - 3$ )
9	$- 3 \rightarrow$	6	$\rightarrow$	9	6
8	$- 3 \rightarrow$	5		8	5
6	$- 3 \rightarrow$	3		6	3

**Example 2** Find the rule for the function table.

Input ( $x$ )	Output (■)
0	0
1	4
2	8

Study the relationship between each input and output.

Input		Output
0	$\times 4 \rightarrow$	0
1	$\times 4 \rightarrow$	4
2	$\times 4 \rightarrow$	8

The output is four times the input. So, the function rule is  $4x$ .

## Exercises

Complete each function table.

1.

Input ( $x$ )	Output ( $2x$ )
0	
2	
4	

2.

Input ( $x$ )	Output ( $4 + x$ )
0	
1	
4	

Find the rule for each function table.

3.

Input ( $x$ )	Output (■)
1	3
2	4
5	7

4.

Input ( $x$ )	Output (■)
2	1
6	3
10	5

**1-6****Homework Practice**

6-3.3, 6-1.8

**Algebra: Functions**

Complete each function table.

1.

Input ( $x$ )	Output ( $x + 6$ )
0	
3	
7	

2.

Input ( $x$ )	Output ( $x - 1$ )
1	
4	
8	

3.

Input ( $x$ )	Output ( $3x$ )
0	
2	
4	

4.

Input ( $x$ )	Output ( $x \div 2$ )
4	
8	
10	

Find the rule for each function table.

5.

$x$	■
4	1
8	2
16	4

6.

$x$	■
12	8
13	9
15	11

7.

$x$	■
2	1
6	3
10	5

8.

$x$	■
3	0
5	2
6	3
8	5
11	8

9.

$x$	■
0	3
1	6
2	9
3	12
4	15

10.

$x$	■
2	5
4	13
6	21
8	29
10	37

11. **FOOD** A pizza place sells pizzas for \$7 each plus a \$4 delivery charge per order. If Pat orders 3 pizzas to be delivered, what will be his total cost?

12. **MOVIES** A store sells used DVDs for \$8 each and used videotapes for \$6 each. Write a function rule to represent the total selling price of DVDs ( $d$ ) and videotapes ( $v$ ). Then use the function rule to find the price of 5 DVDs and 3 videotapes.

**1-6****Problem-Solving Practice**

6-3.3, 6-1.8

**Algebra: Functions**

<p><b>1. DRAGONS</b> The Luck Dragons that live in the Enchanted Forest weigh <math>4x</math> pounds when they are <math>x</math> years old. Write a function table that can be used to find the weights of 6-year old, 8-year old, and 10-year old Luck Dragons.</p>	<p><b>2. ROLLER COASTER</b> Twelve people are able to ride the Serpent of Fire roller coaster at one time. Write a function table that shows the total number of people that have been on the roller coaster after 1, 2, 3, and 4 rides.</p>
<p><b>3. MOVIES</b> At the local movie theater it costs \$10.00 for 2 students to see a movie. It costs \$15.00 for 3 students, and it costs \$20.00 for 4 students. Let the number of students be the input. What is the function rule that relates the number of students to the cost of tickets?</p>	<p><b>4. HOMEWORK</b> At Elmwood Middle School, sixth graders spend 1 hour every night doing homework. Seventh graders spend 2 hours, and eighth graders spend 3 hours. Let the students' grade be the input. What is the function rule between the students' grade and the amount of time the students spend on homework every night?</p>
<p><b>5. BEADS</b> A bead shop sells wooden beads for \$3 each and glass beads for \$7 each. Write a function rule to represent the total selling price of wooden (<math>w</math>) and glass (<math>g</math>) beads.</p>	<p><b>6.</b> Use the function rule in Exercise 5 to find the selling price of 20 wooden beads and 4 glass beads.</p>

**1-8****Explore Through Reading**

6-3.3, 6-1.8

**Algebra: Equations****Get Ready for the Lesson**

Complete the Mini Lab at the top of page 57 in your textbook.  
Write your answers below.

1. Suppose the variable  $x$  represents the number of cubes in the bag. What equation represents this situation?
2. Replace the bag with centimeter cubes until the scale balances. How many centimeter cubes did you need to balance the scale?

Let  $x$  represent the bag. Model each sentence on a scale. Find the number of centimeter cubes needed to balance the scale.

3.  $x + 1 = 4$

4.  $x + 3 = 5$

5.  $x + 7 = 8$

6.  $x + 2 = 2$

**Read the Lesson**

7. In the Mini Lab, how did you make the scale balance?
8. In this lesson, what makes a mathematical sentence true?
9. How are the words *solve* and *solution* related?
10. Look up the word *equate* in a dictionary. How does it relate to the word *equation*?

**Remember What You Learned**

11. Suppose you are buying a soda for \$0.60 and you are going to pay with a dollar bill. Write an equation that represents this situation. What does your variable represent?

**1-8****Study Guide**

6-3.3, 6-1.8

**Algebra: Equations**

An **equation** is a sentence that contains an **equals sign**, =. Some equations contain variables. When you replace a variable with a value that results in a true sentence, you **solve** the equation. The value for the variable is the **solution** of the equation.

**Example 1** Solve  $m + 12 = 15$  mentally.

$$m + 12 = 15 \quad \text{Think: What number plus 12 equals 15?}$$

$$3 + 12 = 15 \quad \text{You know that } 12 + 3 = 15.$$

$$m = 3$$

The solution is 3.

**Example 2** Solve  $14 - p = 6$  using guess and check.

Guess the value of  $p$ , then check it out.

Try 7.	Try 6.	Try 8.
$14 - p \stackrel{?}{=} 6$	$14 - p \stackrel{?}{=} 6$	$14 - p \stackrel{?}{=} 6$
$14 - 7 \neq 6$	$14 - 6 \neq 6$	$14 - 8 = 6$
no	no	yes

The solution is 8 because replacing  $p$  with 8 results in a true sentence.

**Exercises**

Identify the solution of each equation from the list given.

- |                               |                               |
|-------------------------------|-------------------------------|
| 1. $k - 4 = 13$ ; 16, 17, 18  | 2. $31 + x = 42$ ; 9, 10, 11  |
| 3. $45 = 24 + k$ ; 21, 22, 23 | 4. $m - 12 = 15$ ; 27, 28, 29 |
| 5. $88 = 41 + s$ ; 46, 47, 48 | 6. $34 - b = 17$ ; 16, 17, 18 |
| 7. $69 - j = 44$ ; 25, 26, 27 | 8. $h + 19 = 56$ ; 36, 37, 38 |

Solve each equation mentally.

- |                   |                   |                    |
|-------------------|-------------------|--------------------|
| 9. $j + 3 = 9$    | 10. $m - 5 = 11$  | 11. $23 + x = 29$  |
| 12. $31 - h = 24$ | 13. $18 = 5 + d$  | 14. $35 - a = 25$  |
| 15. $y - 26 = 3$  | 16. $14 + n = 19$ | 17. $100 = 75 + w$ |



**1-8****Homework Practice**

6-3.3, 6-1.8

**Algebra: Equations****Identify the solution of each equation from the list given.**

1.  $h + 9 = 21$ ; 10, 11, 12      2.  $45 - k = 27$ ; 17, 18, 19      3.  $34 + p = 52$ ; 18, 19, 20
4.  $t \div 6 = 9$ ; 52, 53, 54      5.  $43 = 52 - s$ ; 8, 9, 10      6.  $56 = 7q$ ; 7, 8, 9
7.  $28 = r - 12$ ; 40, 41, 42      8.  $30 \div w = 5$ ; 4, 5, 6      9.  $y - 13 = 24$ ; 37, 38, 39

**Solve each equation mentally.**

10.  $a + 6 = 11$       11.  $k - 12 = 4$       12.  $24 = 34 - j$
13.  $9b = 36$       14.  $f \div 7 = 8$       15.  $7 + n = 18$
16.  $45 \div m = 5$       17.  $80 = 10d$       18.  $25 - c = 15$
19.  $17 = 9 + e$       20.  $g \div 4 = 12$       21.  $26 \div k = 2$
22. **ANIMALS** A whiptail lizard has a tail that is twice as long as its body. The equation  $2b = 6$  describes the length of a certain whiptail lizard's tail in inches. If  $b$  is the length of the whiptail lizard's body, what is the length of this whiptail lizard's body? What is the total length of the lizard?
23. **SPORTS CAMP** There are 475 campers returning to sports camp this year. Last year, 525 campers attended sports camp. The equation  $475 = 525 - c$  shows the decrease in the number of campers returning to camp from one year to the next. Find the number of campers who did not return to camp this year.



# Mini-Project





## Algebra: Equations

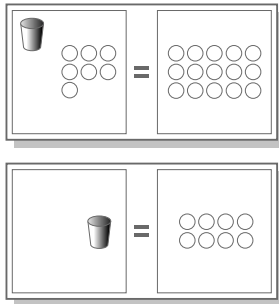
### Algebra: Equations

#### Materials

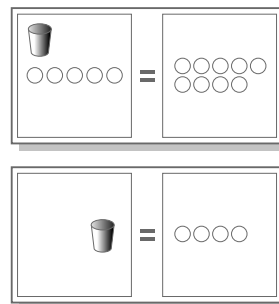
cups, counters

Model each equation using cups and counters. Let a cup  represent the variable and let counters  represent the numbers. Use the guess-and-check strategy to solve each equation.

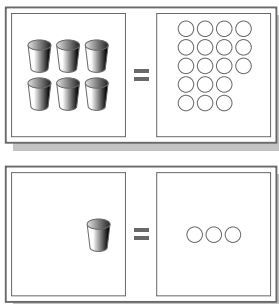
1.  $c + 7 = 15$



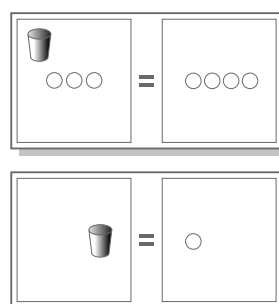
2.  $n + 5 = 9$



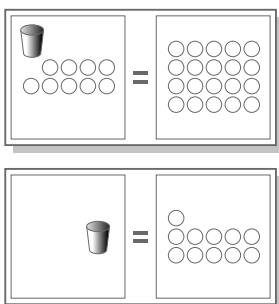
3.  $6s = 18$



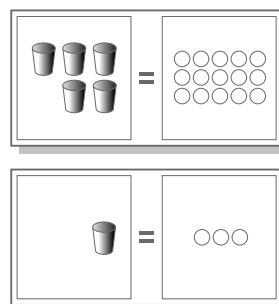
4.  $d + 3 = 4$



5.  $9 + e = 20$



6.  $5y = 15$





# Chapter 1 Test

## Mastering the SC Standards

- 1** Each number in the sequence below has the same relationship to the number immediately before it.

114, 102, 90, 78, 66

How can the next number in the sequence be found?

- (A) Divide the previous number by 12.
- (B) Multiply the previous number by 12.
- (C) Add 9 to the previous number.
- (D) Subtract 12 from the previous number.

**6-3.1**

- 2** What is the prime factorization of 77?

- (A)  $7 \times 7 \times 11$
- (B)  $7^2 \times 11$
- (C)  $7 \times 11^2$
- (D)  $7 \times 11$

**6-2.8**

- 3** How can  $2 \times 2 \times 2$  be represented using an exponent?

- (A)  $2^3$
- (B)  $2^2$
- (C)  $3^2$
- (D)  $3^3$

**6-2.9**

- 4** The table below shows Cami's age compared to her sister Julie's age at different times.

Ages	
Cami's Age ( $c$ )	Julie's Age ( $j$ )
2	7
5	10
9	14
13	18
16	?

If  $c$  represents Cami's age, which equation can be used to find  $j$ , Julie's age?

- (A)  $j = c - 5$
- (B)  $c = j + 3$
- (C)  $j = c + 5$
- (D)  $j = c + 3$

**6-3.3**

- 5** What is the solution to the following expression?

$$5 + 5 \times 2^3 \div 4 = \underline{\hspace{2cm}}$$

- (A) 11
- (B) 15
- (C) 20
- (D) 50

**6-3.2**



# Chapter 1 Test (continued)

## Mastering the SC Standards

**6** What is the prime factorization of 24?

- (A)  $2^3 \times 3$   
 (B)  $2 \times 2 \times 3$   
 (C)  $2 \times 3 \times 3$   
 (D)  $2 \times 3 \times 5$

**6-2.8**

**7** Balloons at a party store cost \$1.50 each, plus a one-time cost of \$3 to have the balloons filled with helium. Which equation can be used to find  $c$ , the total cost of  $b$  balloons filled with helium?

- (A)  $c = 3b + 1.50$   
 (B)  $c = 1.50(b + 3)$   
 (C)  $c = 1.50b + 3$   
 (D)  $c = 3(b + 1.50)$

**6-3.3**

**8** The table below shows the relationship between  $x$  and  $y$ . When  $x$  is equal to 3, what is the value of  $y$ ?

$x$	$y$
0	0
1	4
2	8
3	?

- (A) 8  
 (B) 10  
 (C) 12  
 (D) 16

**6-3.1**

**9** An art gallery in Charleston is hanging paintings on a wall.

Painting Sizes		
Width (ft)	Length (ft)	Area (sq ft)
4	5	20
4	6	24
4	7	28

What formula can be used to find  $A$ , the area of a painting that has a width of 2 feet and a length of 6 feet?

- (A)  $A = 6 \times 2$   
 (B)  $A = 2 + 6 \times 2$   
 (C)  $A = 2 + 2 + 6$   
 (D)  $A = 2 \times 2 + 2 \times 6$

**6-5.5**

**10** Tanisha buys a loaf of bread that is cut into 25 slices. Each sandwich requires 2 slices of bread. Some slices are left over. Which expression represents the number of slices that are left over?

- (A)  $50 - x$   
 (B)  $50 + x$   
 (C)  $25 - 2x$   
 (D)  $25 + 2x$

**6-3.3**

**11** What is another way to represent  $3^3$ ?

- (A)  $3 \times 3$   
 (B)  $3 \times 3 \times 3$   
 (C)  $3 + 3 + 3$   
 (D)  $3 \times 3 \times 3 \times 3$

**6-2.9**

**2****Anticipation Guide****Statistics and Graphs****STEP 1** *Before you begin Chapter 2*

- Read each statement.
- Decide whether you Agree (A) or Disagree (D) with the statement.
- Write A or D in the first column OR if you are not sure whether you agree or disagree, write NS (Not Sure).

<b>STEP 1</b> A, D, or NS	<b>Statement</b>	<b>STEP 2</b> A or D
	1. A table can be used to help solve a problem when there is a multiple number of data in the problem.	
	2. A bar graph or a line graph can be used to display a set of data.	
	3. A stem-and-leaf plot is a graph that looks similar in shape to a tree.	
	4. The <i>mean</i> and the <i>average</i> of a set of numbers are the same.	
	5. The median of an ordered set of numbers is the middle number.	
	6. The range of a set of numbers is the sum of the numbers divided by the number of pieces of data.	
	7. Graphs are always accurate displays of data because they contain facts about the data.	
	8. Integers are the set of all positive whole numbers.	
	9. Positive integers are to the right of zero on a number line.	
	10. Opposite numbers are numbers that are the same distance from zero in opposite directions on the number line.	

**STEP 2** *After you complete Chapter 2*

- Reread each statement and complete the last column by entering an A (Agree) or a D (Disagree).
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a separate sheet of paper to explain why you disagree. Use examples, if possible.

**2**

**Family Activity**

**State Test Practice**

**Fold the page along the dashed line. Work each problem on another piece of paper. Then unfold the page to check your work.**

1. Use the data on the table below to calculate the mean, median, mode, and range of the ages of people who worked at Whetstone Middle School's Spring Festival.

12	15	14	39	45	15
71	13	67	11	14	13
55	54	12	14	15	10
33	15	12	51	25	23

Which selection includes all of the correct answers?

- A** mean = 27; median = 15; modes = 12 and 14; range = 81
- B** mean = 28; median = 15; modes = 12 and 14; range = 61
- C** mean = 27; median = 15; mode = 15; range = 61
- D** mean = 27; median = 15; modes = 12 and 14; range = 61

**Fold here.**

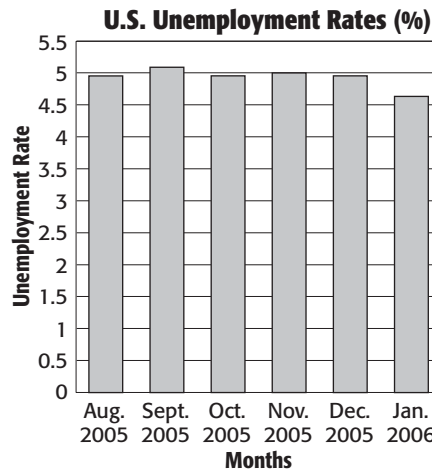
**Solution**

1. *Hint: It is always best to sort a large set of numbers from least to greatest when finding mean, median, mode, and range.*

To find the mean, add all the numbers then divide by how many numbers are in the set. There are 24 numbers, and the sum is 648. The mean is  $648 \div 24$  or 27. This eliminates choice B. You need not calculate the median since all answer choices have the same value. The mode is the number or numbers that occur(s) most often in the set. In this set, 15 occurs most often. Only choice C has a mean of 27 and a mode of 15.

The answer is **C**.

2. Refer to the table below. During which month were U.S. citizens least likely to be unemployed?



Source: U.S. Department of Labor

- A** Aug., 2005
- B** Jan., 2006
- C** Sept., 2005
- D** Nov., 2005

**Solution**

2. U.S. Citizens are least likely to be unemployed when the employment rate is lowest, which corresponds with the shortest bar on the graph above. The shortest bar occurs in January, so that is when citizens are least likely to be unemployed.

The answer is **B**.

**2-1**

**Study Guide**



6-6.2, 6-1.8

**Problem-Solving Investigation: Make a Table**

When solving problems, one strategy that is helpful is to make a table. A table often makes it easy to clarify information in the problem. One type of table that is helpful to use is a *frequency table*, which shows the number of times each item or number appears.

You can use the *make a table* strategy, along with the following four-step problem-solving plan to solve a problem.

- 1 Understand** – Read and get a general understanding of the problem.
- 2 Plan** – Make a plan to solve the problem and estimate the solution.
- 3 Solve** – Use your plan to solve the problem.
- 4 Check** – Check the reasonableness of your solution.

**Example 1**

**MOVIES** Carlos took a survey of the students in his class to find out what type of movie they preferred. Using C for comedy, A for action, D for drama, and M for animated, the results are shown below. How many more students like comedies than action movies?

C A M M A C D C D C M A M M A C C D A C

**Understand** You need to find the number of students that chose comedies and the number of students that chose action. Then find the difference.

**Plan** Make a frequency table of the data.

**Solve** Draw and complete a frequency table.

7 people chose comedies and 5 people chose action. So,  $7 - 5$  or 2 more students chose comedy than action.

Favorite Type of Movie		
Movie Type	Tally	Frequency
comedy		7
action		5
drama		3
animated		5

**Check** Go back to the list to verify there are 7 C's for comedy and 5 A's for action.

**Exercises**

**GRADES** The list below shows the quarterly grades for Mr. Vaquera's math class. Make a frequency table of the data. How many more students received a B than a D?

B C A A B D C B A C B B  
 B D A C B B C A A B A B

**2-1**

**Skills Practice**



6-6.2, 6-1.8

**Problem-Solving Investigation: Make a Table**

**Solve. Use the make a table strategy.**

- BOOKS** Grace took a survey of the students in her class to find out their favorite types of books. Using S for science-fiction, A for adventure, B for biography, and R for romance, the results are shown below. Make a frequency table of the data. How many more students like science-fiction than adventure?

S A S A A R S S S A R S B A B S S A R B

- SPORTS** The table below shows the position that students are trying out for on the school basketball team. Make a frequency table of the data. How many more students are trying out for forward than center?

Basketball Positions						
P	P	S	F	C	C	F
P	S	F	F	C	S	S
C	F	P	S	S	F	F

P = point guard    S = shooting guard  
F = forward        C = center

- FRUIT JUICE** The table below shows the results of a survey of students' favorite fruit juice flavors. Make a frequency table of the data. How many more students like apple juice than pineapple juice?

Favorite Fruit Juice Flavors							
A	C	G	C	P	C	A	O
O	A	P	G	G	A	A	C
G	O	A	C	O	P	O	O

A = apple    C = cranberry    G = grape  
O = orange    P = pineapple



**2-1****Homework Practice**

6-6.2, 6-1.8

**Problem-Solving Investigation: Make a Table****Mixed Problem Solving**

Use the make a table strategy to solve Exercise 1.

1. **BASKETBALL** The winning scores for teams in the National Wheelchair Basketball Association junior division for a recent season are shown. Make a frequency table of the data. How many winning scores were between 21 and 25?

NWBA Jr. Div. Winning Scores					
25	26	34	16	33	18
34	26	24	33	12	23

Use any strategy to solve Exercises 2–5. Some strategies are shown below.

**Problem-Solving Strategies**

- Guess and Check.
- Make a table.

2. **MONEY** Emelio has 9 coins that total \$2.21. He does not have a dollar coin. What are the coins?

3. **SCIENCE** A biologist counted the birds she tagged and released each day for 20 days. Her counts were: 13, 14, 9, 16, 21, 8, 28, 25, 9, 13, 23, 16, 14, 9, 21, 25, 8, 10, 21, and 29. On how many days did she count between 6 and 10 birds or between 26 and 30 birds?

4. **TRAFFIC** The table shows the types of vehicles seen passing a street corner. Make a frequency table of the data. How many fewer motorcycles than cars were seen?

Types of Vehicles							
C	M	M	B	T	T	C	T
B	R	T	C	R	C	R	C
M	C	C	M	C	R	C	T

C = car    B = bicycle    T = truck  
M = motorcycle    R = recreational vehicle

5. **MONEY** Tonisha has \$0 in her savings account. She deposits \$40 every two weeks and withdraws \$25 every four weeks. What will be her balance at the end of 24 weeks?

# 2-1

## Problem-Solving Practice



6-6.2, 6-1.8

### Problem-Solving Investigation: Make a Table

- 1. SPORTS** The table shows the result of Shante’s survey of her classmates’ favorite sports. How many more students chose softball/baseball than football?

Favorite Sports						
B	V	V	S	B	SB	SB
F	SB	B	S	V	F	B
B	SB	V	SB	SB	S	V

B = basketball    F = football    S = soccer  
 SB = softball/baseball    V = volleyball

- 2. BASEBALL** The table shows the national league home run leaders in the 2002–2006 seasons. How many more home runs did Ryan Howard hit in 2006 than Jim Thome in 2003?

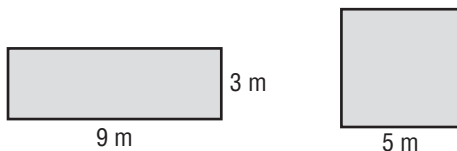
Year	Home Run Leader	Number of Home Runs
2002	Sammy Sosa	49
2003	Jim Thome	47
2004	Adrian Beltre	48
2005	Andruw Jones	51
2006	Ryan Howard	58

- 3. MONEY** Trista has 8 coins in her pocket that total \$1.55. She only has quarters and dimes. How many of each coin does Trista have?

- 4. ORDER OF OPERATIONS** Use each of the symbols +, −, ×, and ÷ to make the following math sentence true.

$$12 \quad \_ \quad 3 \quad \_ \quad 7 \quad \_ \quad 1 \quad \_ \quad 11 = 0$$

- 5. GEOMETRY** Find the difference in the area of the rectangle and the area of the square.



- 6. BICYCLES** Kenji is saving money to buy a new bicycle that costs \$125. So far he has saved his weekly allowance of \$5 for the past 8 weeks. He also saved \$35 from his birthday money. How much more money does Kenji need to save?

**2-3****Explore Through Reading**

6-6.1, 6-1.7

**Interpret Line Graphs****Get Ready for the Lesson**

Complete the activity at the top of page 88 in your textbook.  
Write your answers below.

1. Describe the trends in the winning amounts.
2. Predict how much the 2008 winner received. Research and compare to the actual 2008 amount.
3. The Masters Tournament is held once a year. If a line graph is made of these data, will there be any realistic data values between years? Explain.

**Read the Lesson**

Refer to the sentence just below the activity at the top of page 88:  
“Line graphs are often used to predict future events because they show trends over time.”

3. The word *predict* comes from two Latin words that mean “to tell in advance.” Look up the word *predict* in a dictionary. What meaning is given for the word?
4. Look up the word *trend* in a dictionary. What meaning is given for the word as it is used in the definition of line graph?
5. Look at the line graph at the bottom of page 88. In terms of trends, what happened between 2005 and 2008? What is the difference between prediction and data or statistics?

**Remember What You Learned**

6. Find two line graphs, one where you feel you can predict the future with confidence and one where you cannot. Explain the difference.

# 2-3

## Study Guide



6-6.1, 6-1.7

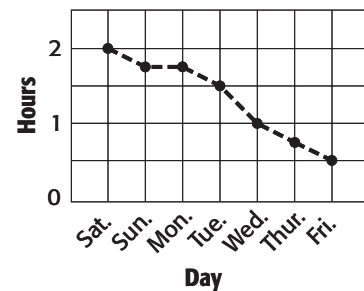
### Interpret Line Graphs

Because they show trends over time, **line graphs** are often used to predict future events.

**Example 1** The graph shows the time Ruben spends each day practicing piano scales. Predict how much time he will spend practicing his scales on Friday.

Continue the graph with a dotted line in the same direction until you reach a vertical position for Friday. By extending the graph, you see that Ruben will probably spend half an hour practicing piano scales on Friday.

**Piano Scale Practice Times**

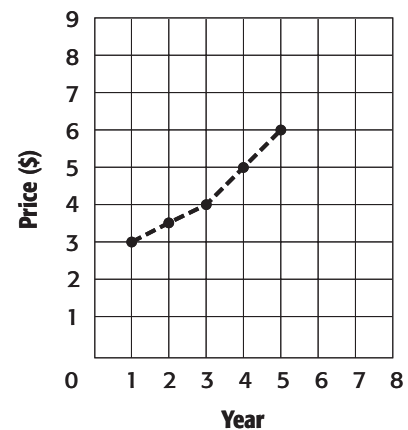


### Exercises

**MONEY** Use the graph that shows the price of a ticket to a local high school football game over the last few years.

- Has the price been increasing or decreasing? Explain.
- Predict the price of a ticket in year 6 if the trend continues.
- In what year do you think the price will reach \$9.00 if the trend continues?

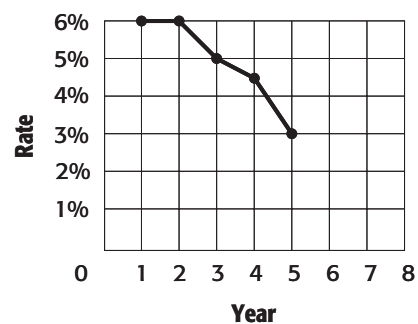
**Football Tickets**



**BANKS** Use the graph that shows the interest rate for a savings account over the last few years.

- What does the graph tell you about interest rates?
- If the trend continues, when will the interest rate reach 1 percent?

**Interest Rates**



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**2-3**

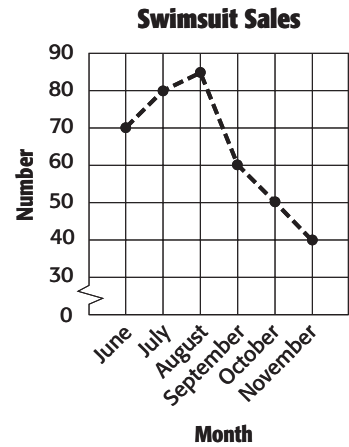
**Homework Practice**

**Interpret Line Graphs**



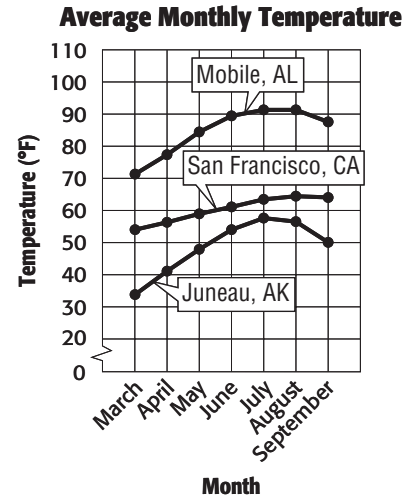
**SPORTS** For Exercises 1–3, use the graph at the right.

1. Describe the change in the number of swimsuits sold.
2. Predict the number of swimsuits sold in December. Explain your reasoning.
3. Predict the number of swimsuits sold in May. How did you reach this conclusion?



**WEATHER** For Exercises 4–7, use the graph at the right.

4. Predict the average temperature for Juneau in February.
5. Predict the average temperature for Mobile in October.
6. What do you think is the average temperature for San Francisco in October?
7. How much colder would you expect it to be in Juneau than in Mobile in October?



**BASEBALL** For Exercises 8–10, use the table that shows the number of games won by the Florida Gators men’s baseball team from 2002 to 2007.

Florida Gators Baseball Statistics						
Year	2002	2003	2004	2005	2006	2007
Games Won	46	37	43	48	28	29

8. Make a line graph of the data.
9. In what year did the team have the greatest increase in the number of games won?
10. Explain the disadvantages of using this line graph to make a prediction about the number of games that the team will win in 2009.

**2-3**

**Problem-Solving Practice**



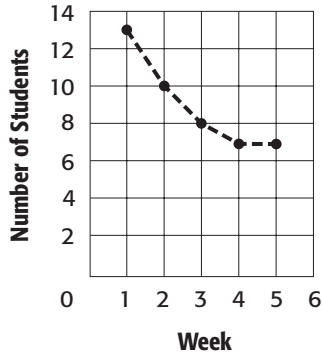
6-6.1, 6-1.7

**Interpret Line Graphs**

**FITNESS** For Exercises 1–3, use Graph A. For Exercises 4–6, use Graph B.

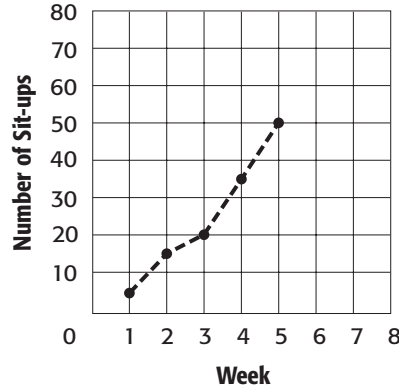
**Graph A**

**Aerobics Class**



**Graph B**

**Cara's Sit-ups**



<p>1. Refer to Graph A. Describe the change in the number of students taking the aerobics class.</p>	<p>2. Predict how many students will be in the aerobics class in week 6 if the trend continues.</p>
<p>3. Predict how many students will be in the aerobics class in week 8.</p>	<p>4. Describe the change in the number of sit-ups Cara can do.</p>
<p>5. Predict how many sit-ups Cara will be able to do in week 6 if the trend continues.</p>	<p>6. Predict the week in which Cara will be able to do 80 sit-ups if the trend continues.</p>

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**2-4****Explore Through Reading**

6-6.2, 6-1.7

***Stem-and-Leaf Plots*****Get Ready for the Lesson**

Complete the activity at the top of page 92 in your textbook.  
Write your answers below.

1. What were the least and greatest number of instant messages sent?
2. Which number of instant messages occurred most often?

**Read the Lesson**

3. In a stem-and-leaf plot, in what order are the data?
4. In a stem-and-leaf plot of two-digit numbers, how are the data represented?
5. Look at the stem-and-leaf plot at the top of page 93. Of the twenty tallest waterfalls, how many are between 600 and 699 feet tall? Using the stem-and-leaf plot, how can you tell that this height-range is most common?

**Remember What You Learned**

6. Write the steps for making a stem-and-leaf plot. Show someone what a stem-and-leaf plot is, how to read one, and how to make one.

# 2-4

## Study Guide



6-6.2, 6-1.7

### Stem-and-Leaf Plots

Sometimes it is hard to read data in a table. You can use a **stem-and-leaf plot** to display the data in a more readable way. In a stem-and-leaf plot, you order the data from least to greatest. Then you organize the data by place value.

**Example 1** Make a stem-and-leaf plot of the data in the table. Then write a few sentences that analyze the data.

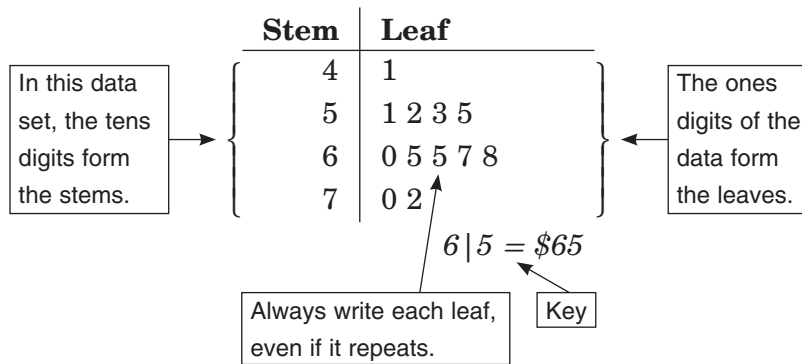
**Step 1** Order the data from least to greatest.

41 51 52 53 55 60 65 65 67 68 70 72

Money Earned Mowing Lawn (\$)			
60	55	53	41
67	72	65	68
65	70	52	51

**Step 2** Draw a vertical line and write the tens digits from least to greatest to the left of the line.

**Step 3** Write the ones digits to the right of the line with the corresponding stems.



**Step 4** Include a key that explains the stems and leaves.

By looking at the plot, it is easy to see that the least amount of money earned was \$41 and the greatest amount was \$72. You can also see that most of the data fall between \$51 and \$68.

### Exercises

Make a stem-and-leaf plot for the set of data below. Write a few sentences that analyze the data.

Points scored: 34 44 51 48 55 41 47 22 55



**2-4****Homework Practice**

6-6.2, 6-1.7

**Stem-and-Leaf Plots****Make a stem-and-leaf plot for each set of data.**

- Minutes on the bus to school:  
10, 5, 21, 30, 7, 12, 15, 21, 8, 12, 12,  
20, 31, 10, 23, 31
- Employee's ages:  
22, 52, 24, 19, 25, 36, 30, 32, 19, 26, 28,  
33, 53, 24, 35, 26

**SHOPPING** For Exercises 3–5, use the stem-and-leaf plot at the right that shows costs for various pairs of jeans.

Stem	Leaf
1	6 6 7 8 8 9 9 9 9
2	1 3 5
3	
4	2 2 3

2 | 3 = \$23

- How much is the most expensive pair of jeans?
  - How many pairs cost less than \$20?
  - Write a sentence or two that analyzes the data.
- Construct a stem-and-leaf plot for the set of test scores 81, 55, 55, 62, 73, 49, 56, 91, 55, 64, 72, 62, 64, 53, 56, and 57. Then write sentences explaining how a teacher might use the plot.
  - Display the amounts \$104, \$120, \$99, \$153, \$122, \$116, \$114, \$139, \$102, \$95, \$123, \$116, \$152, \$104 and \$115 in a stem-and-leaf plot. (*Hint*: Use the hundreds and tens digits to form the stems.)

**2-4**

**Problem-Solving Practice**



6-6.2, 6-1.7

**Stem-and-Leaf Plots**

**TRAFFIC** For Exercises 1 and 2, use the table. For Exercises 3 and 4, use the stem-and-leaf plot.

Number of Trucks Passing Through the Intersection Each Hour					
5	15	6	42	34	28
19	18	19	22	23	21
32	26	34	19	29	21
10	6	8	40	14	17

**Number of Birds at a Watering Hole Each Hour**

Stem	Leaf
1	8 9
2	4 8 9
3	3 4 4 4
4	2 5 5 5 5 7 8
5	0 0 3 3 4 6 6 7

*3|4 = 34 birds*

<p><b>1.</b> Mr. Chin did a traffic survey. He wrote down the number of trucks that passed through an intersection each hour. Make a stem-and-leaf plot of his data.</p>	<p><b>2.</b> Refer to your stem-and-leaf plot from Exercise 1. Mr. Chin needs to know the range of trucks passing through the intersection in one hour into which the greatest number of trucks fall.</p>
<p><b>3.</b> What is the least number of birds at the watering hole in one hour? What is the greatest number?</p>	<p><b>4.</b> What is the most frequent number of birds to be at the watering hole in one hour?</p>
<p><b>5. RVs</b> Make a stem-and-leaf plot for the number of RVs Mr. Chin counted in 12 hours: 3, 4, 9, 13, 7, 9, 8, 5, 4, 6, 1, 11.</p>	<p><b>6. RVs</b> Write a few sentences that analyze the RV data for Mr. Chin’s report in Exercise 5.</p>

# 2A

## Study Guide

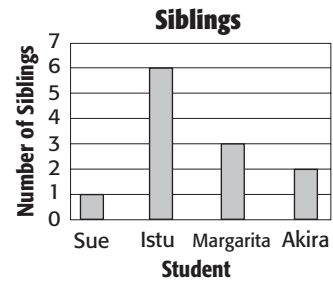


### Bar Graphs and Histograms

A **bar graph** is one method of comparing data by using solid bars to represent quantities. A **histogram** is a special kind of bar graph. It uses bars to represent the frequency of numerical data that have been organized into intervals.

**Example 1** **SIBLINGS** Make a bar graph to display the data in the table below.

Student	Number of Siblings
Sue	1
Isfu	6
Margarita	3
Akira	2

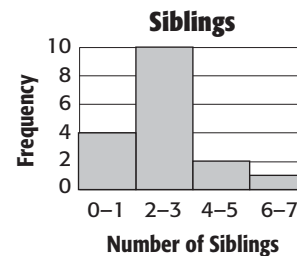


**Step 1** Draw a horizontal and a vertical axis. Label the axes as shown. Add a title.

**Step 2** Draw a bar to represent each student. In this case, a bar is used to represent the number of siblings for each student.

**Example 2** **SIBLINGS** The number of siblings of 17 students have been organized into a table. Make a histogram of the data.

Number of Siblings	Frequency
0–1	4
2–3	10
4–5	2
6–7	1



**Step 1** Draw and label horizontal and vertical axes. Add a title.

**Step 2** Draw a bar to represent the frequency of each interval.

### Exercises

1. Make a bar graph for the data in the table.

Student	Number of Free Throws
Luis	6
Laura	10
Opal	4
Gad	14

2. Make a histogram for the data in the table.

Number of Free Throws	Frequency
0–1	1
2–3	5
4–5	10
6–7	4

# 2A

## Skills Practice



### Bar Graphs and Histograms

**ZOOS** For Exercises 1 and 2, use the table. It shows the number of species at several zoological parks.

1. Make a bar graph of the data.

**Animal Species in Zoos**


Zoo	Species
Los Angeles	350
Lincoln Park	290
Cincinnati	700
Bronx	530
Oklahoma City	600

2. Which zoological park has the most species?

**ZOOS** For Exercises 3 and 4, use the table at the right. It shows the number of species at 37 major U.S. public zoological parks.

3. Make a histogram of the data. Use intervals of 101–200, 201–300, 301–400, 401–500, 501–600, 601–700, and 701–800 for the horizontal axis.

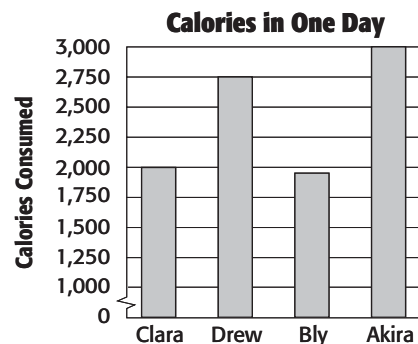
**Animal Species in Zoos**


Number of Species				
200	700	290	600	681
300	643	350	794	400
360	600	134	200	800
305	384	500	330	250
530	715	303	200	475
465	340	347	300	708
184	800	375	350	450
337	221			

4. Which interval has the largest frequency?

**HEALTH** For Exercises 5 and 6, use the graph at the right.

5. What does each bar represent?
6. Determine whether the graph is a bar graph or a histogram. Explain how you know.



**2A**

**Homework Practice**



**Bar Graphs and Histograms**

Select the appropriate graph to display each set of data: bar graph or histogram. Then display the data in the appropriate graph.

1. **Ages of Children Taking Swimming Lessons**

Age	Children
0–2	8
3–5	12
6–8	18
9–11	17
12–14	12
15–17	13

2. **Home Run Derby 2007 Round 1 Home Runs**

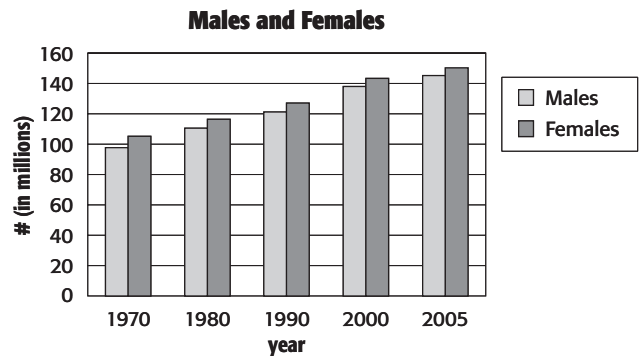
Player	Home Runs
Vladimir Guerrero	5
Alex Rios	5
Matt Holliday	5
Albert Pujols	4
Justin Morneau	4

Source: Baseball Almanac

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**POPULATION** For Exercises 3–5, use the bar graph that shows the number of males and females in the world for the years 1970, 1980, 1990, 2000, 2005.

- By how much did the number of females increase from 1970 to 1980?
- By how much did the number of females increase from 2000 to 2005?
- Between which years did the number of females increase the most?



# 2A

## Problem-Solving Practice



### Bar Graphs and Histograms

**PUPPIES** For Exercises 1 and 2, use the table below. It shows the results of a survey in which students were asked what name they would most like to give a new pet puppy.

Name	Votes
Max	15
Tiger	5
Lady	13
Shadow	10
Molly	9
Buster	2

**EARTH SCIENCE** In Exercises 3–6, use the table below. It shows the highest wind speeds in 30 U.S. cities.

Highest Wind Speeds (mph)										
52	75	60	80	55	54	91	60	81	58	
53	73	46	76	53	46	73	46	51	49	
57	58	56	47	65	49	56	51	54	51	

1. Make a bar graph to display the data.

**Favorite New Puppy Names**


2. Use your bar graph from Exercise 1. Compare the number of votes the name Shadow received to the number of votes the name Tiger received.

3. Make a histogram of the data.

**Highest Wind Speeds**


4. What is the top wind speed of most of the cities?

5. How many cities recorded wind speeds of 80 miles per hour or more?

6. How many cities recorded their highest wind speeds at 60 miles per hour or more?

**2-6****Explore Through Reading****Mean****Get Ready for the Lesson**

**Complete the Mini Lab at the top of page 102 in your textbook.**

**Write your answers below.**

1. On average, how many inches did it snow per day in five days? Explain your reasoning.
2. Suppose on the sixth day it snowed 9 inches. If you moved the cubes again, how many cubes would be in each stack?

**Read the Lesson**

3. Look up the word *mean* in a dictionary. Write the meaning that fits the way the word is used in this lesson.

**Look at the paragraph below the activity at the top of page 102 in your textbook. A number that helps describe all of the data in a data set is an average. An average is also referred to as a measure of central tendency.**

4. Is the mean a good measure of central tendency when there is no outlier? Give an example.
5. Is the mean a good measure of central tendency when there is an outlier? Give an example.

**Remember What You Learned**

6. Explain one problem with using the mean as a measure of central tendency.

# 2-6

# Study Guide



## Mean

The **mean** is the most common measure of central tendency. It is an average, so it describes all of the data in a data set.

**Example 1** The picture graph shows the number of members on four different swim teams. Find the mean number of members for the four different swim teams.

Amberly	
Carlton	
Hamilton	
Westhigh	

Simplify an expression.

$$\begin{aligned} \text{mean} &= \frac{9 + 11 + 6 + 10}{4} \\ &= \frac{36}{4} \text{ or } 9 \end{aligned}$$

A set of data may contain very high or very low values. These values are called **outliers**.

**Example 2** Find the mean for the snowfall data with and without the outlier. Then tell how the outlier affects the mean of the data.

Month	Snowfall (in.)
Nov.	20
Dec.	19
Jan.	20
Feb.	17
Mar.	4

Compared to the other values, 4 inches is low. So, it is an outlier.

**mean with outlier**

$$\begin{aligned} \text{mean} &= \frac{20 + 19 + 20 + 17 + 4}{5} \\ &= \frac{80}{5} \text{ or } 16 \end{aligned}$$

**mean without outlier**

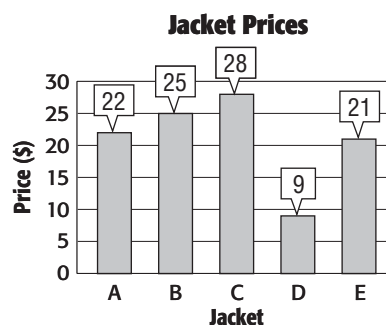
$$\begin{aligned} \text{mean} &= \frac{20 + 19 + 20 + 17}{4} \\ &= \frac{76}{4} \text{ or } 19 \end{aligned}$$

With the outlier, the mean is less than the values of most of the data. Without the outlier, the mean is close in value to the data.

### Exercises

SHOPPING For Exercises 1–3, use the bar graph at the right.

- Find the mean of the data.
- Which jacket price is an outlier?
- Find the mean of the data if the outlier is not included.
- How does the outlier affect the mean of the data?





**2-6**

**Homework Practice**

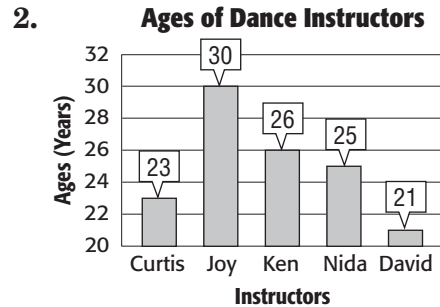


**Mean**

Find the mean of the data represented in each model.

1.

Number of Toys Collected	
Ling	
Kathy	
Lucita	
Terrell	



**NATURE** For Exercises 3–6, use the table that shows the heights of the tallest waterfalls along Oregon’s Columbia River Gorge.

Falls	Height (ft)
Bridal Veil	153
Horsetail	176
Latourell	249
Metlako	150
Multnomah	620
Wahkeena	242

Source: U.S. Forest Service

- Find the mean of the data.
- Identify the outlier.
- Find the mean if Multnomah Falls is not included in the data set.
- How does the outlier affect the mean of the data?

**GARDENING** For Exercises 7–9, use the following information.

Alan earned \$23, \$26, \$25, \$24, \$23, \$24, \$6, \$24, and \$23 gardening.

- What is the mean of the amounts he earned?
- Which amount is an outlier?
- How does the outlier affect the mean of the data?

Find the mean for number of cans collected. Explain the method you used.

- 57, 59, 60, 58, 58, 56

**2-6****Problem-Solving Practice**

6-1.7

**Mean**

**ANIMALS** For Exercises 1–3, use the table about bears.

Bear	Average Height (ft)	Average Weight (lb)
Alaskan Brown	8	1,500
Black	6	338
Grizzly	7	588
Polar	7	850

<p><b>1.</b> You are writing a report on bears. You are analyzing the data on heights and weights in the table above. First look for outliers. Identify the outlier for the height data. Identify the outlier for the weight data.</p>	<p><b>2.</b> Find the mean of the bear weight data with and without the outlier.</p>
<p><b>3.</b> Describe how the outlier affects the mean of the bear weight data.</p>	<p><b>4. WORK</b> Carlos earned \$23, \$29, \$25, \$16, and \$17 working at an ice cream shop after school. What is the mean amount he earned?</p>
<p><b>5. CARS</b> The cost of a tank of gas at nine different gas stations is shown below. What was the mean cost of a tank of gas?</p> <p>Cost of Gas: \$17, \$18, \$22, \$15, \$17, \$16, \$25, \$21, and \$20</p>	<p><b>6. SCHOOL</b> Sally received scores on math quizzes as shown below. Find her mean score with and without both outliers.</p> <p>Quiz Scores: 84, 85, 91, 81, 52, 92, 99, 91, and 45</p>

**2-7****Explore Through Reading**6-3.3, 6-1.7  
6-6.2***Median, Mode, and Range*****Get Ready for the Lesson**

Complete the activity at the top of page 108 in your textbook.

Write your answers below.

1. Order the data from least to greatest. Which piece of data is in the middle of this list?
2. Compare this number to the mean of the data.

**Read the Lesson**

3. How are mean, median, and mode similar? How are they different?

**Look at Example 4 on page 110.**

4. How would you find the average of the data? What is another term for the average of the data?
5. What is causing the mean to be so high?
6. If there were two deserts of 250,000 square miles, how would this affect the mean?
7. Does this example illustrate the statement, “Some averages may describe a data set better than other averages”?

**Remember What You Learned**

8. You may already know that a median strip refers to the concrete or landscaped divider that runs down the center of many roads. How does this idea of median relate to the meaning of median in this lesson?

# 2-7

## Study Guide



6-3.3, 6-1.7  
6-6.2

### 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.

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

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

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 stem-and-leaf plot. Then write a sentence describing how the data vary.

Stem	Leaf
3	2
4	0
5	0 5
6	0 3

3 | 2 = 32°

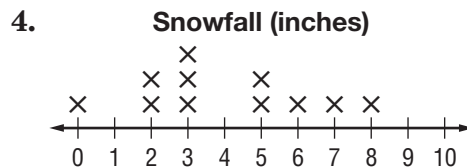
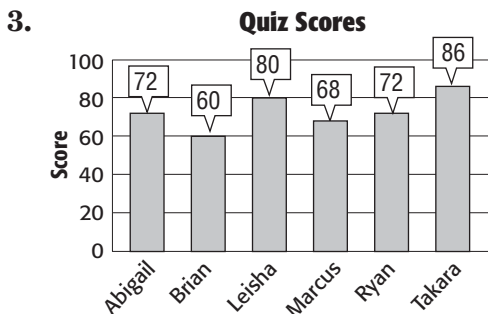
The greatest value is 63. The least value is 32. So, the range is 63° – 32° or 31°. The range is large. It tells us that the data vary greatly in value.

### Exercises

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

1. hours worked: 14, 13, 14, 16, 8

2. points scored by football team:  
29, 31, 14, 21, 31, 22, 20



**2-7**

**Homework Practice**



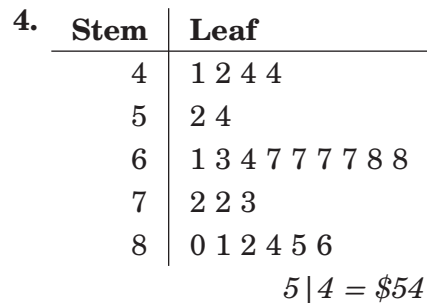
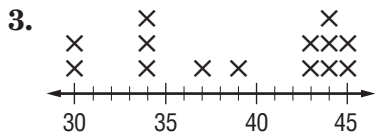
6-3.3, 6-1.7  
6-6.2

**Median, Mode, and Range**

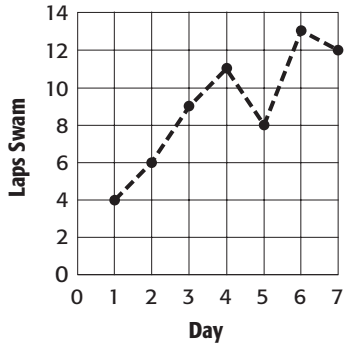
Find the median, mode, and range for each set of data.

1. minutes spent practicing violin:  
25, 15, 30, 25, 20, 15, 24
2. snow in inches:  
40, 28, 24, 37, 43, 26, 30, 36

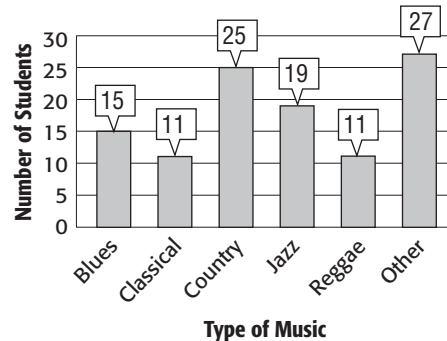
Find the mean, median, mode, and range of the data represented in each statistical graph.



5. Kai-Yo's Swimming Schedule



6. Student's Favorite Music



**WEATHER** For Exercises 7–9, refer to the table at the right.

7. Compare the median low temperatures.
8. Find the range for each data set.
9. Write a statement that compares the daily low temperatures for the two cities.

Daily Low Temperatures (°F)	
Charleston	Atlanta
33 34 33 35	48 41 43 40
36 35 34	45 35 37

**2-7**

**Problem-Solving Practice**



6-3.3, 6-1.7  
6-6.2

**Median, Mode, and Range**

**SCIENCE** For Exercises 1–3, use Table A. For Exercises 4–6, use Table B. Table A shows the number of days it took for some seeds to germinate after planting. Table B shows how tall the plants were after 60 days.

**Table A**

Number of Days for Seeds to Germinate				
15	20	30	15	16
9	21	21	15	

**Table B**

Height (in.) of Plants After 60 Days				
17	19	13	17	20
15	17	21	14	

<p><b>1.</b> Refer to Table A. You are doing some experiments with germinating seeds. You are preparing a report on your findings to a seed company. What are the mean, median, and mode of the data?</p>	<p><b>2.</b> Use your answer from Exercise 1. Which measure of central tendency best describes the data? Explain.</p>
<p><b>3.</b> What is the range of the seed germination data? Describe how the data vary.</p>	<p><b>4.</b> What are the mean, median, and mode of the plant height data?</p>
<p><b>5.</b> Refer to your answer in Exercise 4. Which measure of central tendency best describes the data? Explain.</p>	<p><b>6.</b> What is the range of the plant height data? Describe how the data vary.</p>

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**2-8****Explore Through Reading**

6-1.7, 6-6.2

**Selecting an Appropriate Display****Get Ready for the Lesson**

Read the introduction at the top of page 114 in your textbook. Write your answers below.

1. Which display allows you to find a rabbit's maximum speed?
2. In which display is it easier to find the range of the data?

**Read the Lesson**

3. Write an example of data that is best displayed in a bar graph.
4. Write an example of data that is best displayed in a line graph.
5. Write an example of data that is best displayed in a line plot.
6. Write an example of data that is best displayed in a stem-and-leaf plot.

**Remember What You Learned**

7. Use a magazine, newspaper, or the Internet to find data that is represented in a bar graph, line graph, line plot, or stem-and-leaf plot. Examine the data to see if it is represented in the most appropriate display. Are there other displays in which the data could be represented?

# 2-8

## Study Guide



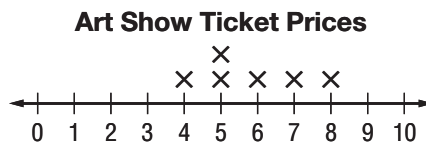
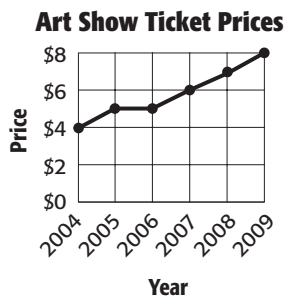
6-1.7, 6-6.2

### Selecting an Appropriate Display

Data can be displayed in many different ways, including the following:

- A **bar graph** shows the number of items in a specific category.
- A **line graph** shows change over a period of time.
- A **line plot** shows how many times each number occurs in the data.
- A **stem-and-leaf plot** lists all individual numerical data in a condensed form.

**Example 1** Which display allows you to see how art show ticket prices have changed since 2004.



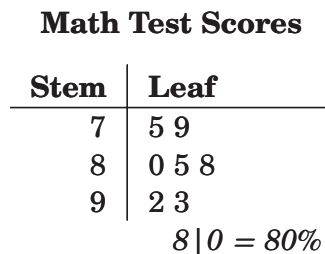
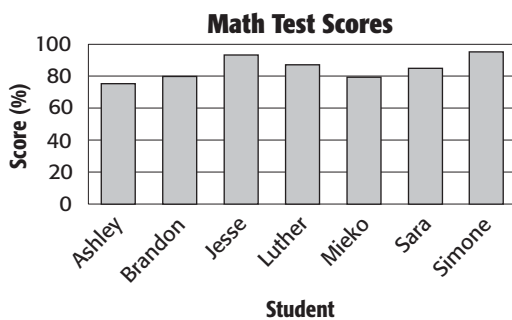
The line graph allows you to see how the art show ticket prices have increased since 2004.

**Example 2** What type of display would you use to show the results of a survey of students' favorite brand of tennis shoes.

Since the data would list the number of students that chose each brand, or category, the data would best be displayed in a bar graph.

#### Exercises

1. **GRADES** Which display makes it easier to see how many students had test scores in the 80s?



2. **VOLLEYBALL** What type of display would you use to show the number of wins the school volleyball team had from 2000 to 2005?



**2-8**

**Homework Practice**



6-1.7, 6-6.2

**Selecting an Appropriate Display**

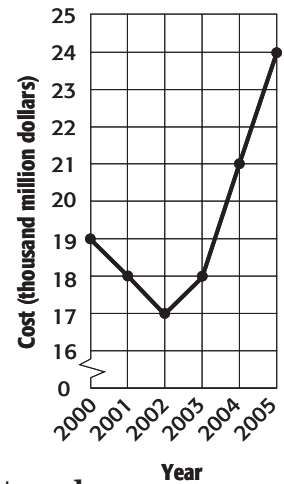
1. **FOOD** Which display makes it easier to see the median cost of providing food stamps from 1998 to 2003?

Stem	Leaf
1	7 8 8 9
2	1 4

*1 | 7 = 17 thousand million dollars*

Source: *The World Almanac*

**U.S. Food Assistance Program Cost of Food Stamps**

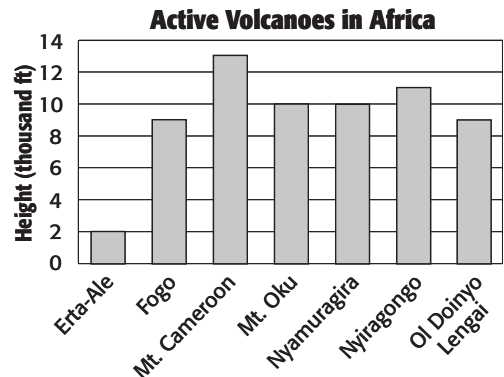


Select an appropriate type of display for data gathered about each situation. Sample answers are given.

- the heights of buildings in town
- the number of cars a dealer sold each month over the past year
- the number of scores made by each team member in a basketball season
- OLYMPICS** Select an appropriate type of display for the data. Then make a display.

Olympic Hammer Throw Winners			
Year	Distance (m)	Year	Distance (m)
1968	73	1988	85
1972	76	1992	83
1976	78	1996	81
1980	82	2000	80
1984	78	2004	83

6. **GEOGRAPHY** Display the data in the bar graph using another type of display. Compare the displays.



Source: *The World Almanac*

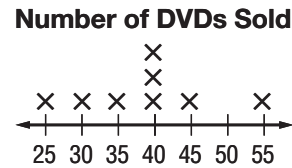
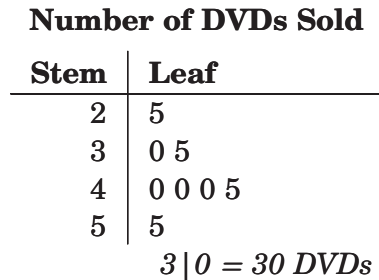
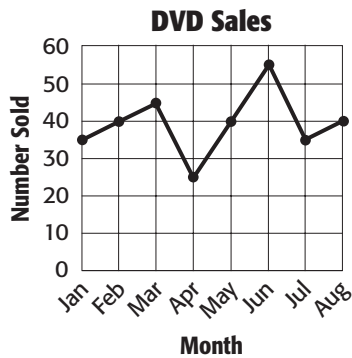
# 2-8

## Problem-Solving Practice



### Selecting an Appropriate Display

**VIDEOS** For Exercises 1–4, use the three graphs on DVD sales shown below.



<p>1. Which display makes it easiest to see what number of DVDs were sold the most often?</p>	<p>2. Which display makes it easiest to find the range of the data?</p>												
<p>3. Which display makes it easiest to see how the number of DVDs sold changed from January to August?</p>	<p>4. Which display makes it easiest to compare the number of DVDs sold in April to the number of DVDs sold in August?</p>												
<p>5. <b>MUSIC</b> What type of display would be best to show the price of a music CD at five different stores?</p>	<p>6. <b>ROLLER COASTERS</b> Select and make an appropriate type of display for the following data.</p> <table border="1"> <thead> <tr> <th colspan="3">Steepness of Wooden Roller Coasters</th> </tr> </thead> <tbody> <tr> <td>70°</td> <td>63°</td> <td>61°</td> </tr> <tr> <td>59°</td> <td>57°</td> <td>56°</td> </tr> <tr> <td>55°</td> <td>55°</td> <td>54°</td> </tr> </tbody> </table>	Steepness of Wooden Roller Coasters			70°	63°	61°	59°	57°	56°	55°	55°	54°
Steepness of Wooden Roller Coasters													
70°	63°	61°											
59°	57°	56°											
55°	55°	54°											

**2-9****Explore Through Reading**

6-2.2, 6-1.7

***Integers and Graphing*****Get Ready for the Lesson****Read the introduction at the top of page 121 in your textbook.****Write your answers below.**

1. What number represents owing 5 dollars? What number represents having 8 dollars left?
2. Who has the most money left? Who owes the most?

**Read the Lesson**

3. Write an example of a situation that a positive number could represent.
4. Write an example of a situation that a negative number could represent.
5. In the number lines shown in this lesson, how is “continues without end” indicated?
6. How do values change as you move from left to right on a number line?

**Remember What You Learned**

7. Antonyms are two words that have opposite meanings, such as *cold* and *hot*. Integers can be described by the antonyms *negative* or *positive* or as being *above* zero or *below* zero. Make a table of antonyms that describe situations involving negative and positive integers.

Negative Integer	Positive Integer
loss	gain

# 2-9

## Study Guide



6-2.2, 6-1.7

### Integers and Graphing

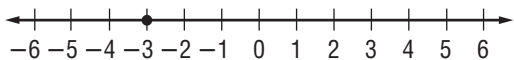
**Negative numbers** represent data that are less than 0. A negative number is written with a  $-$  sign.  
**Positive numbers** represent data that are greater than 0. Positive numbers are written with a  $+$  sign or no sign at all.

**Opposites** are numbers that are the same distance from zero on a number line, but in opposite directions. The set of positive whole numbers, their opposites, and zero are called integers.

**Example 1** Write an integer to show 3 degrees below zero. Then graph the integer on a number line.

Numbers *below zero* are negative numbers. The integer is  $-3$ .

Draw a number line. Then draw a dot at the location that represents  $-3$ .

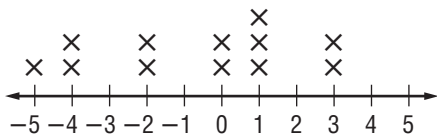


**Example 2** Make a line plot of the data represented in the table.

Draw a number line. Put an  $\times$  above the number that represents each score in the table.

Rachel's Summer Golf Scores			
0	+3	-4	-2
+1	+3	-4	0
+1	-5	-2	+1

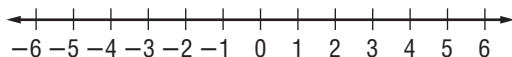
Rachel's Summer Golf Scores



### Exercises

Write an integer to represent each piece of data. Then graph the integer on the number line.

- 4 degrees below zero
- a gain of 2 points



- BOOKS** The table shows the change in the ranking from the previous week of the top ten best-selling novels. Make a line plot of the data.

Novel	A	B	C	D	E	F	G	H	I	J
Change in Ranking	+3	-2	0	+1	-2	0	+2	-4	+1	-2

**2-9****Homework Practice**

6-2.2, 6-1.7

**Integers and Graphing****Write an integer to represent each situation.**

1. Bill drove 25 miles toward Tampa.
2. Susan lost \$4.
3. Joe walked down 6 flights of stairs.
4. The baby gained 8 pounds.

**Draw a number line from  $-10$  to  $10$ . Then graph each integer on the number line.**

- |         |          |          |          |
|---------|----------|----------|----------|
| 5. 2    | 6. 6     | 7. 10    | 8. 8     |
| 9. $-7$ | 10. $-4$ | 11. $-9$ | 12. $-3$ |

**Write the opposite of each integer.**

- |           |           |           |          |
|-----------|-----------|-----------|----------|
| 13. $+8$  | 14. $-5$  | 15. $-2$  | 16. $+9$ |
| 17. $-11$ | 18. $+21$ | 19. $+10$ | 20. $-7$ |

21. **SCIENCE** The average daytime surface temperature on the Moon is  $260^{\circ}\text{F}$ . Represent this temperature as an integer.

22. **GEOGRAPHY** The Salton Sea is a lake at 227 feet below sea level. Represent this altitude as an integer.

23. **WEATHER** The table below shows the extreme low temperatures for select cities. Make a line plot of the data. Then explain how the line plot can be used to determine whether more cities had extremes lower than zero degrees or greater than zero degrees.

<b>Extreme Low Temperatures by City</b>			
<b>City</b>	<b>Temp. <math>^{\circ}\text{F}</math></b>	<b>City</b>	<b>Temp. <math>^{\circ}\text{F}</math></b>
Mobile, AL	3	Boston, MA	$-12$
Wilmington, DE	$-14$	Jackson, MS	2
Jacksonville, FL	7	Raleigh, NC	$-9$
Savannah, GA	3	Portland, OR	$-3$
New Orleans, LA	11	Philadelphia, PA	$-7$
Baltimore, MD	$-7$	Charleston, SC	6

Source: *The World Almanac*

**2-9****Problem-Solving Practice**

6-2.2, 6-1.7

**Integers and Graphing**

- 1. MONEY** Katryn owes her father \$25. Write this number as an integer.

- 2. GEOGRAPHY** Mt. Whitney in California is 14,494 feet above sea level. Write this number as an integer.

- 3. GEOGRAPHY** Badwater in Death Valley is 282 feet below sea level. Write this number as an integer.

- 4. SCHOOL** Dick forgot to put his name on his homework. His teacher deducts 5 points for papers turned in without names on them. So, Dick lost 5 points from his score. Write this number as an integer.

- 5. GEOGRAPHY** Multnomah Falls in Oregon drops 620 feet from the top to the bottom. Suppose a log is carried by the water from the top to the bottom of the falls. Write the integer to describe the location of the log now.

- 6. TRAVEL** The train left the station and traveled ahead on the tracks for 30 miles. Write an integer to describe the new location of the train from the station.

- 7. WEATHER** The table shows the average normal January temperature of three cities in Alaska. Graph the temperatures on a number line.

City	Temperature (°F)
Anchorage	15
Barrow	-13
Fairbanks	-10

- 8. GAMES** The table below shows the number of points Chantal scored on each hand of a card game. Make a line plot of the data.

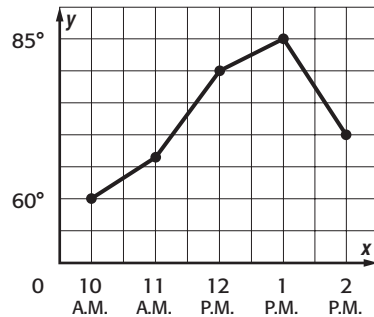
Points Scored		
+20	+5	0
-5	-10	+5
+5	+10	+10



# Chapter 2 Test

## Mastering the SC Standards

- 1** Kenesha kept track of the temperature at her home in Columbia for a science project. She recorded the temperature at each hour from 10 A.M. to 2 P.M. and then made the line graph below.

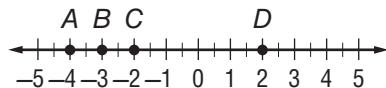


Which statement is true based on the graph?

- (A) The temperature fell throughout the day.
- (B) The temperature rose in the morning and fell in the early afternoon.
- (C) The temperature rose throughout the day.
- (D) The temperature fell in the morning and rose in the early afternoon.

6-6.1

- 2** Which letter on the number line represents  $-2$ ?



- (A) A
- (B) B
- (C) C
- (D) D

6-2.2

Use the following information to answer questions 3 and 4.

Carolyn and her dad went to Caesar's Head State Park to participate in the annual Hawk Watch program. Carolyn made the table below to keep track of how many hawks she and her father saw over a four-day period.

Hawks at Caesar's Head State Park	
Day	Number of Hawks
1	8
2	12
3	5
4	7

- 3** What does Carolyn need to find if she wants to know the difference between the highest and lowest amount of hawks she saw over the four days?

- (A) median
- (B) mode
- (C) mean
- (D) range

6-6.3

- 4** Carolyn wants to find the mean number of hawks that she saw over the four days. What is the mean of the data?

- (A) 6
- (B) 7
- (C) 8
- (D) 10

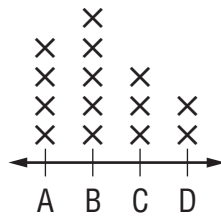
6-6.3



# Chapter 2 Test (continued)

## Mastering the SC Standards

- 5** The line plot below shows the grade each student received in Ms. Garcia's class.



Which statement is supported by the information in the line plot?

- (A) Twelve of the students received a C or higher.  
 (B) The same number of students received an A as received a B.  
 (C) More students received a D than a C.  
 (D) Fewer than two students received an A.

**6-6.1**

- 6** Mr. Chen needs to show all of his students' scores on one display. He also wants this display to show how many students had scores in the 80s. Which type of display is the best choice for Mr. Chen?

- (A) line graph  
 (B) circle graph  
 (C) bar graph  
 (D) stem-and-leaf

**6-6.2**

- 7** Temperatures from around the country are listed in the stem-and-leaf plot below.

### Temperatures

Stem	Leaf
2	9 9
3	0 5 7
4	2 5 8 9
5	7 7 7
6	1 2 3

What is the minimum temperature?

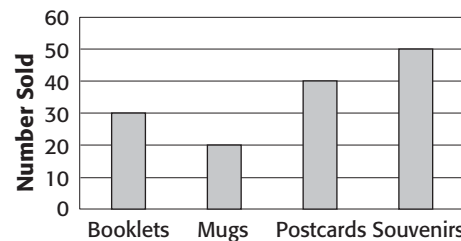
- (A) 29 degrees      (C) 57 degrees  
 (B) 42 degrees      (D) 63 degrees

**6-6.2**

- 8** Mieko made a data table based on the graph below. The graph shows the amount of each item sold at a gift shop in Myrtle Beach during one week. What number is missing from the table?

Item	Number Sold
booklets	30
mugs	20
postcards	?
souvenirs	50

### Items Sold for the Week



- (A) 25      (C) 40  
 (B) 30      (D) 55

**6-6.2**



**3****Anticipation Guide****Adding and Subtracting Decimals****STEP 1** *Before you begin Chapter 3*

- Read each statement.
- Decide whether you Agree (A) or Disagree (D) with the statement.
- Write A or D in the first column OR if you are not sure whether you agree or disagree, write NS (Not Sure).

<b>STEP 1</b> A, D, or NS	<b>Statement</b>	<b>STEP 2</b> A or D
	1. The decimal 0.42 represents 42 hundredths.	
	2. 0.70 is greater than 0.7 because 70 is greater than 7.	
	3. On a number line, numbers to the right of zero are positive and numbers to the left of zero are negative.	
	4. To round a decimal to the hundredths place, look at the digit in the thousandths place.	
	5. The decimal 2.628 can be rounded to 2.63 or 2.6.	
	6. To estimate the sum of two decimals, always round both decimals to the tenths place.	
	7. Only decimals to the same place value can be added or subtracted.	
	8. When solving math problems, estimation can be used when an exact answer is not necessary.	
	9. To multiply a decimal by a whole number, you must first rewrite the whole number as a decimal.	
	10. The solution to $3.5 \times 4.62$ will have three decimal places.	
	11. Before dividing by a decimal, change the divisor to a whole number.	

**STEP 2** *After you complete Chapter 3*

- Reread each statement and complete the last column by entering an A (Agree) or a D (Disagree).
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a separate sheet of paper to explain why you disagree. Use examples, if possible.

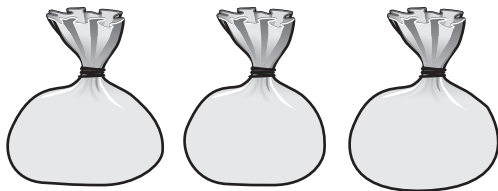
**3**

**Family Activity**

**State Test Practice**

**Fold the page along the dashed line. Work each problem on another piece of paper. Then unfold the page to check your work.**

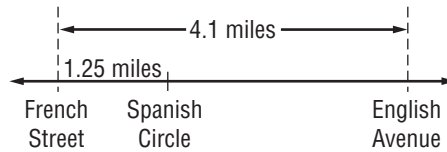
1. Amber weighed three bags all containing different things. If Amber puts all three bags into a previously empty box, how much will the contents of the box weigh altogether?



Bag A 5.78 kg      Bag B 6.2 kg      Bag C 12.12 kg

- A 24.1 kg
- B 18.52 kg
- C 24.11 kg
- D 23.92 kg

2. The following illustration shows the town of Big Pony, Montana. If Eddie rides his bike from French Street to English Avenue, how much farther does he ride than his sister, who rides her bike from French Street to Spanish Circle?



- A 3.85 miles
- B 2.85 miles
- C 1.85 miles
- D 3.15 miles

**Fold here.**

**Solution**

1. *Hint: Remember to line up the decimal points when you add and subtract decimals!*

$$\begin{array}{r}
 \phantom{+} 5.\overset{1}{7}\overset{1}{8} \\
 6.2\mathbf{0} \quad \leftarrow \text{Insert a zero to} \\
 + 12.12 \quad \text{help you add} \\
 \hline
 24.10
 \end{array}$$

24.10 kg is equivalent to 24.1 kg.

The answer is **A**.

**Solution**

2. *Hint: Remember to add zeros to the minuend (the number being subtracted from) if necessary to complete the subtraction problem. Also remember to borrow from the next greater place value when subtracting a larger number from a smaller number.*

$$\begin{array}{r}
 \phantom{+} 4.\overset{3}{1}\overset{10}{0} \quad \leftarrow \text{Insert a zero to} \\
 - 1.25 \quad \text{help you subtract} \\
 \hline
 2.85
 \end{array}$$

The answer is **B**.

**3-2****Explore Through Reading**

6-2.3, 6-1.6

**Comparing and Ordering Decimals****Get Ready for the Lesson**

Read the introduction at the top of page 142 in your textbook.  
Write your answers below.

1. Which city has the longest subway system? Explain.

**Read the Lesson**

For Exercises 2–4, refer to the paragraph above Example 2 on page 143.

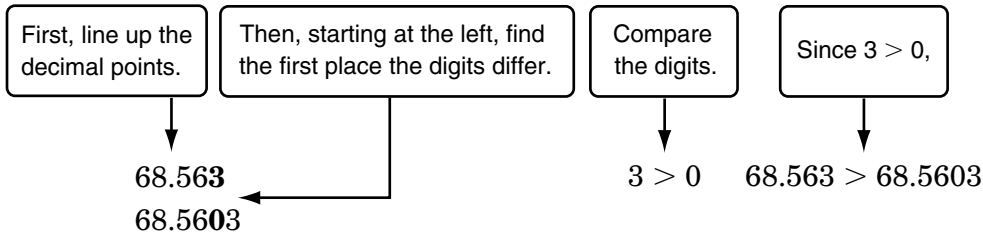
2. What are *equivalent decimals*?
3. What does it mean to annex a zero in a decimal? What happens to the value of the decimal?
4. List three decimals that are equivalent to 0.8.
5. Look at Example 2 on page 143. Why is annexing zeros used in ordering decimals?
6. What does the expression  $7.6 < 7.8$  mean?
7. What symbol would you use to compare 7.6 and 7.3? Explain.

**Remember What You Learned**

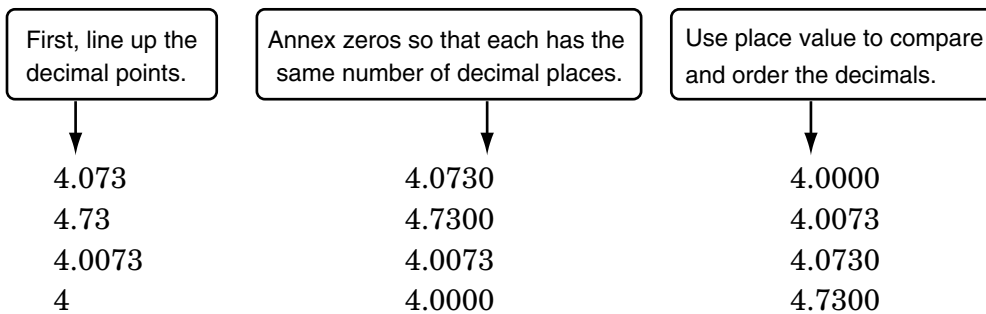
8. Explain how using a number line to compare decimals is similar to using a number line to compare whole numbers.

**3-2****Study Guide**

6-2.3, 6-1.6

**Comparing and Ordering 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.  $4.08 \bullet 4.080$

2.  $0.001 \bullet 0.01$

3.  $23.659 \bullet 22.659$

4.  $50.031 \bullet 50.030$

5.  $7 \bullet 7.0001$

6.  $18.01 \bullet 18.010$

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

Order each set of decimals from greatest to least.

9. 3.01, 3.009, 3.09, 3.0001

10. 45.303, 45.333, 45.03, 45.0003, 45.003

**3-2****Homework Practice**

6-2.3, 6-1.6

**Comparing and Ordering Decimals**Use  $>$ ,  $<$ , or  $=$  to compare each pair of decimals.

- |                            |                             |                             |
|----------------------------|-----------------------------|-----------------------------|
| 1. $8.8 \bullet 8.80$      | 2. $0.3 \bullet 3.0$        | 3. $0.06 \bullet 0.6$       |
| 4. $5.10 \bullet 5.01$     | 5. $4.42 \bullet 4.24$      | 6. $0.009 \bullet 0.9$      |
| 7. $0.305 \bullet 0.315$   | 8. $7.006 \bullet 7.060$    | 9. $8.408 \bullet 8.044$    |
| 10. $91.77 \bullet 91.770$ | 11. $7.2953 \bullet 7.2593$ | 12. $0.0826 \bullet 0.0286$ |

Order each set of decimals from least to greatest.

- |                            |                                  |
|----------------------------|----------------------------------|
| 13. 33.6, 34.01, 33.44, 34 | 14. 78.203, 78.34, 78.023, 78.23 |
|----------------------------|----------------------------------|

Order each set of decimals from greatest to least.

- |                            |                                     |
|----------------------------|-------------------------------------|
| 15. 8.7, 8.77, 8.07, 8.777 | 16. 26.0999, 26.199, 25.99, 26.1909 |
|----------------------------|-------------------------------------|

17. **LIBRARY** Books in the library are placed on shelves in order according to their Dewey Decimal numbers. Arrange these numbers in order from least to greatest.

Book Number
943.678
943.6
943.67

18. **ANALYZE TABLES** The following table shows the amount of money Sonia spent on lunch each day this week. Order the amounts from least to greatest and then find the median amount she spent on lunch.

Day	Mon.	Tues.	Wed.	Thu.	Fri.
Amount Spent (\$)	4.45	4.39	4.23	4.53	4.38



# Mini-Project

(Use with Lesson 3-2)



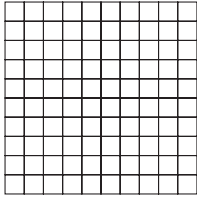
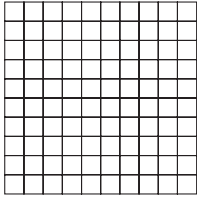
6-2.3, 6-1.6

## Comparing and Ordering Decimals

Shade a hundred grid to show each decimal. Which decimal is greater?

1. 0.78

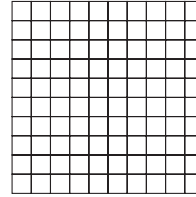
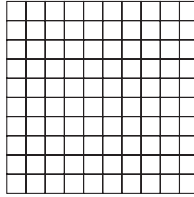
0.87



\_\_\_\_\_ is greater.

2. 0.65

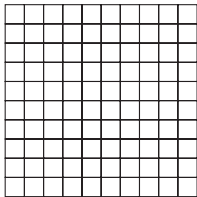
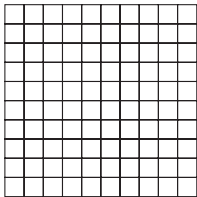
0.49



\_\_\_\_\_ is greater.

3. 0.3

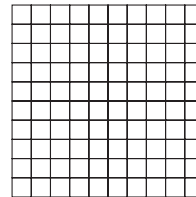
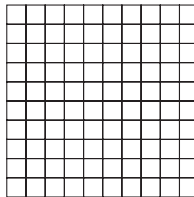
0.41



\_\_\_\_\_ is greater.

4. 0.98

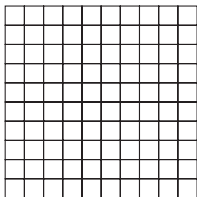
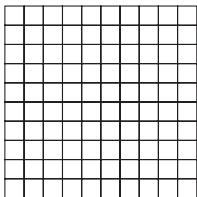
0.9



\_\_\_\_\_ is greater.

5. 0.5

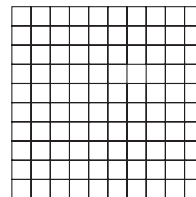
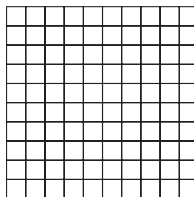
0.47



\_\_\_\_\_ is greater.

6. 0.09

0.63



\_\_\_\_\_ is greater.

**3-6****Explore Through Reading**

6-2.5, 6-2.7

***Multiplying Decimals by Whole Numbers*****Get Ready for the Lesson**

Read the introduction at the top of page 163 in your textbook.

Write your answers below.

1. Use the addition problem and the estimate to find  $2 \times \$4.92$ .
2. Write an addition problem, an estimate, and a multiplication problem to find the total over 3 days, 4 days, and 5 days.
3. **MAKE A CONJECTURE** about how to find  $5.35 \times 4$ .

**Read the Lesson**

4. When multiplying a whole number and a decimal, it is very important that the decimal point in the product is in the right place. What are two methods for determining the placement of the decimal point in the product?
5. If you place the decimal point in the product of a whole number and a decimal by counting decimal places, how is this done?
6. What does it mean to annex zeros in the product? Why is it sometimes necessary to do this?

**Remember What You Learned**

7. Work with a partner. Explain the difference between standard form and scientific notation, and give examples of each.

**3-6****Study Guide**

6-2.5, 6-2.7

**Multiplying Decimals by Whole Numbers**

When you multiply a decimal by a whole number, you multiply the numbers as if you were multiplying all whole numbers. Then you use estimation or you count the number of decimal places to decide where to place the decimal point. If there are not enough decimal places in the product, annex zeros to the left.

**Example 1 Find  $6.25 \times 5$ .****Method 1** Use estimation.

Round 6.25 to 6.

$6.25 \times 5 \rightarrow 6 \times 5 \text{ or } 30$

$$\begin{array}{r} 1\ 2 \\ 6.25 \\ \times 5 \\ \hline 31.25 \end{array}$$

Since the estimate is 30  
place the decimal point  
after 31.

**Method 2** Count decimal places.

$$\begin{array}{r} 6.25 \\ \times 5 \\ \hline 31.25 \end{array}$$

There are two places to the right of  
the decimal point.

Count the same number of decimal  
places from right to left.

**Example 2 Find  $3 \times 0.0047$ .**

$$\begin{array}{r} 2 \\ 0.0047 \\ \times 3 \\ \hline 0.0141 \end{array}$$

There are four decimal places.

Annex a zero on the left of 141 to make  
four decimal places.

**Example 3 Find  $6.3 \times 1,000$ .****Method 1** Use paper and pencil.

$$\begin{array}{r} 1,000 \\ \times 6.3 \\ \hline 3\ 000 \\ 60\ 000 \\ \hline 6,300.0 \end{array}$$

**Method 2** Use mental math.

Move the decimal point to the right the  
same number of zeros that are in 1,000  
or 3 places.

$6.3 \times 1,000 = 6,300$

**Exercises****Multiply.**

1.  $8.03 \times 3$

2.  $6 \times 12.6$

3.  $2 \times 0.012$

4.  $0.0008 \times 9$

5.  $2.32 \times 10$

6.  $6.8 \times 100$

7.  $5.2 \times 1000$

8.  $1.412 \times 100$



**3-6****Homework Practice**

6-2.5, 6-2.7

***Multiplying Decimals by Whole Numbers*****Multiply.**

1.  $0.8 \times 6$

2.  $0.7 \times 4$

3.  $1.9 \times 5$

4.  $3.4 \times 9$

5.  $6 \times 3.4$

6.  $5.2 \times 9$

7.  $0.6 \times 6$

8.  $4 \times 0.8$

9.  $5 \times 0.05$

10.  $3 \times 0.029$

11.  $0.0027 \times 15$

12.  $0.0186 \times 92$

**ALGEBRA Evaluate each expression.**

13.  $5.02h$  if  $h = 36$

14.  $72.33j$  if  $j = 3$

15.  $21k$  if  $k = 24.09$

**Multiply.**

16.  $4.23 \times 100$

17.  $3.7 \times 1,000$

18.  $2.6 \times 10$

19.  $4.2 \times 1,000$

20.  $1.23 \times 100$

21.  $5.14 \times 1,000$

22.  $6.7 \times 10$

23.  $7.89 \times 1,000$

**24. SHOPPING** Basketballs sell for \$27.99 each at the Super D and for \$21.59 each at the Bargain Spot. If the coach buys a dozen basketballs, how much can he save by buying them at the Bargain Spot? Justify your answer.

**25. SCHOOL** Jaimie purchases 10 pencils at the school bookstore. They cost \$0.30 each. How much did she spend on pencils?

**3-6****Problem-Solving Practice**

6-2.5, 6-2.7

***Multiplying Decimals by Whole Numbers***

<p><b>1. COOKING</b> Norberto uses three 14.7 oz cans of chicken broth when he makes his delicious tortilla soup. How many total ounces of chicken broth does he use?</p>	<p><b>2. TIME</b> Amanda works on a farm out in the hills. It takes her 2.25 hours to drive to town and back. She usually goes to town twice a week to get supplies. How much time does Amanda spend driving if she takes 8 trips to town each month?</p>
<p><b>3. EXERCISE</b> The local health club is advertising a special for new members: no initiation fee to join and only \$34.50 per month for the first year. If Andy joins the health club for one year, how much will he spend on membership?</p>	<p><b>4. BIKING</b> In order to train for a cross-state biking trip, Julie rides her bike 34.75 miles five times a week. How many total miles does she ride each week?</p>
<p><b>5. MONEY</b> David wants to buy 16 bolts from a bin at the hardware store. Each bolt costs \$0.03. How much will David pay for the bolts?</p>	<p><b>6. INSECTS</b> One wing of a Royal Moth is 0.75 inch across. How wide is the moth's wingspan when both wings are open?</p>
<p><b>7. COSTUMES</b> KJ is making costumes for this year's samba parade. The pattern she is using calls for 2.125 yards of fabric for each costume. How many yards of fabric will she need to make 34 costumes?</p>	<p><b>8. POOL PASSES</b> The girl scouts are going to the pool. It will cost them \$2.50 per person to go and there are 10 people going. What will the total cost be?</p>

**3-7****Explore Through Reading**

6-2.5, 6-1.1

***Multiplying Decimals*****Get Ready for the Lesson**

Read the introduction at the top of page 169 in your textbook.

Write your answers below.

1. The average weight of each block is 2.5 tons. The expression  $2.3 \times 2.5$  can be used to find the total weight, in millions of tons, of the blocks in the pyramid's base. Estimate the product of 2.3 and 2.5.
2. Multiply 23 by 25.
3. **MAKE A CONJECTURE** about how you can use your answers in Exercises 2 and 3 to find the product of 2.3 and 2.5?
4. What is the total weight of the blocks in the pyramid's base?
5. Use your conjecture in Exercise 3 to find  $1.7 \times 5.4$ . Explain each step.

**Read the Lesson**

6. When multiplying decimals, what is the relationship between the number of decimal places in each factor and the number of decimal places in the product?
7. Look at Exercises 1 and 2 above and the answers for these exercises.
  - a. How is 25 related to 2.5 tons?
  - b. How is 23 related to 2.3?
  - c. What is the actual weight if 2.3 is multiplied by 2.5?
  - d. How is 575 related to the actual weight of the blocks?

**Remember What You Learned**

8. In situations where you are multiplying decimals by whole numbers it is easy to think of the calculation as adding the same value multiple times. What does it mean to multiply decimals? Describe some situations where you would need to multiply decimals.

**3-7****Study Guide**

6-2.5, 6-1.1

**Multiplying Decimals**

When you multiply a decimal by a decimal, multiply the numbers as if you were multiplying all whole numbers. To decide where to place the decimal point, find the sum of the number of decimal places in each factor. The product has the same number of decimal places.

**Example 1 Find  $5.2 \times 6.13$ .****Estimate:**  $5 \times 6$  or 30

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

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

**Example 2 Evaluate  $0.023t$  if  $t = 2.3$ .** $0.023t = 0.023 \times 2.3$  Replace  $t$  with 2.3.

$$\begin{array}{r}
 0.023 \longleftarrow \text{three decimal places} \\
 \times 2.3 \longleftarrow \text{one decimal place} \\
 \hline
 69 \\
 46 \\
 \hline
 0.0529 \longleftarrow \text{Annex a zero to make four decimal places.}
 \end{array}$$

**Exercises****Multiply.**

1.  $7.2 \times 2.1$

2.  $4.3 \times 8.5$

3.  $2.64 \times 1.4$

4.  $14.23 \times 8.21$

5.  $5.01 \times 11.6$

6.  $9.001 \times 4.2$

**ALGEBRA Evaluate each expression if  $x = 5.07$ ,  $y = 1.5$ , and  $z = 0.403$ .**

7.  $3.2x + y$

8.  $yz + x$

9.  $z \times 7.06 - y$

**3-7****Homework Practice**

6-2.5, 6-1.1

**Multiplying Decimals****Multiply.**

1.  $0.3 \times 0.9$

2.  $2.6 \times 1.7$

3.  $1.09 \times 5.4$

4.  $17.2 \times 12.86$

5.  $0.56 \times 0.03$

6.  $4.9 \times 0.02$

7.  $2.07 \times 2.008$

8.  $26.02 \times 2.006$

**ALGEBRA** Evaluate each expression if  $r = 0.034$ ,  $s = 4.05$ , and  $t = 2.6$ .

9.  $5.027 + 4.68r$

10.  $2.9s - 3.7t$

11.  $4.13s + r$

12.  $rst$

**13. MINING** A mine produces 42.5 tons of coal per hour. How much coal will the mine produce in 9.5 hours?

**14. SHOPPING** Ms. Morgan bought 3.5 pounds of bananas at \$0.51 a pound and 4.5 pounds of pineapple at \$1.19 a pound. How much did she pay for the bananas and pineapple?

**3-7****Problem-Solving Practice**

6-2.5, 6-1.1

***Multiplying Decimals***

<p><b>1. GIFTS</b> Colin is filling 4.5 ounce bottles with lavender bubble bath that he made for gifts. He was able to fill 7.5 bottles. How many ounces of bubble bath did he make?</p>	<p><b>2. GROCERY</b> Iona's favorite peaches are \$2.50 per pound at the local farmers' market. She bought 3.5 pounds of the peaches. How much did she spend?</p>
<p><b>3. SHOPPING</b> Jennifer is buying new school clothes. The items she wants to buy add up to \$132.50 before sales tax. Sales tax is calculated by multiplying the total amount by 0.08. What is the amount of sales tax for the items?</p>	<p><b>4. DRIVING</b> Ana bought a van that holds 20.75 gallons of gas and gets an average of 15.5 miles per gallon. How many miles can she expect to go on a full tank?</p>
<p><b>5. INCOME</b> Ishi makes \$8.50 an hour rolling sushi at Kyoto Japanese Restaurant. His paycheck shows that he worked 20.88 hours over the past two weeks. How much did Ishi make before taxes?</p>	<p><b>6. TRAVEL</b> Manny is on vacation in France. He rented a car to drive 233.3 kilometers from Paris to Brussels and wants to figure out the distance in miles. To convert from kilometers to miles, he needs to multiply the total kilometers by 0.62. How many miles will Manny drive?</p>

**3-8****Explore Through Reading**

6-2.5, 6-1.1

***Dividing Decimals by Whole Numbers*****Get Ready for the Lesson**

Complete the Mini Lab at the top of page 173 in your textbook.  
Write your answers below.

Use base-ten blocks to show each quotient.

1.  $3.4 \div 2$

2.  $4.2 \div 3$

3.  $5.6 \div 4$

**Find each whole number quotient.**

4.  $34 \div 2$

5.  $42 \div 3$

6.  $56 \div 4$

7. Compare and contrast the quotients in Exercises 1–3 with the quotients in Exercises 4–6.

8. **MAKE A CONJECTURE** Write a rule for dividing a decimal by a whole number.

**Read the Lesson**

9. In the equation  $4.8 \div 8 = 0.6$ , how can you check to see if the division sentence is true?

10. Where do you place the decimal point in the quotient when dividing by a whole number?

**Remember What You Learned**

11. Work with a partner. Pretend your partner missed the class that covered this lesson. Explain to your partner the method for knowing where to place the decimal point when you are dividing with decimals.

**3-8****Study Guide**

6-2.5, 6-1.1

**Dividing Decimals by Whole Numbers**

When you divide a decimal by a whole number, place the decimal point in the quotient above the decimal point in the dividend. Then divide as you do with whole numbers.

**Example 1 Find  $8.73 \div 9$ .****Estimate:**  $9 \div 9 = 1$ 

$$\begin{array}{r} 0.97 \\ 9 \overline{)8.73} \\ \underline{-0} \\ 87 \\ \underline{-81} \\ 63 \\ \underline{-63} \\ 0 \end{array}$$

Place the decimal point directly above the decimal point in the quotient.

Divide as with whole numbers.

 $8.73 \div 9 = 0.97$  Compared to the estimate, the quotient is reasonable.**Example 2 Find  $8.58 \div 12$ .****Estimate:**  $10 \div 10 = 1$ 

$$\begin{array}{r} 0.715 \\ 12 \overline{)8.580} \\ \underline{-84} \\ 18 \\ \underline{-12} \\ 60 \\ \underline{-60} \\ 0 \end{array}$$

Place the decimal point.

Annex a zero to continue dividing.

 $8.58 \div 12 = 0.715$  Compared to the estimate, the quotient is reasonable.**Exercises****Divide.**

1.  $9.2 \div 4$

2.  $4.5 \div 5$

3.  $8.6 \div 2$

4.  $2.89 \div 4$

5.  $3.2 \div 4$

6.  $7.2 \div 3$

7.  $7.5 \div 5$

8.  $3.25 \div 5$



**3-8****Homework Practice**

6-2.5, 6-1.1

**Dividing Decimals by Whole Numbers****Divide. Round to the nearest tenth if necessary.**

1.  $25.2 \div 4$

2.  $147.2 \div 8$

3.  $5.69 \div 7$

4.  $13.28 \div 3$

5.  $22.5 \div 15$

6.  $65.28 \div 12$

7.  $243.83 \div 32$

8.  $654.29 \div 19$

9. **WEATHER** What is the average January precipitation in Arches National Park? Round to the nearest hundredth if necessary.

January Precipitation in Arches National Park								
Year	1997	1998	1999	2000	2001	2002	2003	2004
Precipitation (in.)	1.09	0.013	0.54	0.80	0.89	0.24	0.11	0.16

Source: National Park Service

10. **SHOPPING** A 3-pack of boxes of juice costs \$1.09. A 12-pack of boxes costs \$4.39. A case of 24 boxes costs \$8.79. Which is the best buy? Explain your reasoning.

**3-8****Problem-Solving Practice**

6-2.5, 6-1.1

**Dividing Decimals by Whole Numbers**

**1. ENTERTAINMENT** Frank, Gina, Judy, and Connie are splitting their dinner bill. After tip, the total is \$30.08. How much does each owe if they split the bill four ways?

**2. FOOD** There are 25 servings in a 12.5 ounce bottle of olive oil. How many ounces are in a serving?

**3. RUNNING** Isabella has found that she stays the most fit by running various distances and terrains throughout the week. On Mondays she runs 2.5 miles, on Tuesdays 4.6 miles, on Thursdays 6.75 miles, and on Saturdays 4.8 miles. What is the average distance Isabella runs on each of the days that she runs? Round to the nearest hundredth of a mile.

**4. BUSINESS** Katherine spends \$1,089.72 each month for rent and supplies to run her hair salon. If she charges \$18 for a haircut, how many haircuts must Katherine do to cover her monthly expenses? Round to the nearest whole number.

**5. CONSTRUCTION** It took Steve and his construction crew 8 months to build a house. After expenses, he was left with \$24,872.67 for himself. On average, how much did Steve make per month? Round to the nearest dollar.

**6. GRADES** Shane wants to figure out what grade he is getting in math. His test scores were 85.6, 78.5, 92.5, 67, and 83.7. What was his average test score? What grade will he receive?

Grade	Average Score
A	90 – 100
B	80 – 89
C	70 – 79
D	60 – 69
F	50 – 59

**3-9****Explore Through Reading**

6-2.5, 6-1.1

***Dividing by Decimals*****Get Ready for the Lesson**

Complete the Mini Lab at the top of page 179 in your textbook.  
Write your answers below.

Use a calculator to find each quotient.

1. Describe a pattern among the division problems and their quotients for each set.
2. Use the pattern in Set A to find  $36 \div 0.0009$  without a calculator.
3. Use the pattern in Set B to find  $0.0036 \div 9$  without a calculator.
4. Use the pattern in Set C to find  $0.0036 \div 0.0009$  without a calculator.
5. How could you find  $0.042 \div 0.07$  without a calculator?

**Read the Lesson**

6. When dividing decimals, what happens to the decimal point in the divisor and the dividend when you multiply both by the same power of 10?
7. Without doing any dividing, describe what you must do to start dividing 0.07 by 1.5.

**Remember What You Learned**

8. Write a short song or come up with a clever saying that will help you remember that whatever change you make to the decimal point of the divisor you must also make to the decimal point of the dividend.

# 3-9

## Study Guide



6-2.5, 6-1.1

### Dividing by Decimals

When you divide a decimal by a decimal, multiply both the divisor and the dividend by the same power of ten. Then divide as with whole numbers.

#### Example 1 Find $10.14 \div 5.2$ .

**Estimate:**  $10 \div 5 = 2$

Multiply by 10 to make a whole number.

$$\begin{array}{r}
 5.2 \overline{)10.14} \longrightarrow 53 \overline{)101.40} \\
 \underline{52} \phantom{0} \\
 494 \\
 \underline{-468} \\
 260 \\
 \underline{-260} \\
 0
 \end{array}$$

Place the decimal point.  
Divide as with whole numbers.

Multiply by the same number, 10.

Annex a zero to continue.

10.14 divided by 5.2 is 1.95.

Compare to the estimate.

**Check:**  $1.95 \times 5.2 = 10.14 \checkmark$

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

$$\begin{array}{r}
 0.02 \overline{)4.09} \longrightarrow 2 \overline{)409.0} \\
 \underline{4} \phantom{00} \\
 00 \\
 \underline{-0} \\
 09 \\
 \underline{-8} \\
 10 \\
 \underline{-10} \\
 0
 \end{array}$$

Place the decimal point.  
Divide.

Multiply each by 100.

Write a zero in the dividend and continue to divide.

$4.09 \div 0.02$  is 204.5.

**Check:**  $204.5 \times 0.02 = 4.09 \checkmark$

#### Exercises

**Divide.**

1.  $9.8 \div 1.4$

2.  $4.41 \div 2.1$

3.  $16.848 \div 0.72$

4.  $8.652 \div 1.2$

5.  $0.5 \div 0.001$

6.  $9.594 \div 0.06$

**3-9****Homework Practice**

6-2.5, 6-1.1

**Dividing the Decimals****Divide.**

1.  $12.92 \div 3.4$

2.  $22.47 \div 0.7$

3.  $0.025 \div 0.5$

4.  $7.224 \div 0.08$

5.  $0.855 \div 9.5$

6.  $0.9 \div 0.12$

7.  $3.0084 \div 0.046$

8.  $0.0868 \div 0.007$

**9. WHALES** After its first day of life, a baby blue whale started growing. It grew 47.075 inches. If the average baby blue whale grows at a rate of 1.5 inches a day, for how many days did the baby whale grow, to the nearest tenth of a day?

**10. LIZARDS** The two largest lizards in the United States are the Gila Monster and the Chuckwalla. The average Gila Monster is 0.608 meter long. The average Chuckwalla is 0.395 meters long. How many times longer is the Gila Monster than the Chuckwalla to the nearest hundredth?

**3-9****Problem-Solving Practice**

6-2.5, 6-1.1

**Dividing by Decimals**

**MARATHON** For Exercises 1 and 2, use the table that shows course records for the Boston Marathon.

Course Records for the Boston Marathon			
Division	Record-holder	Year	Time (hours)
Men's Open	Cosmas Ndeti	1994	2.121
Women's Open	Margaret Okayo	2002	2.345
Men's Wheelchair	Ernst Van Dyk	2004	1.305
Women's Wheelchair	Jean Driscoll	1994	1.523

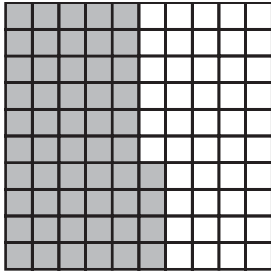
<p><b>1.</b> The Boston Marathon is 26.2 miles. Use the times shown in the table to calculate the miles per hour for each division winner. Round to the nearest thousandth.</p>	<p><b>2.</b> To the nearest hundredth, how many times greater was the men's open time than the women's wheelchair time?</p>
<p><b>3. DRIVING</b> The Martinez family drove 48.7 miles to the river. It took them 1.2 hours to get there. How fast did they drive? Round to the nearest whole number.</p>	<p><b>4. SHOPPING</b> Nikki is buying some refrigerator magnets for her friends. Her total bill is \$16.80. If magnets are \$0.80 each, how many magnets is she buying?</p>
<p><b>5. SCALE MODEL</b> Matt is making a scale model of a building. The model is 3.4 feet tall. The actual building is 41.48 feet tall. How many times smaller is the model than the actual building?</p>	<p><b>6. COOKING</b> Yori has 14.25 cups of cupcake batter. If each cupcake uses 0.75 cup of batter, how many cupcakes can Yori make?</p>



# Chapter 3 Test

## Mastering the SC Standards

- 1** What decimal is shown in the model below?



- (A) 0.54  
 (B) 0.56  
 (C) 0.6  
 (D) 0.64

**6-2.5**

- 2** Jose and his sister Luz want to hike two trails in Oconee State Park. The Hidden Falls trail is about 2.5 miles long. The Old Water Wheel trail is about 1.4 miles long. What is an estimate of how far they will hike altogether?

- (A) 2 miles  
 (B) 3 miles  
 (C) 4 miles  
 (D) 5 miles

**6-1.1**

- 3** Which symbol will make the number sentence true when it is placed in the blank?

$$2.04 \square 2.4$$

- (A)  $<$   
 (B)  $>$   
 (C)  $=$   
 (D)  $\geq$

**6-2.3**

- 4** Emily and her dad go fishing for striped bass. After they each catch one fish, they weigh them. Together both fish weigh 16.8 pounds. If Emily's fish weighs 9.2 pounds, how much does her dad's fish weigh?

- (A) 6.9 lbs  
 (B) 7.3 lbs  
 (C) 7.6 lbs  
 (D) 10.2 lbs

**6-1.1**

- 5** Ramon solved the problem  $13.7 \times 0.52$  and got 7124 as the answer. His teacher reminded him that he forgot the decimal point. Where should the decimal point be placed in the number 7124 so that Eric has the correct answer?

- (A) before the 7  
 (B) between the 7 and the 1  
 (C) between the 1 and the 2  
 (D) between the 2 and the 4

**6-2.5**



# Chapter 3 Test (continued)

## Mastering the SC Standards

- 6** Keiko takes the bus to her job after school. She pays \$0.60 every time she rides the bus. At the end of 2 weeks, Keiko spends \$9.60 on bus fare. If she divides the total cost of her bus fare by the cost of each ride, how many times does she ride the bus?

(A) 2  
(B) 6  
(C) 12  
(D) 16

**6-2.5**

- 7** Which multiplication is shown by the model below?



(A)  $1.7 \times 3$   
(B)  $7 \times 3$   
(C)  $0.5 \times 2$   
(D)  $0.7 \times 3$

**6-2.5**

- 8** What is 12.37 rounded to the nearest whole number?

(A) 10  
(B) 12  
(C) 13  
(D) 20

**6-1.1**

- 9** Ms. Franklin's sixth-grade class goes on a field trip to Congaree National Park. Each of the 38 students gets the same souvenir from the park. Altogether their souvenirs weigh 87.4 pounds. If the class divides the total pounds by the number of souvenirs, how much does one souvenir weigh?

(A) 0.8 lbs  
(B) 1.3 lbs  
(C) 2.3 lbs  
(D) 4.9 lbs

**6-2.5**

- 10** Gianna stops at a convenience store. She wants to buy a drink for \$1.29, a bag of nuts for \$0.99, a loaf of bread for \$1.89, and a pen for \$1.29. The tax is \$0.44. She only has \$5.00. How much more money does Gianna need to buy all of the items?

(A) \$0.35  
(B) \$0.44  
(C) \$0.46  
(D) \$0.90

**6-1.1**



## 4

**Anticipation Guide****Fractions and Decimals****STEP 1** *Before you begin Chapter 4*

- Read each statement.
- Decide whether you Agree (A) or Disagree (D) with the statement.
- Write A or D in the first column OR if you are not sure whether you agree or disagree, write NS (Not Sure).

STEP 1 A, D, or NS	Statement	STEP 2 A or D
	1. The greatest common factor of two numbers can be found by listing all factors of both numbers.	
	2. The greatest common factor of two numbers is always less than both numbers.	
	3. Two fractions are equivalent only if their numerators are the same and their denominators are the same.	
	4. A fraction is in simplest form only when the greatest common factor of the numerator and denominator is 1.	
	5. $\frac{7}{5}$ is an example of a mixed number.	
	6. Improper fractions can be rewritten as mixed numbers.	
	7. A multiple of a number is always divisible by the number.	
	8. When comparing two fractions, the greater fraction is always the fraction with the greater denominator.	
	9. To write a fraction as a decimal, divide the denominator into the numerator.	
	10. To write the decimal 0.32 as a fraction, first write 32 over one thousand, then simplify.	
	11. Since 8 does not divide evenly into 7, it is not possible to write $\frac{7}{8}$ as a decimal.	
	12. On the coordinate plane, the $x$ -axis is horizontal and the $y$ -axis is vertical.	

**STEP 2** *After you complete Chapter 4*

- Reread each statement and complete the last column by entering an A (Agree) or a D (Disagree).
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a separate sheet of paper to explain why you disagree. Use examples, if possible.

## 4

## Family Activity

## State Test Practice

Fold the page along the dashed line. Work each problem on another piece of paper. Then unfold the page to check your work.

1. Which of the following choices is the lowest common multiple that can be used to add fractions with denominators of 16, 6, and 8?

$$\frac{3}{16} + \frac{1}{6} + \frac{5}{8}$$

- A 16  
B 32  
C 96  
D 48

2. When changed to a decimal, which of the following fractions is written as 0.75?

- A  $\frac{1}{2}$   
B  $\frac{3}{5}$   
C  $\frac{6}{8}$   
D  $\frac{1}{4}$

*Fold here.*

## Solution

1. *Hint: To find the least common multiple, list the multiples of each number until you find a common multiple.*

16: 16, 32, 48

6: 6, 12, 18, 24, 30, 36, 42, 48

8: 8, 16, 24, 32, 40, 48

48 is the least common multiple listed.

The answer is **D**.

## Solution

2. *Hint: In order to change a fraction to a decimal, you divide the numerator (top of the fraction) by the denominator (bottom of the fraction).*

A  $1 \div 2 = 0.5$

B  $3 \div 5 = 0.6$

C  $6 \div 8 = 0.75$

D  $1 \div 4 = 0.25$

The answer is **C**.

**4-6****Explore Through Reading**

6-2.3, 6-1.6

**Comparing and Ordering Fractions****Get Ready for the Lesson**

Complete the Mini Lab at the top of page 220 in your textbook.  
Write your answers below.

1. Which fraction is greater?

Use a model to determine which fraction is greater.

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

3.  $\frac{1}{6}$  or  $\frac{2}{9}$

4.  $\frac{3}{8}$  or  $\frac{4}{7}$

**Read the Lesson**

For Exercises 4–6, look at the key concept box on page 220.

4. How is LCM related to LCD?
5. How can you find the least common denominator?
6. For the second step, it says to write an equivalent fraction for each fraction using the LCD. What are equivalent fractions?
7. When comparing numbers, you can use the signs  $<$ ,  $>$ , and  $=$ . What does each sign mean?

**Remember What You Learned**

8. Explain how to order fractions having different denominators from least to greatest.

## 4-6

## Study Guide



6-2.3, 6-1.6

## Comparing and Ordering Fractions

To compare two fractions,

- Find the **least common denominator (LCD)** of the fractions; that is, find the least common multiple of the denominators.
- Write an equivalent fraction for each fraction using the LCD.
- Compare the numerators.

**Example 1** Replace  $\bullet$  with  $<$ ,  $>$ , or  $=$  to make  $\frac{1}{3} \bullet \frac{5}{12}$  true.

- The LCM of 3 and 12 is 12. So, the LCD is 12.
- Rewrite each fraction with a denominator of 12.

$$\begin{array}{l} \uparrow \times 4 \\ \frac{1}{3} = \frac{\bullet}{12}, \text{ so } \frac{1}{3} = \frac{4}{12}. \end{array} \quad \frac{5}{12} = \frac{5}{12}$$

$$\begin{array}{l} \downarrow \times 4 \\ \end{array}$$

- Now, compare. Since  $4 < 5$ ,  $\frac{4}{12} < \frac{5}{12}$ . So  $\frac{1}{3} < \frac{5}{12}$ .

**Example 2** Order  $\frac{1}{6}$ ,  $\frac{2}{3}$ ,  $\frac{1}{4}$ , and  $\frac{3}{8}$  from least to greatest.

The LCD of the fractions is 24. So, rewrite each fraction with a denominator of 24.

$$\begin{array}{l} \uparrow \times 4 \\ \frac{1}{6} = \frac{\bullet}{24}, \text{ so } \frac{1}{6} = \frac{4}{24}. \end{array} \quad \begin{array}{l} \uparrow \times 8 \\ \frac{2}{3} = \frac{\bullet}{24}, \text{ so } \frac{2}{3} = \frac{16}{24}. \end{array}$$

$$\begin{array}{l} \downarrow \times 4 \\ \end{array} \quad \begin{array}{l} \downarrow \times 8 \\ \end{array}$$

$$\begin{array}{l} \uparrow \times 6 \\ \frac{1}{4} = \frac{\bullet}{24}, \text{ so } \frac{1}{4} = \frac{6}{24}. \end{array} \quad \begin{array}{l} \uparrow \times 3 \\ \frac{3}{8} = \frac{\bullet}{24}, \text{ so } \frac{3}{8} = \frac{9}{24}. \end{array}$$

$$\begin{array}{l} \downarrow \times 6 \\ \end{array} \quad \begin{array}{l} \downarrow \times 3 \\ \end{array}$$

The order of the fractions from least to greatest is  $\frac{1}{6}$ ,  $\frac{1}{4}$ ,  $\frac{3}{8}$ ,  $\frac{2}{3}$ .

## Exercises

Replace each  $\bullet$  with  $<$ ,  $>$ , or  $=$  to make a true sentence.

1.  $\frac{5}{12} \bullet \frac{3}{8}$

2.  $\frac{6}{8} \bullet \frac{3}{4}$

3.  $\frac{2}{7} \bullet \frac{1}{6}$

Order the fractions from least to greatest.

4.  $\frac{3}{4}, \frac{3}{8}, \frac{1}{2}, \frac{1}{4}$

5.  $\frac{2}{3}, \frac{1}{6}, \frac{5}{18}, \frac{7}{9}$

6.  $\frac{1}{2}, \frac{5}{6}, \frac{5}{8}, \frac{5}{12}$

## 4-6

## Homework Practice



6-2.3, 6-1.6

## Comparing and Ordering Fractions

Replace each ● with  $<$ ,  $>$ , or  $=$  to make a true statement.

1.  $\frac{11}{21}$  ●  $\frac{2}{3}$

2.  $\frac{1}{2}$  ●  $\frac{9}{18}$

3.  $2\frac{3}{8}$  ●  $2\frac{8}{24}$

4.  $6\frac{2}{3}$  ●  $6\frac{12}{15}$

5.  $5\frac{3}{4}$  ●  $5\frac{8}{12}$

6.  $\frac{2}{3}$  ●  $\frac{10}{18}$

7.  $\frac{18}{14}$  ●  $1\frac{2}{7}$

8.  $\frac{11}{12}$  ●  $2\frac{1}{3}$

9.  $\frac{34}{18}$  ●  $1\frac{5}{6}$

Order the fractions from least to greatest.

10.  $\frac{3}{5}, \frac{1}{4}, \frac{1}{2}, \frac{2}{5}$

11.  $\frac{7}{9}, \frac{13}{18}, \frac{5}{6}, \frac{2}{3}$

12.  $6\frac{3}{5}, 6\frac{1}{2}, 6\frac{5}{6}, 6\frac{3}{8}$

13.  $2\frac{2}{3}, 2\frac{6}{15}, 2\frac{3}{5}, 2\frac{4}{9}$

14. **MUSIC** Ramundus is making a xylophone. So far, he has bars that are  $1\frac{3}{4}$  feet,  $1\frac{7}{12}$  feet, and  $1\frac{2}{3}$  feet long. What is the length of the longest bar?

15. **DANCE** Alana practiced dancing for  $\frac{11}{4}$  hours on Monday,  $\frac{19}{8}$  hours on Wednesday, and  $2\frac{3}{5}$  hours on Friday. On which day did she practice the closest to 2 hours? Explain your reasoning.

## 4-6

## Problem-Solving Practice



6-2.3, 6-1.6

## Comparing and Ordering Fractions

<p><b>1. SHOES</b> Toya is looking in her closet. If <math>\frac{1}{3}</math> of her shoes are black and <math>\frac{2}{5}</math> are brown, does she have more black shoes or more brown shoes? Explain.</p>	<p><b>2. BUDGET</b> Daniel spends <math>\frac{3}{7}</math> of his money on rent and <math>\frac{4}{9}</math> of his money on food. Does he spend more money on food or rent? Explain.</p>
<p><b>3. WOODWORKING</b> Isi drilled a hole that is <math>\frac{5}{9}</math> inch wide. She has a screw that is <math>\frac{5}{6}</math> inch wide. Is the hole wide enough to fit the screw? Explain.</p>	<p><b>4. FOOD</b> In a recent survey, <math>\frac{2}{5}</math> of the people surveyed said their favorite food was pizza, <math>\frac{1}{4}</math> said it was hot dogs, and <math>\frac{3}{10}</math> said it was popcorn. Which food was favored by the greatest number of people? Explain.</p>
<p><b>5. OFFICE SUPPLIES</b> A blue paper clip is <math>\frac{1}{6}</math> inch wide. A silver paper clip is <math>\frac{3}{8}</math> inch wide, and a red paper clip is <math>\frac{1}{3}</math> inch wide. What color paper clip has the smallest width? Explain.</p>	<p><b>6. GUMBALLS</b> A red gumball is <math>\frac{5}{8}</math> inch across. A green gumball is <math>\frac{5}{6}</math> inch across, and a blue gumball is <math>\frac{7}{9}</math> inch across. List the gumballs in order from smallest to largest.</p>

**4-7****Explore Through Reading**

6-2.3, 6-1.2

**Writing Decimals as Fractions****Get Ready for the Lesson**

Read the introduction at the top of page 225 in your textbook.

Write your answers below.

1. Write the word form of the decimal that represents the part of those surveyed who play a stringed instrument.
2. Write this decimal as a fraction.
3. Repeat Exercises 1 and 2 with each of the other decimals.

**Read the Lesson**

For Exercises 4–6, look at Example 1 on page 225.

4. Why is the denominator of the fraction 10?
5. How does the example tell you to simplify the fraction?
6. What do the letters GCF stand for?
7. Look at Example 3 on page 226. What is the place value of the last decimal place? What does that mean when you go to write the corresponding fraction?

**Remember What You Learned**

8. Work with a partner. Each of you write several decimals with varying numbers of digits. Next, exchange papers and write the decimals as fractions. Then, exchange the papers again and check one another's work.

**4-7****Study Guide**

6-2.3, 6-1.2

**Writing Decimals as Fractions**

Decimals like 0.58, 0.12, and 0.08 can be written as fractions.

To write a decimal as a fraction, you can follow these steps.

1. Identify the place value of the last decimal place.
2. Write the decimal as a fraction using the place value as the denominator.

**Example 1 Write 0.5 as a fraction in simplest form.**

$$\begin{aligned}
 0.5 &= \frac{5}{10} && 0.5 \text{ means five tenths.} \\
 &= \frac{1}{2} && \text{Simplify. Divide the numerator and denominator by the GCF, 5.} \\
 &= \frac{1}{2} && \text{So, in simplest form, 0.5 is } \frac{1}{2}.
 \end{aligned}$$

**Example 2 Write 0.35 as a fraction in simplest form.**

$$\begin{aligned}
 0.35 &= \frac{35}{100} && 0.35 \text{ means 35 hundredths.} \\
 &= \frac{7}{20} && \text{Simplify. Divide the numerator and denominator by the GCF, 5.} \\
 &= \frac{7}{20} && \text{So, in simplest form, 0.35 is } \frac{7}{20}.
 \end{aligned}$$

**Example 3 Write 4.375 as a mixed number in simplest form.**

$$\begin{aligned}
 4.375 &= 4\frac{375}{1,000} && 0.375 \text{ means 375 thousandths.} \\
 &= 4\frac{3}{8} && \text{Simplify. Divide by the GCF, 125.} \\
 &= 4\frac{3}{8}
 \end{aligned}$$

**Exercises**

Write each decimal as a fraction or mixed number in simplest form.

- |           |           |            |            |
|-----------|-----------|------------|------------|
| 1. 0.9    | 2. 0.8    | 3. 0.27    | 4. 0.75    |
| 5. 0.34   | 6. 0.125  | 7. 0.035   | 8. 0.008   |
| 9. 1.4    | 10. 3.6   | 11. 6.28   | 12. 2.65   |
| 13. 12.05 | 14. 4.004 | 15. 23.205 | 16. 51.724 |



**4-7****Homework Practice**

6-2.3, 6-1.2

**Writing Decimals as Fractions****Write each decimal as a fraction in simplest form.**

1. 0.5

2. 0.8

3. 0.9

4. 0.75

5. 0.48

6. 0.72

7. 0.625

8. 0.065

9. 0.002

**Write each decimal as a mixed number in simplest form.**

10. 3.6

11. 10.4

12. 2.11

13. 29.15

14. 7.202

15. 23.535

**16. DISTANCE** The library is 0.96 mile away from Theo's home. Write this distance as a fraction in simplest form.

**17. INSECTS** A Japanese beetle has a length between 0.3 and 0.5 inch. Find two lengths that are within the given span. Write them as fractions in simplest form.

**4-7****Problem-Solving Practice**

6-2.3, 6-1.2

**Writing Decimals as Fractions**

<p><b>1. FIELD TRIP</b> About 0.4 of a biology class will be going on a field trip. Write the decimal as a fraction in simplest form.</p>	<p><b>2. EARTH</b> Eighty percent of all life on Earth is below the ocean's surface. Write 0.80 as a fraction in simplest form.</p>
<p><b>3. VENUS</b> The planet Venus is 67.24 million miles away from the Sun. Write the decimal as a mixed number in simplest form.</p>	<p><b>4. SATURN</b> If you weighed 138 pounds on Earth, you would weigh 128.34 pounds on Saturn. Write the weight on Saturn as a mixed number in simplest form.</p>
<p><b>5. MERCURY</b> If you were 10 years old on Earth, you would be 41.494 years old on Mercury. Write the age on Mercury as a mixed number in simplest form.</p>	<p><b>6. INTERNET</b> According to recent figures, 4.65 million people in the Middle East are online. Write the decimal as a mixed number in simplest form.</p>

**4-8****Explore Through Reading**

6-2.3, 6-1.7

**Writing Fractions as Decimals****Get Ready for the Lesson**

Read the introduction at the top of page 229 in your textbook.

Write your answers below.

1. Write the decimal for  $\frac{3}{10}$ .
2. Write the fraction equivalent to  $\frac{1}{2}$  with a denominator of 10.
3. Write the decimal for the fraction you found in Exercise 2.

**Read the Lesson**

4. Look at Exercise 2 at the top of page 229. What do you need to do to the fraction in order to write the decimal?
5. Look at Example 1 on page 229. Why do you multiply both the numerator and denominator by 2?
6. Look at Example 3 on page 230. Why do you annex zeros in method 1?
7. Explain what the word *annex* means.

**Remember What You Learned**

8. Write the following fractions as decimals. First, use the paper and pencil method. Then, use a calculator and compare your answers.

$$\frac{3}{12}, \frac{3}{20}, \frac{1}{5}, \frac{5}{8}$$

**4-8****Study Guide**

6-2.3, 6-1.7

**Writing Fractions as Decimals**

Fractions whose denominators are factors of 10, 100, or 1,000 can be written as decimals using equivalent fractions. Any fraction can also be written as a decimal by dividing the numerator by the denominator.

**Example 1** Write  $\frac{3}{5}$  as a decimal.

Since 5 is a factor of 10, write an equivalent fraction with a denominator of 10.

$$\begin{array}{l} \left( \times 2 \right) \\ \frac{3}{5} = \frac{6}{10} \\ \left( \times 2 \right) \\ = 0.6 \end{array}$$

Therefore,  $\frac{3}{5} = 0.6$ .

**Example 2** Write  $\frac{3}{8}$  as a decimal.

Divide.

$$\begin{array}{r} 0.375 \\ 8 \overline{)3.000} \\ \underline{-24} \phantom{00} \\ 60 \\ \underline{-56} \phantom{0} \\ 40 \\ \underline{-40} \\ 0 \end{array}$$

Therefore,  $\frac{3}{8} = 0.375$ .

**Exercises**

Write each fraction or mixed number as a decimal.

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

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

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

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

5.  $\frac{1}{8}$

6.  $2\frac{1}{4}$

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

8.  $\frac{9}{25}$

9.  $1\frac{3}{8}$

10.  $1\frac{5}{8}$

11.  $3\frac{5}{16}$

12.  $4\frac{9}{20}$

**4-8****Homework Practice**

6-2.3, 6-1.7

**Writing Fractions as Decimals**

Write each fraction or mixed number as a decimal.

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

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

3.  $\frac{13}{250}$

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

5.  $\frac{3}{16}$

6.  $\frac{11}{32}$

7.  $9\frac{29}{40}$

8.  $7\frac{29}{80}$

9.  $4\frac{11}{32}$

Replace each ● with &lt;, &gt;, or = to make a true sentence.

10.  $\frac{1}{4}$  ● 0.2

11.  $\frac{13}{20}$  ● 0.63

12. 0.5 ●  $\frac{3}{5}$

13. **DISTANCE** River Road is  $11\frac{4}{5}$  miles long. Prairie Road is 14.9 miles long. How much longer is Prairie Road than River Road?

14. **ANIMALS** The table shows lengths of different pond insects. Using decimals, name the insect having the smallest length and the insect having the greatest length.

Pond Insects				
Insect	Deer Fly	Spongilla Fly	Springtail	Water Treader
Length (in.)	$\frac{2}{5}$	$\frac{3}{10}$	$\frac{3}{20}$	$\frac{1}{2}$

Source: *Golden Nature Guide to Pond Life*

**4-8****Problem-Solving Practice**

6-2.3, 6-1.7

**Writing Fractions as Decimals**

<p><b>1. PLANETS</b> The planet Mercury is roughly <math>\frac{2}{5}</math> the size of Earth. Write the fraction as a decimal.</p>	<p><b>2. MARBLES</b> Lin has a marble that is <math>\frac{5}{8}</math> inch wide. Write the marble's width as a decimal.</p>
<p><b>3. HOMEWORK</b> Miko has finished <math>\frac{5}{16}</math> of her homework. Write the fraction as a decimal.</p>	<p><b>4. EXERCISE</b> Tate has been dancing for <math>\frac{7}{10}</math> of an hour. Write this fraction as a decimal.</p>
<p><b>5. SPORTS</b> Charlie played tennis for <math>3\frac{3}{4}</math> hours. Write the mixed number as a decimal.</p>	<p><b>6. COOKING</b> A recipe calls for <math>2\frac{3}{4}</math> cups of milk. Write the mixed number as a decimal.</p>
<p><b>7. HEIGHT</b> Winona is <math>2\frac{3}{12}</math> the height of her little brother. Write the mixed number as a decimal.</p>	<p><b>8. RECESS</b> Jennifer has been spinning in circles for <math>4\frac{3}{16}</math> minutes. Write the mixed number as a decimal.</p>

**4-9****Explore Through Reading**

6-4.1, 6-1.8

**Algebra: Ordered Pairs and Functions****Get Ready for the Lesson**

Read the introduction at the top of page 233 in your textbook.  
Write your answers below.

1. How is the map labeled?
2. Location C5 is closest to the end of which street?
3. Identify where Cedar Court and Juniper Lane intersect on the map.

**Read the Lesson**

4. What is an ordered pair? Write three examples.
5. What definition does a dictionary give for the word *origin*?
6. How does this definition of origin relate to the meaning of the word in terms of a coordinate plane?

**Remember What You Learned**

7. Work with a partner. Have one of you plot a point on a coordinate plane, without showing your partner the point. Have your partner guess the location of the point. Without giving them the exact location, give them a hint of which direction they need to move to guess your point. Continue with a guess and a hint until your partner names the correct point. Then exchange roles and see who can name the point in the fewest number of guesses.

# 4-9

## Study Guide



### Algebra: Ordered Pairs and Functions

A **coordinate plane** is formed when two number lines intersect at their zero points. This intersection is called the **origin**. The horizontal number line is called the **x-axis**. The vertical number line is called the **y-axis**.

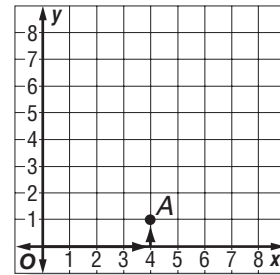
An **ordered pair** is used to name a point on a coordinate plane. The first number in the ordered pair is the **x-coordinate**, and the second number is the **y-coordinate**.

#### Example 1 Write the ordered pair that names point A.

Start at the origin. Move right along the *x*-axis until you are under point A. The *x*-coordinate is 4.

Then move up until you reach point A. The *y*-coordinate is 1.

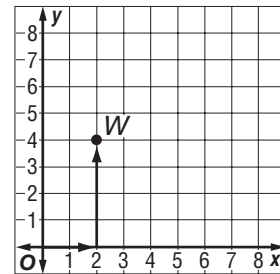
So, point A is named by the ordered pair (4, 1).



#### Example 2 Graph the point W(2, 4).

Start at the origin. Move 2 units to the right along the *x*-axis.

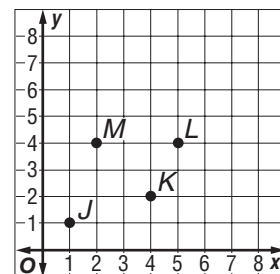
Then move 4 units up to locate the point. Draw a dot and label the point W.



#### Exercises

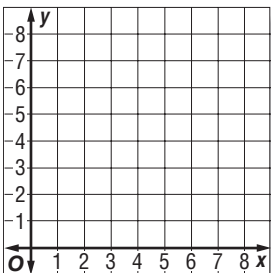
Use the coordinate plane at the right to name the ordered pair for each point.

1. J
2. K
3. L
4. M

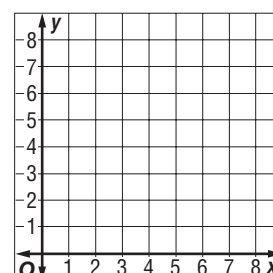


Graph and label each point on the coordinate plane.

5. S(1, 3)



6. T(4, 0)





**4-9**

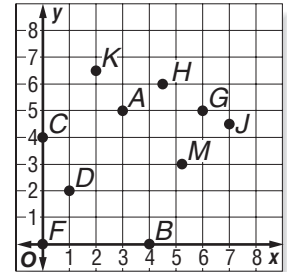
**Homework Practice**



6-4.1, 6-1.8

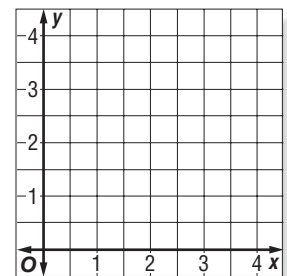
**Algebra: Ordered Pairs and Functions**

Use the coordinate plane at the right to name the ordered pair for each point.



- 1. A
- 2. B
- 3. C
- 4. D
- 5. F
- 6. G
- 7. H
- 8. J
- 9. K
- 10. M

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



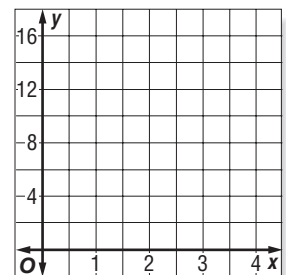
- 11.  $N(4, 3)$
- 12.  $P(0, 4)$
- 13.  $R(2, 4\frac{1}{2})$
- 14.  $S(1\frac{3}{4}, 2)$
- 15.  $T(2.75, 4)$
- 16.  $W(3, 1.5)$
- 17.  $A(4\frac{1}{4}, 1)$
- 18.  $B(1, 3\frac{3}{4})$

**CAR WASH** For Exercises 19 and 20, use the following information.

A car wash can wash four cars in one hour. The table shows the total number of cars washed in 0, 1, 2, and 3 hours.

<b>Hour</b>	0	1	2	3
<b>Cars Washed</b>	0	4	8	12

- 19. List this information as ordered pairs (number of hours, number of cars washed).
- 20. Graph the ordered pairs on the coordinate plane at the right. Then describe the graph.
- 21. **GEOMETRY** A square drawn on a coordinate plane has the following ordered pairs: (2, 2.5), (2, 6.5), and (6, 2.5). What is the ordered pair of the fourth point?



## 4-9

## Problem-Solving Practice



6-4.1, 6-1.8

## Algebra: Ordered Pairs and Functions

**PHOTOGRAPHY** A photography store sells black and white film. The cost of 1, 2, and 3 rolls of black and white film are shown in the table.

Black and White Film Costs	
Number of Rolls	Cost (\$)
1	4
2	8
3	12

- List this information as ordered pairs (number of rolls of film, cost).
- Graph the ordered pairs. Then describe the graph.

**EXERCISE** The table shows the time it takes Quentin to jog 1, 2, 3, and 4 laps around the track.

Number of Times Around Track	Total Time (min)
1	5
2	10
3	15
4	20

- List this information as ordered pairs (number of times around track, total time).
- Graph the ordered pairs. Then describe the graph.

**FOOTBALL** In football, each field goal made scores 3 points. The table shows this relationship.

Field Goals Made	Total Points
0	0
1	3
2	6
3	9

- List this information as ordered pairs (field goals made, total points).
- Graph the ordered pairs. Then describe the graph.

**JEWELRY** The table gives the number of beads needed to make bracelets of lengths 7, 7.5, 8, and 8.5 inches.

Bracelet Length (in.)	7	7.5	8	8.5
Number of Beads	28	30	32	34

- List this information as ordered pairs (bracelet length, number of beads).
- Graph the ordered pairs. Then describe the graph.



# Chapter 4 Test

## Mastering the SC Standards

- 1** South Carolina became a state on May 23, 1788. It was the eighth state, out of 50, to become a state. Which of the following decimals represents  $\frac{8}{50}$ ?

(A) 0.16  
(B) 0.5  
(C) 0.625  
(D) 0.8

**6-2.3**

- 2** What is the greatest common factor of 18 and 45?

(A) 3  
(B) 6  
(C) 8  
(D) 9

**6-1.2**

- 3** Which fraction shows  $\frac{15}{21}$  in simplest form?

(A)  $\frac{1}{2}$   
(B)  $\frac{2}{3}$   
(C)  $\frac{5}{7}$   
(D)  $\frac{5}{21}$

**6-2.4**

- 4** Which symbol will make the number sentence true when it is placed in the blank?

$$1\frac{1}{4} \square 1\frac{1}{8}$$

(A)  $>$   
(B)  $<$   
(C)  $=$   
(D)  $\geq$

**6-2.3**

- 5** Marita is walking home from school. She lives 1.6 miles from school. Which of the following fractions represents 1.6?

(A)  $\frac{5}{8}$   
(B)  $\frac{8}{5}$   
(C)  $\frac{16}{6}$   
(D)  $\frac{6}{1}$

**6-2.3**

- 6** What is the least common multiple of 18 and 24?

(A) 6  
(B) 12  
(C) 72  
(D) 432

**6-1.2**



# Chapter 4 Test (continued)

## Mastering the SC Standards

- 7** Out of the 50 states, South Carolina is ranked fortieth in land area. Which of the following decimals represents  $\frac{40}{50}$ ?

(A) 0.5  
 (B) 0.75  
 (C) 0.8  
 (D) 0.92

6-2.3

- 8** Which symbol will make the number sentence true when it is placed in the blank?

$$\frac{3}{7} \square \frac{4}{5}$$

(A) <  
 (B) >  
 (C) =  
 (D) ≥

6-2.3

- 9** How is  $\frac{8}{3}$  written as a mixed number?

(A)  $1\frac{1}{3}$   
 (B)  $1\frac{2}{3}$   
 (C)  $2\frac{1}{3}$   
 (D)  $2\frac{2}{3}$

6-2.3

- 10** What is  $4\frac{1}{2}$  written as an improper fraction?

(A)  $\frac{7}{2}$   
 (B)  $\frac{8}{2}$   
 (C)  $\frac{9}{2}$   
 (D)  $\frac{9}{4}$

6-2.3

- 11** Jen and her mom hike the Beech Bluff trail in the Lake Hartwell State Recreation Area. The trail is 0.7 of a mile long. Which fraction represents 0.7?

(A)  $\frac{7}{100}$   
 (B)  $\frac{70}{10}$   
 (C)  $\frac{7}{10}$   
 (D)  $\frac{77}{10}$

6-2.3

- 12** Which fraction shows  $\frac{16}{36}$  in simplest form?

(A)  $\frac{1}{2}$   
 (B)  $\frac{2}{3}$   
 (C)  $\frac{4}{9}$   
 (D)  $\frac{8}{18}$

6-2.4

**5****Anticipation Guide****Operations with Fractions****STEP 1** *Before you begin Chapter 5*

- Read each statement.
- Decide whether you Agree (A) or Disagree (D) with the statement.
- Write A or D in the first column OR if you are not sure whether you agree or disagree, write NS (Not Sure).

STEP 1 A, D, or NS	Statement	STEP 2 A or D
	1. If the numerator of a fraction is about half of the denominator, the fraction can be rounded to $\frac{1}{2}$ .	
	2. $\frac{1}{4}$ can be rounded to 0 or $\frac{1}{2}$ .	
	3. When adding two fractions, first add the numerators and then add the denominators.	
	4. Finding the least common denominator of two fractions is the same as finding the least common multiple of the denominators.	
	5. Before adding or subtracting mixed numbers, the numbers must be rewritten as improper fractions.	
	6. $3\frac{2}{3}$ can not be subtracted from 5 since 5 does not have a fractional part.	
	7. 3 is a good estimate for $\frac{1}{6} \times 19$ .	
	8. To multiply two mixed numbers, multiply the whole numbers, and then multiply the fractions.	
	9. To divide $\frac{4}{5}$ by $\frac{2}{7}$ , multiply $\frac{5}{4}$ by $\frac{7}{2}$ .	
	10. Before dividing two mixed numbers, rewrite both as improper fractions.	

**STEP 2** *After you complete Chapter 5*

- Reread each statement and complete the last column by entering an A (Agree) or a D (Disagree).
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a separate sheet of paper to explain why you disagree. Use examples, if possible.

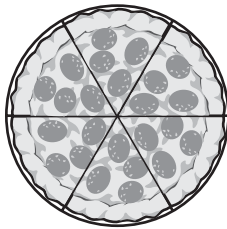
## 5

## Family Activity

## State Test Practice

Fold the page along the dashed line. Work each problem on another piece of paper. Then unfold the page to check your work.

1. On Sunday, Billy ate  $\frac{1}{6}$  of a pizza. On Monday, he ate another  $\frac{2}{3}$  of the pizza. How much of the pizza remained for Tuesday?



- A  $\frac{1}{6}$   
 B  $\frac{1}{3}$   
 C  $\frac{6}{9}$   
 D  $\frac{5}{6}$

**Fold here.**

**Solution**

1. *Hint: To find the sum of these fractions, you need to find the least common denominator.*

The amount of pizza Billy ate is  $\frac{1}{6} + \frac{2}{3} = \frac{1}{6} + \frac{4}{6}$  or  $\frac{5}{6}$ . The amount left over is a whole pizza ( $\frac{6}{6}$ ) minus the amount eaten.

$$\frac{6}{6} - \frac{5}{6} = \frac{1}{6}$$

The answer is **A**.

2. Dennis is mixing together the ingredients for a recipe that calls for  $4\frac{1}{2}$  cups of flour and  $1\frac{1}{4}$  cup of sugar. How much more flour goes into the recipe than sugar?

- A  $3\frac{1}{2}$   
 B  $2\frac{3}{4}$   
 C  $5\frac{2}{6}$   
 D  $3\frac{1}{4}$

**Solution**

2. *Hint: The denominators of the fractions should be the same in order to subtract the fraction. You can also change the mixed number to an improper fraction to make subtraction easier.*

In order to subtract, the denominators in the fractions should be the same.

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

You can also used mixed numbers:

$$\frac{9}{2} - \frac{5}{4} = \frac{18}{4} - \frac{5}{4} = \frac{13}{4} = 3\frac{1}{4}$$

The answer is **D**.

**5-3****Explore Through Reading**

6-2.4, 6-1.7

**Adding and Subtracting Fractions with Like Denominators****Get Ready for the Lesson**

Complete the Mini Lab at the top of page 256 in your textbook.  
Write your answers below.

Find each sum using grid paper.

1.  $\frac{4}{12} + \frac{3}{12}$

2.  $\frac{1}{6} + \frac{1}{6}$

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

4. What patterns do you notice with the numerators?
5. What patterns do you notice with the denominators?
6. Explain how you could find the sum of  $\frac{3}{8} + \frac{1}{8}$  without using grid paper.

**Read the Lesson**

Look at the paragraph below the Mini Lab on page 256 in your textbook.

7. Write a definition for *like fractions*.
8. What meaning does your textbook give for *denominator*?
9. The units being added are twelfths. Write a fraction that indicates one twelfth.

**Remember What You Learned**

10. In your own words, explain how to add like fractions. Then explain how to subtract like fractions.

**5-3****Study Guide**

## Adding and Subtracting Fractions with Like Denominators

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.

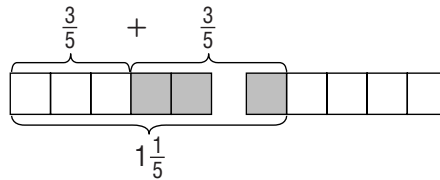
**Example 1** Find the sum of  $\frac{3}{5}$  and  $\frac{3}{5}$ .

**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  $\frac{3}{4}$  and  $\frac{1}{4}$ .

**Estimate**  $1 - 0 = 1$

$$\frac{3}{4} - \frac{1}{4} = \frac{3-1}{4} \quad \text{Subtract the numerators.}$$

$$= \frac{2}{4} \text{ or } \frac{1}{2} \quad \text{Simplify.}$$

Compared to the estimate, the answer is reasonable.

### 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.  $\frac{4}{7} + \frac{5}{7}$

6.  $\frac{4}{9} - \frac{1}{9}$

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

8.  $\frac{6}{7} - \frac{4}{7}$

9.  $\frac{3}{4} + \frac{3}{4}$

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

11.  $\frac{5}{6} + \frac{1}{6}$

12.  $\frac{7}{10} - \frac{1}{10}$



**5-3****Homework Practice**

6-2.4, 6-1.7

### *Adding and Subtracting Fractions with Like Denominators*

Add or subtract. Write in simplest form.

1.  $\frac{3}{7} + \frac{6}{7}$

2.  $\frac{2}{5} + \frac{4}{5}$

3.  $\frac{3}{4} + \frac{3}{4}$

4.  $\frac{2}{3} + \frac{2}{3}$

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

6.  $\frac{11}{16} + \frac{7}{16}$

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

8.  $\frac{3}{10} - \frac{1}{10}$

9.  $\frac{11}{15} - \frac{6}{15}$

10.  $\frac{7}{9} - \frac{4}{9}$

11.  $\frac{9}{11} - \frac{6}{11}$

12.  $\frac{17}{18} - \frac{5}{18}$

13.  $\frac{5}{7} + \frac{1}{7} + \frac{6}{7}$

14.  $\frac{9}{10} + \frac{9}{10} - \frac{3}{10}$

15.  $\frac{11}{12} - \frac{7}{12} + \frac{5}{12}$

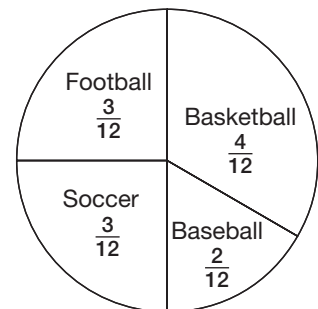
Write an addition or subtraction expression for each model. Then add or subtract.



18. **WEATHER** In January through March, Death Valley gets a total of about  $\frac{21}{25}$  inch of precipitation. In April through June, it gets a total of about  $\frac{6}{25}$  inch. How much more precipitation occurs in January through March?

19. **ANALYZE GRAPHS** What part of the school population likes basketball, baseball, or football? How much larger is this than the part of the student population that prefers soccer?

**Brown Middle School's Favorite Sports**





# Mini-Project



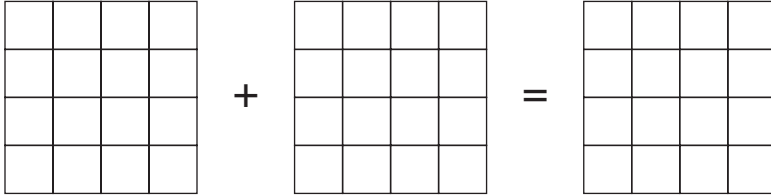
6-2.4, 6-1.7

(Use with Lesson 5-3)

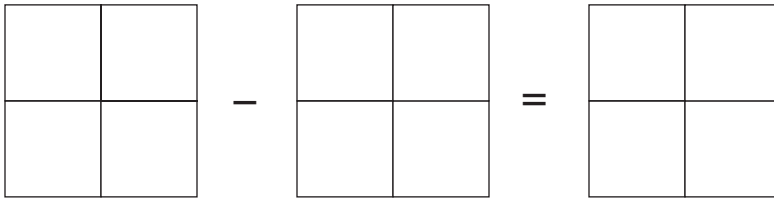
## Adding and Subtracting Fractions

Shade each figure to model each fraction. Use the models to find the sum.

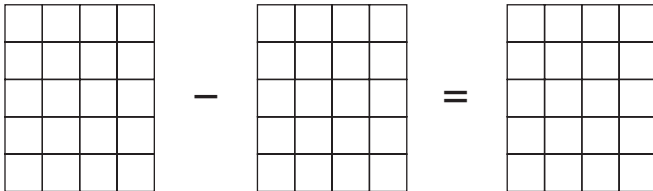
1.  $\frac{5}{16} + \frac{4}{16} =$



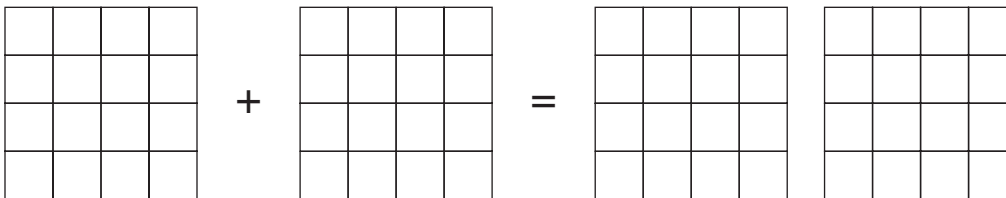
2.  $\frac{3}{4} - \frac{1}{4} =$



3.  $\frac{11}{20} - \frac{3}{20} =$



4.  $\frac{9}{16} + \frac{13}{16} =$



**5-4****Explore Through Reading**

6-2.4, 6-1.7

**Adding and Subtracting Fractions with Like Denominators****Get Ready for the Lesson**

Read the introduction at the top of page 263 in your textbook.  
Write your answers below.

1. Write each fraction in simplest form.
2. What fraction of one hour is equal to the sum of 15 minutes and 20 minutes?  
Write in simplest form.
3. Explain why  $\frac{1}{6}$  hour +  $\frac{1}{3}$  hour =  $\frac{1}{2}$  hour.
4. Explain why  $\frac{1}{12}$  hour +  $\frac{1}{2}$  hour =  $\frac{7}{12}$  hour.

**Read the Lesson**

5. Look at the Key Concept box on page 263 in your textbook. What does it mean to rename a fraction?
6. What do the letters *LCD* stand for?
7. What is the LCD of  $\frac{1}{6}$  and  $\frac{1}{4}$ ?

**Remember What You Learned**

8. Work with a partner. Pretend you are a teacher. You are teaching your partner how to add and subtract fractions with unlike denominators. Simplify  $\frac{1}{2} + \frac{3}{4}$ , showing and explaining the steps to your partner. Then have your partner simplify  $\frac{1}{2} - \frac{2}{5}$ , showing and explaining each step.

## 5-4

## Study Guide



6-2.4, 6-1.7

## Adding and Subtracting Fractions with Like Denominators

To find the sum or difference of two fractions with unlike denominators, rename the fractions using the least common denominator (LCD). Then add or subtract and simplify.

**Example 1** Find  $\frac{1}{3} + \frac{5}{6}$ .

The LCD of  $\frac{1}{3}$  and  $\frac{5}{6}$  is 6.

Write the problem.

$$\begin{array}{r} \frac{1}{3} \\ + \frac{5}{6} \\ \hline \end{array}$$

→

Rename using the LCD, 6.

$$\begin{array}{r} \frac{1 \times 2}{3 \times 2} = \frac{2}{6} \\ + \frac{5 \times 1}{6 \times 1} = \frac{5}{6} \\ \hline \end{array}$$

→

Add the fractions.

$$\begin{array}{r} \frac{2}{6} \\ + \frac{5}{6} \\ \hline \frac{7}{6} \text{ or } 1\frac{1}{6} \end{array}$$

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

The LCD of  $\frac{2}{3}$  and  $\frac{1}{4}$  is 12.

Write the problem.

$$\begin{array}{r} \frac{2}{3} \\ - \frac{1}{4} \\ \hline \end{array}$$

→

Rename using the LCD, 12.

$$\begin{array}{r} \frac{2 \times 4}{3 \times 4} = \frac{8}{12} \\ - \frac{1 \times 3}{4 \times 3} = \frac{3}{12} \\ \hline \end{array}$$

→

Subtract the fractions.

$$\begin{array}{r} \frac{8}{12} \\ - \frac{3}{12} \\ \hline \frac{5}{12} \end{array}$$

**Example 3** Evaluate  $x - y$  if  $x = \frac{1}{2}$  and  $y = \frac{2}{5}$ .

$$\begin{aligned} x - y &= \frac{1}{2} - \frac{2}{5} \\ &= \frac{1 \times 5}{2 \times 5} - \frac{2 \times 2}{5 \times 2} \\ &= \frac{5}{10} - \frac{4}{10} \\ &= \frac{1}{10} \end{aligned}$$

Replace  $x$  with  $\frac{1}{2}$  and  $y$  with  $\frac{2}{5}$ .

Rename  $\frac{1}{2}$  and  $\frac{2}{5}$  using the LCD, 10.

Simplify.

Subtract the numerators.

### Exercises

Add or subtract. Write in simplest form.

1.  $\frac{1}{6} + \frac{1}{2}$

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

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

4.  $\frac{9}{10} - \frac{3}{5}$

5.  $\frac{2}{4} + \frac{1}{2}$

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

7.  $\frac{7}{10} + \frac{1}{2}$

8.  $\frac{4}{9} - \frac{1}{3}$

9. Evaluate  $x + y$  if  $x = \frac{1}{12}$  and  $y = \frac{1}{6}$ .

10. Evaluate  $a + b$  if  $a = \frac{1}{2}$  and  $b = \frac{3}{4}$ .

**5-4****Homework Practice**

6-2.4, 6-1.7

**Adding and Subtracting Fractions with Like Denominators**

Add or subtract. Write in simplest form.

1. 
$$\begin{array}{r} \frac{3}{4} \\ + \frac{1}{8} \\ \hline \end{array}$$

2. 
$$\begin{array}{r} \frac{1}{2} \\ + \frac{1}{3} \\ \hline \end{array}$$

3. 
$$\begin{array}{r} \frac{11}{12} \\ - \frac{2}{3} \\ \hline \end{array}$$

4. 
$$\begin{array}{r} \frac{7}{10} \\ - \frac{1}{2} \\ \hline \end{array}$$

5. 
$$\begin{array}{r} \frac{1}{6} \\ + \frac{3}{10} \\ \hline \end{array}$$

6. 
$$\begin{array}{r} \frac{3}{4} \\ + \frac{1}{6} \\ \hline \end{array}$$

7. 
$$\begin{array}{r} \frac{3}{5} \\ - \frac{1}{4} \\ \hline \end{array}$$

8. 
$$\begin{array}{r} \frac{6}{7} \\ - \frac{3}{4} \\ \hline \end{array}$$

9.  $\frac{6}{7} + \frac{1}{3}$

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

11.  $\frac{11}{12} - \frac{3}{4}$

12.  $\frac{7}{11} - \frac{1}{2}$

**ALGEBRA** Evaluate each expression.

13.  $a + b$  if  $a = \frac{3}{5}$  and  $b = \frac{5}{8}$

14.  $c - d$  if  $c = \frac{9}{10}$  and  $d = \frac{5}{6}$

15. **ANIMALS** A newborn panda at the San Diego zoo grew about  $\frac{9}{16}$  pound the first week and about  $\frac{5}{8}$  pound the second week. How much more did the panda grow the second week? Justify your answer.

16. **EXERCISES** Every day Kim does leg muscle exercises for  $\frac{3}{7}$  of an hour and foot muscle exercises for  $\frac{2}{3}$  of an hour. Which exercises does she spend the most time doing and by how much?

**5-4****Problem-Solving Practice**

6-2.4, 6-1.7

### *Adding and Subtracting Fractions with Like Denominators*

**BUSINESS** For Exercises 1–4, use the table below. It lists the fractions of United States car sales held by several companies in a recent year.

Leading Car Sales in U.S.	
Company	Fraction of Sales
Company A	$\frac{1}{5}$
Company B	$\frac{4}{25}$
Company C	$\frac{2}{5}$
Company D	$\frac{3}{20}$

<p>1. What fraction of the U.S. sales did Company C and Company B hold together?</p>	<p>2. How much greater was the fraction of the market of Company A than of Company D?</p>
<p>3. How much more than Company A's fraction of the market did Company C have?</p>	<p>4. Find the total fraction of the market that Company D and Company B hold together.</p>
<p>5. <b>TRAVEL</b> Gabriella's travel shampoo bottle holds <math>\frac{1}{2}</math> cup of shampoo. Before leaving on vacation, she filled the bottle to the top with <math>\frac{1}{8}</math> cup of shampoo. How much shampoo was already in the bottle?</p>	<p>6. <b>EXERCISE</b> Bill and Andy were racing to see who could run the farthest in 5-minutes. Bill ran <math>\frac{5}{8}</math> of a mile, and Andy ran <math>\frac{3}{4}</math> of a mile. How much farther did Andy run than Bill?</p>

**5-5****Explore Through Reading**

6-2.4, 6-1.7

**Adding and Subtracting Mixed Numbers****Get Ready for the Lesson**

Complete the Mini Lab at the top of page 270 in your textbook.  
Write your answers below.

1. How many whole paper plates can you make?
2. What fraction is represented by the leftover pieces?

Use paper plate models to find each sum or difference.

3.  $1\frac{3}{4} + 2\frac{1}{2}$

4.  $2\frac{3}{4} - 1\frac{1}{4}$

5.  $1\frac{2}{3} + 2\frac{1}{6}$

**Read the Lesson**

6. What is a mixed number? Give an example.
7. In Example 2 on page 271 in your textbook, the letters *LCD* are used. What does *LCD* stand for?

**Remember What You Learned**

8. In your own words, summarize how to add or subtract mixed numbers.

**5-5****Study Guide**

6-2.4, 6-1.7

**Adding and Subtracting Mixed Numbers**

To add or subtract mixed numbers:

1. Add or subtract the fractions.
2. Then add or subtract the whole numbers.
3. Rename and simplify if necessary.

**Example 1** Find  $2\frac{1}{3} + 4\frac{1}{4}$ .The LCD of  $\frac{1}{3}$  and  $\frac{1}{4}$  is 12.

Write the problem.

$$\begin{array}{r} 2\frac{1}{3} \\ + 4\frac{1}{4} \\ \hline \end{array}$$

→

Rename the fractions  
using the LCD, 12.

$$\begin{array}{r} 2\frac{1 \times 4}{3 \times 4} = 2\frac{4}{12} \\ + 4\frac{1 \times 3}{4 \times 3} = + 4\frac{3}{12} \\ \hline \end{array}$$

→

Add the fractions. Then  
add the whole numbers.

$$\begin{array}{r} 2\frac{4}{12} \\ + 4\frac{3}{12} \\ \hline 6\frac{7}{12} \end{array}$$

So,  $2\frac{1}{3} + 4\frac{1}{4} = 6\frac{7}{12}$ .

**Example 2** Find  $6\frac{1}{2} - 2\frac{1}{3}$ .The LCD of  $\frac{1}{2}$  and  $\frac{1}{3}$  is 6.

Write the problem.

$$\begin{array}{r} 6\frac{1}{2} \\ - 2\frac{1}{3} \\ \hline \end{array}$$

→

Rename the fractions  
using the LCD, 6.

$$\begin{array}{r} 6\frac{1 \times 3}{2 \times 3} = 6\frac{3}{6} \\ - 2\frac{1 \times 2}{3 \times 2} = - 2\frac{2}{6} \\ \hline \end{array}$$

→

Subtract the fractions. Then  
subtract the whole numbers.

$$\begin{array}{r} 6\frac{3}{6} \\ - 2\frac{2}{6} \\ \hline 4\frac{1}{6} \end{array}$$

So,  $6\frac{1}{2} - 2\frac{1}{3} = 4\frac{1}{6}$ .

**Exercises**

Add or subtract. Write in simplest form.

1.  $\begin{array}{r} 3\frac{2}{3} \\ - 2\frac{1}{3} \\ \hline \end{array}$

2.  $\begin{array}{r} 4\frac{3}{4} \\ + 1\frac{3}{4} \\ \hline \end{array}$

3.  $\begin{array}{r} 5\frac{1}{2} \\ + 4\frac{1}{3} \\ \hline \end{array}$

4.  $\begin{array}{r} 6\frac{7}{8} \\ - 3\frac{1}{2} \\ \hline \end{array}$

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

6.  $4\frac{2}{3} + 2\frac{1}{4}$

7.  $5\frac{1}{3} - 2\frac{1}{4}$



**5-5****Homework Practice**

6-2.4, 6-1.7

**Adding and Subtracting Mixed Numbers**

Add or subtract. Write in simplest form.

1. 
$$\begin{array}{r} 5 \\ - 3\frac{4}{7} \\ \hline \end{array}$$

2. 
$$\begin{array}{r} 8 \\ - 2\frac{3}{8} \\ \hline \end{array}$$

3. 
$$\begin{array}{r} 7\frac{7}{8} \\ - 3\frac{3}{8} \\ \hline \end{array}$$

4. 
$$\begin{array}{r} 8\frac{5}{7} \\ - 4\frac{3}{7} \\ \hline \end{array}$$

5. 
$$\begin{array}{r} 9\frac{3}{4} \\ - 2\frac{3}{8} \\ \hline \end{array}$$

6. 
$$\begin{array}{r} 6\frac{2}{3} \\ - 1\frac{1}{6} \\ \hline \end{array}$$

7. 
$$\begin{array}{r} 8\frac{1}{4} \\ + 2\frac{4}{5} \\ \hline \end{array}$$

8. 
$$\begin{array}{r} 10\frac{2}{3} \\ + 8\frac{7}{10} \\ \hline \end{array}$$

9.  $5\frac{9}{10} + 3\frac{1}{2}$

10.  $3\frac{5}{6} + 10\frac{5}{8}$

11.  $8\frac{5}{6} - 3\frac{1}{3}$

12.  $9\frac{6}{7} - 2\frac{5}{14}$

ALGEBRA. Evaluate each expression if  $a = 3\frac{5}{6}$ ,  $b = 2\frac{2}{3}$ , and  $c = 1\frac{1}{4}$ .

13.  $a + b$

14.  $a + c$

15.  $b - c$

16.  $a - c$

17. **COOKING** A punch recipe calls for  $4\frac{1}{4}$  cups pineapple juice,  $2\frac{2}{3}$  cups orange juice, and  $3\frac{1}{2}$  cups cranberry juice. How much juice is needed to make the punch?

18. **ANALYZE TABLES** The wingspans of two butterflies and a moth are shown. How much greater is the longest wingspan than the shortest wingspan? Justify your answer.

Butterfly or Moth Wingspans	
Butterfly or Moth	Width (in.)
American Snout butterfly	$1\frac{3}{8}$
Garden Tiger Moth	$1\frac{13}{16}$
Milbert's Tortoiseshell butterfly	$1\frac{3}{4}$

**5-5****Problem-Solving Practice**

6-2.4, 6-1.7

**Adding and Subtracting Mixed Numbers**

Solve. Write answers in simplest form.

<p><b>1. SCHOOL</b> Liwanu spent <math>2\frac{2}{5}</math> hours on his math homework and <math>1\frac{3}{5}</math> hours on his science homework. How much time did he spend doing math and science homework?</p>	<p><b>2. FARMING</b> Mr. Garcia planted <math>4\frac{7}{8}</math> acres of wheat and <math>1\frac{5}{8}</math> acres of corn. How much more wheat did he plant than corn?</p>
<p><b>3. TRAVEL</b> It usually takes Amalie <math>1\frac{3}{4}</math> hours to get to her aunt's house. Due to Thanksgiving traffic, this year it took <math>3\frac{1}{3}</math> hours. How much longer did it take this year?</p>	<p><b>4. COOKING</b> Gina wants to make muffins. The recipe for blueberry muffins calls for <math>2\frac{3}{4}</math> cups of flour. The recipe for cornmeal muffins calls for <math>1\frac{1}{3}</math> cups of flour. How many more cups of flour would Gina need for blueberry muffins than corn muffins?</p>
<p><b>5. SCULPTURE</b> José has <math>8\frac{1}{2}</math> cups of Plaster of Paris powder. If José uses <math>5\frac{3}{5}</math> cups for a sculpture, how much plaster will he have left?</p>	<p><b>6. BOOKS</b> Kyle read <math>3\frac{5}{6}</math> books and Jan read <math>2\frac{1}{3}</math> books. How many more books did Kyle read than Jan?</p>
<p><b>7. ANIMALS</b> The average length of a Rufous hummingbird is <math>3\frac{1}{2}</math> inches. The average length of a Broad-tailed hummingbird is <math>4\frac{1}{2}</math> inches. How much shorter is the Rufous hummingbird?</p>	<p><b>8. RECYCLING</b> The class collected <math>9\frac{5}{7}</math> pounds of glass bottles and <math>6\frac{1}{2}</math> pounds of aluminum cans. How many pounds of glass and aluminum did the class collect in all?</p>

**5-7****Explore Through Reading**

6-2.5, 6-1.2

***Multiplying Fractions*****Get Ready for the Lesson**

Complete the activity at the top of page 282 in your textbook.  
Write your answers below.

1. Refer to the model. What fraction represents  $\frac{1}{2} \times \frac{2}{3}$ ?
2. What is the relationship between the numerators and denominators of the factors and the numerator and denominator of the product?

**Read the Lesson**

For Exercises 3 and 4, look at Example 3 and the sentence before it on page 283 in your textbook.

3. What must the numerator and denominator have in order to simplify before you multiply?
4. Why is it helpful to simplify before you multiply?

**Remember What You Learned**

5. Work with a partner. Look at each example on pages 282 and 283 in your textbook. Use a piece of paper to cover up the words that are beside the equations. Explain to your partner in your own words what is happening in each step. Then uncover the words and check.

## 5-7

## Study Guide



6-2.5, 6-1.2

## Multiplying Fractions

Type of Product	What to do	Example
two fractions	Multiply the numerators. Then multiply the denominators.	$\frac{2}{3} \times \frac{4}{5} = \frac{2 \times 4}{3 \times 5} = \frac{8}{15}$
fraction and a whole number	Rename the whole number as an improper fraction. Multiply the numerators. Then multiply the denominators.	$\frac{3}{11} \times 6 = \frac{3}{11} \times \frac{6}{1} = \frac{18}{11} = 1\frac{7}{11}$

**Example 1** Find  $\frac{2}{5} \times \frac{3}{4}$ .**Estimate:**  $\frac{1}{2} \times 1 = \frac{1}{2}$ 

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

$$= \frac{6}{20} \text{ or } \frac{3}{10}$$

Multiply the numerators. Multiply the denominators.

Simplify. Compare to the estimate.

**Example 2** Find  $\frac{4}{9} \times 8$ .**Estimate:**  $\frac{1}{2} \times 8 = 4$ 

$$\frac{4}{9} \times 8 = \frac{4}{9} \times \frac{8}{1}$$

$$= \frac{4 \times 8}{9 \times 1}$$

$$= \frac{32}{9} \text{ or } 3\frac{5}{9}$$

Write 8 as  $\frac{8}{1}$ .

Multiply.

Simplify. Compare to the estimate.

**Example 3** Find  $\frac{2}{5} \times \frac{3}{8}$ .**Estimate:**  $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ 

$$\frac{2}{5} \times \frac{3}{8} = \frac{\cancel{2} \times 3}{5 \times \cancel{8}_4}$$

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

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

Simplify. Compare to the estimate.

**Exercises****Multiply.**

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

6.  $\frac{2}{3} \times \frac{3}{8}$

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

8.  $\frac{2}{9} \times \frac{1}{2}$

**5-7****Homework Practice**

6-2.5, 6-1.2

**Multiplying Fractions****Multiply.**

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

2.  $\frac{7}{8} \times \frac{1}{3}$

3.  $\frac{1}{2} \times \frac{3}{4}$

4.  $\frac{2}{3} \times \frac{2}{9}$

5.  $\frac{1}{3} \times 11$

6.  $\frac{1}{2} \times 12$

7.  $\frac{5}{6} \times 21$

8.  $\frac{3}{4} \times 10$

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

10.  $\frac{4}{9} \times \frac{3}{8}$

11.  $\frac{7}{10} \times \frac{4}{21}$

12.  $\frac{3}{5} \times \frac{5}{12}$

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

14.  $\frac{3}{4} \times \frac{3}{8} \times \frac{2}{3}$

15.  $\frac{2}{3} \times \frac{12}{17} \times \frac{1}{4}$

**ALGEBRA** Evaluate each expression if  $a = \frac{4}{5}$ ,  $b = \frac{1}{2}$ , and  $c = \frac{2}{7}$ .

16.  $bc$

17.  $abc$

18.  $ab + \frac{3}{5}$

19. **PRESIDENTS** By 2005, 42 different men had been President of the United States. Of these men,  $\frac{2}{21}$  had no children. How many presidents had no children?

**5-7****Problem-Solving Practice**

6-2.5, 6-1.2

**Multiplying Fractions**

**COOKING** For Exercises 1 and 2, use the recipe for chocolate frosting.

**Chocolate Frosting Recipe**

$\frac{1}{3}$  cup butter

2 ounces melted unsweetened chocolate

2 cups powdered sugar

$\frac{1}{2}$  teaspoon vanilla

2 tablespoons milk

<p><b>1.</b> Georgia wants to cut the recipe for chocolate frosting in half for a small cake that she's making. How much of each ingredient will she need?</p>	<p><b>2.</b> Suppose Georgia wanted to double the recipe; what would the measurements be for each ingredient?</p>
<p><b>3. COMPUTERS</b> <math>\frac{1}{5}</math> of today's college students began using computers between the ages of 5 and 8. If a college has 3,500 students, how many of the students began using computers between the ages of 5 and 8?</p>	<p><b>4. EXERCISE</b> A paper published in a medical journal reported that about <math>\frac{11}{25}</math> of girls ages 16 to 17 do not exercise at all. The entire study consisted of about 2,500 girls. About how many did not exercise?</p>
<p><b>5. ANIMALS</b> Catherine walks her dog <math>\frac{3}{4}</math> mile every day. How far does she walk each week?</p>	<p><b>6. MUSIC</b> If you practice a musical instrument each day for <math>\frac{2}{3}</math> of an hour, how many hours of practice would you get in each week?</p>

**5-8****Explore Through Reading**

6-2.5, 6-1.1

**Multiplying Mixed Numbers****Get Ready for the Lesson**

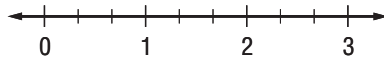
Complete the activity at the top of page 287 in your textbook.

Write your answers below.

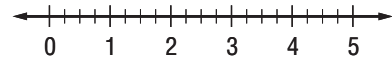
- Write a multiplication expression that shows the size of the Atlantic Giant Squid's eyeball.
- Use repeated addition to find  $12 \times 1\frac{1}{4}$ . (*Hint:*  $12 \times 1\frac{1}{4}$  means there are 12 groups of  $1\frac{1}{4}$ .)
- Write the multiplication expression from Exercise 1 using improper fractions.
- Multiply the improper fractions from Exercise 3. How large is the Atlantic Giant Squid's eyeball?

Use a number line and improper fractions to find each product.

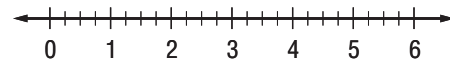
5.  $2 \times 1\frac{1}{3}$



6.  $2 \times 2\frac{1}{4}$



7.  $3 \times 1\frac{3}{4}$

**Read the Lesson**

- What is an improper fraction?
- What is a mixed number?
- Why is it helpful to write a mixed number as an improper fraction?

**Remember What You Learned**

- Example 2 on page 288 shows how to multiply mixed numbers. Describe a general process you would use to check if your answer is correct. Trade your description with a partner and follow your partner's process to check the answer for Example 3. Answer any questions your partner may have about your process.

## 5-8

## Study Guide



6-2.5, 6-1.1

### Multiplying Mixed Numbers

To multiply mixed numbers, write the mixed numbers as improper fractions, and then multiply as with fractions.

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

$$2\frac{1}{4} \times 1\frac{2}{3} = \frac{9}{4} \times \frac{5}{3} \quad \text{Write mixed numbers as improper fractions.}$$

$$= \frac{\overset{3}{\cancel{9}} \times 5}{4 \times \underset{1}{\cancel{3}}} \quad \text{Divide the numerator and denominator by their common factor, 3.}$$

$$= \frac{15}{4} \text{ or } 3\frac{3}{4} \quad \text{Simplify. Compare to the estimate.}$$

**Example 2** If  $a = 1\frac{1}{3}$  and  $b = 2\frac{1}{4}$ , what is the value of  $ab$ ?

$$ab = 1\frac{1}{3} \times 2\frac{1}{4} \quad \text{Replace } a \text{ with } 1\frac{1}{3} \text{ and } b \text{ with } 2\frac{1}{4}.$$

$$= \frac{4}{3} \times \frac{9}{4} \quad \text{Write mixed numbers as improper fractions.}$$

$$= \frac{\overset{1}{\cancel{4}} \times \overset{3}{\cancel{9}}}{\underset{1}{\cancel{3}} \times \underset{1}{\cancel{4}}} \quad \text{Divide the numerator and denominator by their common factors, 3 and 4.}$$

$$= \frac{3}{1} \text{ or } 3 \quad \text{Simplify.}$$

### Exercises

Multiply. Write in simplest form.

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

2.  $1\frac{1}{5} \times \frac{3}{4}$

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

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

5.  $9 \times 1\frac{1}{6}$

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

10.  $\frac{3}{8} \times 2\frac{1}{2}$

11.  $4 \times 1\frac{1}{8}$

12.  $1\frac{1}{9} \times 3$

13. **ALGEBRA** Evaluate  $5x$  if  $x = 1\frac{2}{3}$ .

14. **ALGEBRA** If  $t = 2\frac{3}{8}$ , what is  $4t$ ?



**5-8****Homework Practice**

6-2.5, 6-1.1

**Multiplying Mixed Numbers****Multiply. Write in simplest form.**

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

2.  $\frac{9}{10} \times 3\frac{1}{3}$

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

4.  $2\frac{5}{8} \times \frac{2}{3}$

5.  $\frac{2}{3} \times 3\frac{1}{4}$

6.  $3\frac{3}{4} \times 2\frac{2}{3}$

7.  $1\frac{1}{4} \times 2\frac{2}{3}$

8.  $5\frac{1}{3} \times 2\frac{1}{4}$

9.  $2\frac{1}{5} \times 1\frac{1}{4}$

10.  $5\frac{1}{2} \times 4\frac{1}{3}$

11.  $\frac{2}{9} \times \frac{3}{4} \times 2\frac{1}{4}$

12.  $1\frac{1}{2} \times 2\frac{1}{6} \times 1\frac{1}{5}$

**ALGEBRA** Evaluate each expression if  $f = \frac{6}{7}$ ,  $g = 1\frac{3}{4}$ , and  $h = 2\frac{2}{3}$ .

13.  $fg$

14.  $\frac{3}{8}h$

15.  $gh$

16. **LUMBER** A lumber yard has a scrap sheet of plywood that is  $23\frac{3}{4}$  inches by  $41\frac{1}{5}$  inches. What is the area of the plywood?

17. **LANDSCAPING** A planter box in the city plaza measures  $3\frac{2}{3}$  feet by  $4\frac{1}{8}$  feet by  $2\frac{1}{2}$  feet. Find the volume of the planter box.

**5-8****Problem-Solving Practice**

6-2.5, 6-1.1

**Multiplying Mixed Numbers**

**FOOD** For Exercises 1–3, use the table. The table shows Keith’s food options for a 7-day outdoor survival course.

Food Options for 7-day Outdoor Survival Course	
peanut butter	1 plastic jar = $4\frac{3}{5}$ cups
dried noodles/rice	$14\frac{2}{3}$ cups
dried fruit/nuts	$6\frac{1}{6}$ cups
concentrated juice boxes	8 boxes = $16\frac{1}{4}$ cups
beef jerky	$3\frac{1}{3}$ cups
powdered milk	1 box = $8\frac{4}{5}$ cups
dehydrated soup	5 packages = $15\frac{2}{3}$ cups
canned tuna/meat	4 cans = $5\frac{3}{5}$ cups

<p><b>1.</b> Keith wants to divide his tuna over the seven-day course. How many cups of tuna meat can Keith plan on consuming each day?</p>	<p><b>2.</b> Keith would like to bring enough concentrated juice in order to have <math>2\frac{1}{4}</math> cups available per day. How much juice does he need and is 8 boxes of concentrated juice enough?</p>
<p><b>3.</b> Six other students have been advised to bring the same menu on the course. How many cups of dried fruits and nuts will the students be bringing all together?</p>	<p><b>4. MEASUREMENT</b> Bill wants to put a large mural on a wall that is <math>9\frac{1}{3}</math> feet long and <math>8\frac{1}{8}</math> feet wide. Find the area of the wall. If the mural is 100 square feet, will it fit on the wall?</p>
<p><b>5. PAINTING</b> Pam is mixing <math>3\frac{1}{5}</math> batches of paint. If one batch calls for <math>2\frac{3}{4}</math> tablespoons of detergent to add to the tempera powder, how many tablespoons of detergent will Pam need?</p>	<p><b>6. COOKING</b> To make a batch of fruit punch, Steve needs <math>2\frac{2}{3}</math> cups blackberry juice. If he wants to make <math>2\frac{3}{4}</math> batches of punch, how many cups of blackberry juice will he need?</p>

**5-9****Explore Through Reading**

6-2.5, 6-1.1

**Dividing Fractions****Get Ready for the Lesson**

Complete the Mini Lab at the top of page 293 in your textbook.  
Write your answers below.

1. How many  $\frac{1}{2}$ -sandwich servings are there?
2. The model shows  $3 \div \frac{1}{2}$ . What is  $3 \div \frac{1}{2}$ ?

Draw a model to find each quotient.

3.  $3 \div \frac{1}{4}$
4.  $2 \div \frac{1}{6}$
5.  $4 \div \frac{1}{2}$

**Read the Lesson**

6. What is the definition of *reciprocals*?
7. Show that  $\frac{1}{3} \times 3 = 1$ .
8. How do you find the reciprocal of a whole number? How do you find the reciprocal of a fraction?

**Remember What You Learned**

9. Work with a partner. Study Example 3 at the top of page 294. Explain how you can use a model to show that  $\frac{1}{8}$  is  $\frac{1}{6}$  of  $\frac{3}{4}$ .

**5-9****Study Guide**

6-2.5, 6-1.1

**Dividing Fractions**

When the product of two numbers is 1, the numbers are called **reciprocals**.

**Example 1** Find the reciprocal of 8.

Since  $8 \times \frac{1}{8}$ , the reciprocal of 8 is  $\frac{1}{8}$ .

**Example 2** Find the reciprocal of  $\frac{5}{9}$ .

Since  $\frac{5}{9} \times \frac{9}{5} = 1$ , the reciprocal of  $\frac{5}{9}$  is  $\frac{9}{5}$ .

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

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

$$\frac{2}{3} \div \frac{4}{5} = \frac{2}{3} \times \frac{5}{4} \quad \text{Multiply by the reciprocal, } \frac{5}{4}.$$

$$= \frac{\overset{1}{\cancel{2}} \times 5}{3 \times \underset{2}{\cancel{4}}} \quad \text{Divide 2 and 4 by the GCF, 2.}$$

$$= \frac{5}{6} \quad \text{Multiply numerators and denominators.}$$

**Exercises**

Find the reciprocal of each number.

1. 2

2.  $\frac{1}{6}$

3.  $\frac{4}{11}$

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

Divide. Write in simplest form.

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

6.  $\frac{1}{9} \div \frac{1}{2}$

7.  $\frac{2}{3} \div \frac{1}{4}$

8.  $\frac{1}{2} \div \frac{3}{4}$

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

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

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

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

13.  $\frac{3}{4} \div \frac{7}{12}$

14.  $\frac{9}{10} \div 9$

15.  $\frac{2}{3} \div \frac{5}{8}$

16.  $4 \div \frac{7}{9}$

**5-9****Homework Practice**

6-2.5, 6-1.1

**Dividing Fractions****Find the reciprocal of each number.**

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

2.  $\frac{1}{9}$

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

4. 2

5. 12

**Divide. Write in simplest form.**

6.  $\frac{2}{3} \div \frac{1}{6}$

7.  $\frac{1}{2} \div \frac{2}{5}$

8.  $\frac{2}{3} \div \frac{1}{4}$

9.  $\frac{3}{4} \div \frac{1}{10}$

10.  $2 \div \frac{1}{4}$

11.  $8 \div \frac{2}{5}$

12.  $3 \div \frac{4}{5}$

13.  $2 \div \frac{5}{3}$

14.  $\frac{3}{7} \div 3$

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

16.  $\frac{7}{9} \div 14$

17.  $\frac{5}{7} \div 4$

**ALGEBRA** Find the value of each expression if  $h = \frac{3}{8}$ ,  $j = \frac{1}{3}$ , and  $k = \frac{1}{4}$ .

18.  $h \div k$

19.  $k \div j - h$

20.  $h \div j + k$

21. **INSECTS** An average ant is  $\frac{1}{4}$  inch long. An average aphid is  $3\frac{3}{2}$  inch long. How many times longer is an average ant than an average aphid?

**5-9****Problem-Solving Practice**

6-2.5, 6-1.1

**Dividing Fractions**

<p><b>1. PIZZA</b> Norberto has <math>\frac{9}{10}</math> of a pizza. The pizza will be divided equally among 6 people. How much will each person get?</p>	<p><b>2. CARPENTRY</b> Laura wants to cut a board into three equal pieces. The board is <math>\frac{5}{8}</math> feet long. How long will each piece be?</p>
<p><b>3. PETS</b> Errol uses <math>\frac{1}{3}</math> can of wet dog food for his dog, Muddy, each day. How many servings will he get from 5 cans of dog food?</p>	<p><b>4. ICE CREAM</b> Julia ate <math>\frac{1}{2}</math> pint of mint chocolate chip ice cream. Mark ate <math>\frac{3}{4}</math> pint of malt ice cream. How many times more ice cream did Mark eat?</p>
<p><b>5. GARDENING</b> Talia wants to give away 6 bundles of rosemary from her herb garden. If she has <math>\frac{1}{2}</math> pound of rosemary, how much will each bundle weigh?</p>	<p><b>6. SCHOOL</b> Kirsten has <math>\frac{3}{4}</math> hour left to finish 5 math problems on the test. How much time does she have to spend on each problem?</p>
<p><b>7. FOOD</b> Joe has <math>\frac{1}{2}</math> of a cake he would like to split among 3 people. What part of the cake will each person get?</p>	<p><b>8. INTERNET</b> <math>\frac{3}{4}</math> of college students use the Internet more than the library. <math>\frac{9}{100}</math> use the library more. How many times more students use the Internet?</p>

**5-10****Explore Through Reading**

6-2.5, 6-1.1

**Dividing Mixed Numbers****Get Ready for the Lesson**

Complete the activity at the top of page 298 in your textbook.  
Write your answers below.

1. Write a division expression to find how many times as tall is Mt. Everest than the depth of the average ocean.
2. Write a division expression to find how many times as deep is the Mariana Trench than the average ocean on Earth.

**Read the Lesson**

3. Describe how to write a mixed number as an improper fraction.
4. Describe what is happening at each step below. If you need help, use Examples 1 and 2 on pages 298 and 299 as a guide.

Find the value of  $a \div b$  if  $a = 5\frac{5}{8}$  and  $b = 2\frac{1}{4}$ .

$$\begin{aligned} a \div b &= 5\frac{5}{8} \div 2\frac{1}{4} \\ &= \frac{45}{8} \div \frac{9}{4} \\ &= \frac{45}{8} \times \frac{4}{9} \\ &= \frac{\cancel{45}^5}{8} \times \frac{\cancel{4}_1}{\cancel{9}_3} \\ &= \frac{5}{2} \text{ or } 2\frac{1}{2} \end{aligned}$$

**Remember What You Learned**

5. As an experiment, try to find  $4\frac{1}{4} \div 2\frac{1}{2}$  in a different way from the way you learned in this lesson. First, divide the whole numbers. Next divide the fractions. Then, put together the whole number you found and the fraction you found to make a mixed number. Now find  $4\frac{1}{4} \div 2\frac{1}{2}$  in the way the lesson shows how to divide mixed numbers. What two important steps must you do in order when dividing mixed numbers?

**5-10****Study Guide**

6-2.5, 6-1.1

**Dividing Mixed Numbers**

To divide mixed numbers, express each mixed number as an improper fraction. Then divide as with fractions.

**Example 1**Find  $2\frac{2}{3} \div 1\frac{1}{5}$ .Estimate:  $3 \div 1 = 3$ 

$$2\frac{2}{3} \div 1\frac{1}{5}$$

$$= \frac{8}{3} \div \frac{6}{5}$$

Write mixed numbers as improper fractions.

$$= \frac{8}{3} \times \frac{5}{6}$$

Multiply by the reciprocal,  $\frac{5}{6}$ .

$$= \frac{\cancel{8} \times 5}{3 \times \cancel{6}_3}$$

Divide 8 and 6 by the GCF, 2.

$$= \frac{20}{9} \text{ or } 2\frac{2}{9}$$

Simplify. Compare to the estimate.

**Example 2**Find the value of  $s \div t$  if  $s = 1\frac{2}{3}$  and  $t = \frac{3}{4}$ .

$$s \div t = 1\frac{2}{3} \div \frac{3}{4}$$

Replace  $s$  with  $1\frac{2}{3}$  and  $t$  with  $\frac{3}{4}$ .

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

Write  $1\frac{2}{3}$  as an improper fraction.

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

Multiply by the reciprocal,  $\frac{4}{3}$ .

$$= \frac{20}{9} \text{ or } 2\frac{2}{9}$$

Simplify.

**Exercises**

Divide. Write in simplest form.

1.  $2\frac{1}{2} \div \frac{4}{5}$

2.  $1\frac{2}{3} \div 1\frac{1}{4}$

3.  $5 \div 1\frac{3}{7}$

4.  $2\frac{1}{3} \div \frac{7}{9}$

5.  $5\frac{2}{5} \div \frac{9}{10}$

6.  $7\frac{1}{2} \div 1\frac{2}{3}$

7.  $3\frac{5}{6} \div 2$

8.  $2\frac{1}{4} \div \frac{2}{7}$

9.  $9 \div 1\frac{1}{9}$

10.  $\frac{4}{5} \div 2\frac{6}{7}$

11.  $1\frac{8}{9} \div 5$

12.  $\frac{3}{8} \div 2\frac{1}{4}$

13. **ALGEBRA** If  $x = 1\frac{1}{4}$  and  $y = 3$ , what is  $x \div y$ ?14. **ALGEBRA** Evaluate  $18 \div t$  if  $t = \frac{9}{11}$ .



**5-10****Homework Practice**

6-2.5, 6-1.1

**Dividing Mixed Numbers****Divide. Write in simplest form.**

1.  $3\frac{2}{3} \div 2$

2.  $10 \div 1\frac{1}{4}$

3.  $4\frac{3}{4} \div \frac{7}{8}$

4.  $1\frac{15}{16} \div \frac{7}{8}$

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

6.  $3\frac{3}{8} \div 2\frac{1}{4}$

7.  $2\frac{1}{10} \div 1\frac{1}{5}$

8.  $4\frac{1}{2} \div 2\frac{7}{10}$

**ALGEBRA** Evaluate the expression if  $r = 2\frac{4}{5}$ ,  $s = 1\frac{3}{4}$ , and  $t = \frac{2}{3}$ .

9.  $t \div 10$

10.  $s \div t$

11.  $r \div s$

12.  $r \div (st)$

**13. PIPES** How many  $\frac{3}{4}$ -foot lengths of pipe can be cut from a  $6\frac{1}{3}$ -foot pipe?**14. TRUCKING** A truck driver drove 300 miles in  $6\frac{3}{4}$  hours. How many miles per hour did the driver drive?

**5-10****Problem-Solving Practice**

6-2.5, 6-1.1

**Dividing Mixed Numbers**

<p><b>1. VIDEOTAPES</b> Lyle is putting his videotapes on a shelf. The shelf is 12 inches long. If each videotape is <math>1\frac{1}{2}</math> inches wide, how many ideotapes can he put side-by-side on the shelf?</p>	<p><b>2. FOOD</b> DeLila has <math>4\frac{1}{2}</math> pies to divide equally among 9 people. How much will each person get?</p>
<p><b>3. GARDENING</b> Maurice mows lawns on Saturday. Last week it took him <math>5\frac{1}{2}</math> hours to finish. This week it took only 5 hours. How many times longer did it take last week than this week?</p>	<p><b>4. COOKING</b> Chris is cutting a roll of cookie dough into pieces that are <math>\frac{1}{2}</math> inch thick. If the roll is <math>10\frac{1}{2}</math> inches long, how many pieces can he make?</p>
<p><b>5. SPORTS</b> Tanya Streeter holds the world record for free-diving in the ocean. She dove 525 feet in <math>3\frac{1}{2}</math> minutes. How many feet per minute did she dive?</p>	<p><b>6. GARDENING</b> Catherine got <math>9\frac{3}{8}</math> pounds of cherries from her tree this year. Last year she only got <math>6\frac{1}{4}</math> pounds. How many times more pounds did she get this year than last year?</p>
<p><b>7. SEWING</b> Jeanne has <math>3\frac{3}{5}</math> yards of fabric. She needs <math>1\frac{4}{5}</math> yards to make a pair of pants. How many pairs of pants can she make?</p>	<p><b>8. EXERCISE</b> Del Ray can run <math>20\frac{1}{2}</math> miles in <math>2\frac{1}{4}</math> hours. How many miles per hour can he run?</p>



# Chapter 5 Test

## Mastering the SC Standards

**1** What is  $8\frac{2}{3}$  rounded to the nearest half?

- (A) 8
- (B)  $8\frac{1}{2}$
- (C) 9
- (D)  $9\frac{1}{2}$

**6-2.4**

**2** Tom cut a piece of pipe  $2\frac{1}{4}$  inches long from a piece of pipe  $5\frac{3}{4}$  inches long. He needs to figure out how much of the original pipe is left. First he subtracts  $\frac{3}{4} - \frac{1}{4}$  and gets  $\frac{2}{4}$ , or  $\frac{1}{2}$ . What expression shows what his next step should be?

- (A)  $5 - \frac{1}{2}$
- (B)  $2 + \frac{1}{2}$
- (C)  $5 + 2$
- (D)  $5 - 2$

**6-2.4**

**3** Which expression shows a strategy for solving  $\frac{4}{9} \times \frac{5}{7}$ ?

- (A)  $(4 \times 5) + (9 \times 7)$
- (B)  $(4 \times 5) - (9 \times 7)$
- (C)  $(4 \times 5) \times (9 \times 7)$
- (D)  $(4 \times 5) \div (9 \times 7)$

**6-2.5**

**4** Shawna wants to subtract  $\frac{3}{5}$  from  $\frac{5}{6}$ . She finds the lowest common denominator for both fractions and rewrites both with the new denominator. Which expression shows how Shawna rewrote the two fractions?

- (A)  $\frac{25}{30} - \frac{18}{30}$
- (B)  $\frac{25}{30} - \frac{1}{30}$
- (C)  $\frac{5}{6} - \frac{18}{30}$
- (D)  $\frac{5}{11} - \frac{3}{11}$

**6-2.4**

**5** Which of the following expressions could be used to find how many  $\frac{1}{3}$  cups of flour are in  $\frac{7}{9}$  cup of flour?

- (A)  $\frac{7}{9} \div \frac{1}{3}$
- (B)  $\frac{7}{9} + \frac{1}{3}$
- (C)  $\frac{7}{9} \times \frac{1}{3}$
- (D)  $\frac{7}{9} - \frac{1}{3}$

**6-2.5**



# Chapter 5 Test (continued)

## Mastering the SC Standards

- 6** Ms. Ricardo needs  $\frac{2}{3}$  cup of pineapple juice to make a pitcher of tropical punch. About how much pineapple juice does she need to make 5 pitchers of punch?

- (A) about 1 cup  
 (B) about 3 cups  
 (C) about 7 cups  
 (D) about 10 cups

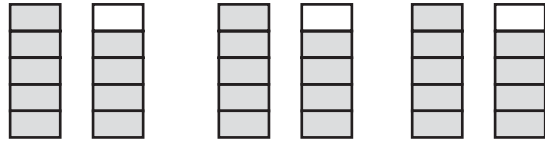
**6-2.5**

- 7** Marco and Maria shared a veggie pizza. Marco ate  $\frac{5}{8}$  of the pizza and Maria ate  $\frac{2}{8}$  of the pizza. Which expression can be used to find how much of the pizza they ate altogether?

- (A)  $\frac{(5 + 2)}{8}$   
 (B)  $\frac{5}{8} - 2$   
 (C)  $\frac{(5 + 2)}{(8 + 8)}$   
 (D)  $\frac{(5 - 2)}{8}$

**6-2.4**

- 8** Which multiplication is shown by the model below?



- (A)  $\frac{4}{5} \times 3$   
 (B)  $1\frac{4}{5} \times 2$   
 (C)  $3 \times 1\frac{4}{5}$   
 (D)  $1\frac{4}{5} \times 1\frac{4}{5}$

**6-2.5**

- 9** Flora needs to solve the following problem:  $6\frac{3}{8} \div 3\frac{4}{9}$ . What should her first step be?

- (A) Multiply the two numerators together.  
 (B) Multiply the two denominators together.  
 (C) Multiply by the reciprocal of the divisor.  
 (D) Change each mixed number into an improper fraction.

**6-2.5**

**6****Anticipation Guide****Ratio, Proportion, and Functions****STEP 1** *Before you begin Chapter 6*

- Read each statement.
- Decide whether you Agree (A) or Disagree (D) with the statement.
- Write A or D in the first column OR if you are not sure whether you agree or disagree, write NS (Not Sure).

STEP 1 A, D, or NS	Statement	STEP 2 A or D
	1. A ratio is a comparison of two numbers by division.	
	2. A ratio can be simplified in the same way as a fraction.	
	3. A rate is a ratio of two measurements with the same kind of units.	
	4. An example of a unit rate is $\frac{132 \text{ miles}}{2 \text{ hours}}$ .	
	5. $\frac{3}{5} = \frac{12}{20}$ is an example of a proportion.	
	6. Cross products can be used to determine if two ratios form a proportion.	
	7. Looking for patterns in a problem can lead to a solution.	
	8. A sequence is a list of numbers in order from least to greatest.	
	9. Each number in a sequence is called a factor of that sequence.	
	10. The equation $y = 5x$ could represent a sequence in which each output is equal to 5 times the input.	

**STEP 2** *After you complete Chapter 6*

- Reread each statement and complete the last column by entering an A (Agree) or a D (Disagree).
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a separate sheet of paper to explain why you disagree. Use examples, if possible.

**6****Family Activity****State Test Practice**

Fold the page along the dashed line. Work each problem on another piece of paper. Then unfold the page to check your work.

1.



What is the ratio of stars to balloons?

- A 3 : 4
- B 4 : 7
- C 4 : 3
- D 7 : 4

**Fold here.**

**Solution**

1. *Hint: Ratios are listed in the specified order, for example the ratio of A to B is A:B, not B:A.*

There are 4 stars and 3 balloons. The problem asks for the ratio of stars to balloons, so the number of stars will be first in the ratio, or 4 : 3.

The answer is **C**.

2. Kara is practicing her free throw shot. She is averaging 7 shots made out of every 11 attempted. How many shots would you expect her to make if she attempted 55?

- A 21
- B 35
- C 51
- D 42

**Solution**

2. *Hint: She is attempting 5 times as many shots as the total in the provided ratio.*

If she attempted 55 shots, it would be 5 times as many as 11, and since we expect her to make 7 out of 11, we can expect her to make  $7 \times 5$ , or 35 out of 55.

You can also use a ratio.

$$\frac{7}{11} = \frac{?}{55}$$

The denominator is multiplied by 5, so the same will be true of the numerator.

The answer is **B**.

**6-1****Explore Through Reading**
**6-2.6, 6-5.6,**  
**6-5.7, 6-1.7**
**Ratios and Rates****Get Ready for the Lesson**

Complete the Mini Lab at the top of page 314 in your textbook.

Write your answers below.

1. Compare the number of blue paper clips to the number of red paper clips using the word *more* and then using the word *times*.
2. Compare the number of red paper clips to the number of blue paper clips using the word *less* and then using a fraction.

**Read the Lesson**

3. A ratio compares amounts of two different things by division. Tell what different things are compared in the examples in your textbook.

Example 1 \_\_\_\_\_

Example 2 \_\_\_\_\_

4. Write the ratio of *2 pens out of a total of 3 pens* 3 different ways.

\_\_\_\_\_

5. What is the denominator in a unit rate?

**Remember What You Learned**

6. Go to your local grocery store and make a list of unit rates that are used to price items in the store. Also, compare prices for different brands of a certain product. How can you find out which brand provides the best value? Does the store help you to make the comparison? If so, how?

# 6-1

## Study Guide

### Ratios and Rates



6-2.6, 6-5.6,  
6-5.7, 6-1.7

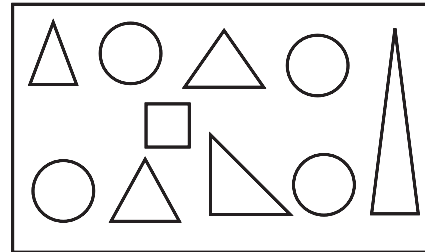
A **ratio** is a comparison of two numbers by division. A common way to express a ratio is as a fraction in simplest form. Ratios can also be written in other ways. For example, the ratio  $\frac{2}{3}$  can be written as 2 to 3, 2 out of 3, or 2:3.

**Examples** Refer to the diagram at the right.

- 1 Write the ratio in simplest form that compares the number of circles to the number of triangles.

circles  $\rightarrow \frac{4}{5}$   
 triangles  $\rightarrow \frac{5}{5}$       The GCF of 4 and 5 is 1.

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.



- 2 Write the ratio in simplest form that compares the number of circles to the total number of figures.

circles  $\rightarrow \frac{4}{10} = \frac{2}{5}$   
 total figures  $\rightarrow \frac{10}{10}$       The GCF of 4 and 10 is 2.

The ratio of circles to the total number of figures is  $\frac{2}{5}$ , 2 to 5, or 2:5.  
 For every two circles, there are five total figures.

A **rate** is a ratio of two measurements having different kinds of units. When a rate is simplified so that it has a denominator of 1, it is called a **unit rate**.

**Example 3** Write the ratio *20 students to 5 computers* as a unit rate.

$\frac{20 \text{ students}}{5 \text{ computers}} = \frac{4 \text{ students}}{1 \text{ computer}}$       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*.

**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

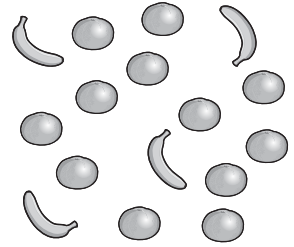
Write each rate as a unit rate.

4. 6 eggs for 3 people      5. \$12 for 4 pounds      6. 40 pages in 8 days



**6-1****Homework Practice**6-2.6, 6-5.6,  
6-5.7, 6-1.7**Ratios and Rates**

1. **FRUITS** Find the ratio of bananas to oranges in the graphic at the right. Write the ratio as a fraction in simplest form. Then explain its meaning.



2. **MODEL TRAINS** Hiroshi has 4 engines and 18 box cars. Find the ratio of engines to box cars. Write the ratio as a fraction in simplest form. Then explain its meaning.
3. **ZOOS** A petting zoo has 5 lambs, 11 rabbits, 4 goats, and 4 piglets. Find the ratio of goats to the total number of animals. Then explain its meaning.
4. **FOOD** At the potluck, there were 6 pecan pies, 7 lemon pies, 13 cherry pies, and 8 apple pies. Find the ratio of apple pies to the total number of pies. Then explain its meaning.

**Write each rate as a unit rate.**

5. 3 inches of snow in 6 hours
6. \$46 for 5 toys
7. **TRAINS** The Nozomi train in Japan can travel 558 miles in 3 hours. At this rate, how far can the train travel per hour?

**ANALYZE TABLES For Exercises 8 and 9, refer to the table showing tide pool animals.**

8. Find the ratio of limpets to snails. Then explain its meaning.

Animals Found in a Tide Pool	
Animal	Number
Anemones	11
Limpets	14
Snails	18
Starfish	9

9. Find the ratio of snails to the total number of animals. Then explain its meaning.

**6-1****Problem-Solving Practice**
**6-2.6, 6-5.6,**  
**6-5.7, 6-1.7**
**Ratios and Rates**

<p><b>1. FOOTBALL</b> In a recent the NFL season, the Miami Dolphins won 4 games and the Oakland Raiders won 5 games. What is the ratio of wins for the Dolphins to wins for the Raiders?</p>	<p><b>2. GARDENING</b> Rod has 10 rosebushes, 2 of which produce yellow roses. Write the ratio <i>2 yellow rosebushes out of 10 rosebushes</i> in simplest form.</p>
<p><b>3. TENNIS</b> Nancy and Lisa played 20 sets of tennis. Nancy won 12 of them. Write the ratio of Nancy's wins to the total number of sets in simplest form.</p>	<p><b>4. AGES</b> Oscar is 16 years old and his sister Julia is 12 years old. What will be the ratio of Oscar's age to Julia's age in 2 years? Write as a fraction in simplest form.</p>
<p><b>5. MOVIES</b> Four friends paid a total of \$32 for movie tickets. What is the ratio <i>\$32 for 4 people</i> written as a unit rate?</p>	<p><b>6. WORKING</b> At a warehouse, the employees can unload 18 trucks in 6 hours. What is the unit rate for unloading trucks?</p>
<p><b>7. ANIMALS</b> A reindeer can run 96 miles in 3 hours. At this rate, how far can a reindeer run in 1 hour? Explain.</p>	<p><b>8. SHOPPING</b> Jenny wants to buy cereal that comes in large and small boxes. The 32-ounce box costs \$4.16, and the 14-ounce box costs \$2.38. Which box is less expensive per ounce? Explain.</p>

**6-2****Explore Through Reading**

6-2.6, 6-1.8

**Ratio Tables****Get Ready for the Lesson**

Read the introduction at the top of page 322 in your textbook.

Write your answers below.

1. How many cans of juice and how many cans of water would you need to make 2 batches that have the same taste? 3 batches? Draw a picture to support your answers.

2. Find the ratio in simplest form of juice to water needed for 1, 2, and 3 batches of juice. What do you notice?

**Read the Lesson**

3. In a ratio table, what relationship exists between the columns?
4. Explain how you can check your answers when using a ratio table to solve a problem.

**Remember What You Learned**

5. Think of a real-world situation in which you would need to find equivalent ratios. Make a ratio table for this situation. Would you need to *scale back* or *scale forward* in this situation to find equivalent ratios? Explain.

# 6-2

## Study Guide



6-2.6, 6-1.8

### Ratio Tables

A **ratio table** organizes data into columns that are filled with pairs of numbers that have the same ratio, or are equivalent. **Equivalent ratios** express the same relationship between two quantities.

**Example 1** **BAKING** You need 1 cup of rolled oats to make 24 oatmeal cookies. Use the ratio table at the right to find how many oatmeal cookies you can make with 5 cups of rolled oats.

<b>Cups of Oats</b>	1				5
<b>Oatmeal Cookies</b>	24				■

Find a pattern and extend it.

		$\overset{+1}{\curvearrowright}$	$\overset{+1}{\curvearrowright}$	$\overset{+1}{\curvearrowright}$	$\overset{+1}{\curvearrowright}$	
<b>Cups of Oats</b>	1	2	3	4	5	
<b>Oatmeal Cookies</b>	24	48	72	96	120	
		$\underbrace{+24}$	$\underbrace{+24}$	$\underbrace{+24}$	$\underbrace{+24}$	

So, 120 oatmeal cookies can be made with 5 cups of rolled oats.

Multiplying or dividing two related quantities by the same number is called **scaling**. You may sometimes need to *scale back* and then *scale forward* or vice versa to find an equivalent ratio.

**Example 2** **SHOPPING** A department store has socks on sale for 4 pairs for \$10. Use the ratio table at the right to find the cost of 6 pairs of socks.

There is no whole number by which you can multiply 4 to get 6. Instead, scale back to 2 and then forward to 6.

So, the cost of 6 pairs of socks would be \$15.

<b>Pairs of Socks</b>		4	6
<b>Cost in Dollars</b>		10	■

		$\overset{\times 3}{\underbrace{\div 2}}$	
<b>Pairs of Socks</b>	2	4	6
<b>Cost in Dollars</b>	5	10	15
		$\underbrace{\div 2}$	$\times 3$

#### Exercises

1. **EXERCISE** Keewan bikes 6 miles in 30 minutes. At this rate, how long would it take him to bike 18 miles?

<b>Distance Biked (mi)</b>	6		18
<b>Time (min)</b>	30		■

2. **HOBBIES** Christine is making fleece blankets. 6 yards of fleece will make 2 blankets. How many blankets can she make with 9 yards of fleece?

<b>Yards of Fleece</b>		6	9
<b>Number of Blankets</b>		2	■

**6-2****Homework Practice**

6-2.6, 6-1.8

**Ratio Tables****For Exercises 1–3, use the ratio tables given to solve each problem.**

1. **CAMPING** To disinfect 1 quart of stream water to make it drinkable, you need to add 2 tablets of iodine. How many tablets do you need to disinfect 4 quarts?

<b>Number of Tablets</b>	2			■
<b>Number of Quarts</b>	1			4

2. **BOOKS** A book store bought 160 copies of a book from the publisher for \$4,000. If the store gives away 2 books, how much money will it lose?

<b>Number of Copies</b>	160		2
<b>Cost in Dollars</b>	4,000		■

3. **BIRDS** An ostrich can run at a rate of 50 miles in 60 minutes. At this rate, how long would it take an ostrich to run 18 miles?

<b>Distance Run (mi)</b>	50		18
<b>Time (min)</b>	60		■

4. **DISTANCE** If 10 miles is about 16 kilometers and the distance between two towns is 45 miles, use a ratio table to find the distance between the towns in kilometers. Explain your reasoning.
5. **SALARY** Luz earns \$400 for 40 hours of work. Use a ratio table to determine how much she earns for 6 hours of work.

**RECIPES For Exercises 6–8, use the following information.**

A soup that serves 16 people calls for 2 cans of chopped clams, 4 cups of chicken broth, 6 cups of milk, and 4 cups of cubed potatoes.

6. Create a ratio table to represent this situation.
7. How much of each ingredient would you need to make an identical recipe that serves 8 people? 32 people?
8. How much of each ingredient would you need to make an identical recipe that serves 24 people? Explain your reasoning.

**6-2****Problem-Solving Practice**

6-2.6, 6-1.8

**Ratio Tables**

For Exercises 1–4, use the ratio tables below.

**Table 1**

<b>Cups of Flour</b>	1			
<b>Number of Cookies</b>	30			

**Table 2**

<b>Number of Books</b>		6	
<b>Cost in Dollars</b>		10	

<p><b>1. BAKING</b> In Table 1, how many cookies could you make with 4 cups of flour?</p>	<p><b>2. BAKING</b> In Table 1, how many cups of flour would you need to make 90 cookies?</p>
<p><b>3. BOOKS</b> In Table 2, at this rate how many books can you buy with \$5?</p>	<p><b>4. BOOKS</b> In Table 2, at this rate, how much would it cost to buy 9 books?</p>
<p><b>5. FRUIT</b> Patrick buys 12 bunches of bananas for \$9 for the after school program. Use a ratio table to determine how much Patrick will pay for 8 bunches of bananas.</p>	<p><b>6. HIKING</b> On a hiking trip, LaShana notes that she hikes about 12 kilometers every 4 hours. If she continues at this rate, use a ratio table to determine about how many kilometers she could hike in 6 hours.</p>

**6-3****Explore Through Reading**6-2.6, 6-5.6,  
6-1.7**Proportions****Get Ready for the Lesson**

Read the introduction at the top of page 329 in your textbook.

Write your answers below.

1. Express the relationship between the total cost and number of prints he made for each situation as a rate in fraction form.
2. Compare the relationship between the numerators of each rate you wrote in Exercise 1. Compare the relationship between the denominators of these rates.
3. Are the rates you wrote in Exercise 1 equivalent? Explain.

**Read the Lesson**

4. Look at the Key Concept box on page 329. How can you tell that the two examples given are proportions?
5. Explain one method you can use to determine if a relationship among quantities is proportional.

**Remember What You Learned**

6. Work with a partner. Each of you should write about two different relationships, one which is proportional, and one that is not. Exchange what you wrote with your partner. Then determine which relationship is proportional and which one is not proportional.

## 6-3

## Study Guide

6-2.6, 6-5.6,  
6-1.7

## Proportions

Two quantities are said to be **proportional** if they have a constant ratio. A **proportion** is an equation stating that two ratios are equivalent.

**Example 1** Determine if the quantities in each pair of rates are proportional. Explain your reasoning and express each proportional relationship as a proportion.

**\$35 for 7 balls of yarn; \$24 for 4 balls of yarn.**

Write each ratio as a fraction. Then find its unit rate.

$$\frac{\$35}{7 \text{ balls of yarn}} = \frac{\$5}{1 \text{ ball of yarn}}$$

$\overset{\div 7}{\curvearrowright}$        $\underset{\div 7}{\curvearrowleft}$

$$\frac{\$24}{4 \text{ balls of yarn}} = \frac{\$6}{1 \text{ ball of yarn}}$$

$\overset{\div 4}{\curvearrowright}$        $\underset{\div 4}{\curvearrowleft}$

Since the ratios do not share the same unit rate, the cost is not proportional to the number of balls of yarn purchased.

**Example 2** Determine if the quantities in each pair of rates are proportional. Explain your reasoning and express each proportional relationship as a proportion.

**8 boys out of 24 students; 4 boys out of 12 students**

Write each ratio as a fraction.

$$\frac{8 \text{ boys}}{24 \text{ students}} = \frac{4 \text{ boys}}{12 \text{ students}}$$

$\overset{\div 2}{\curvearrowright}$        $\underset{\div 2}{\curvearrowleft}$

← The numerator and the denominator are divided by the same number.

Since the fractions are equivalent, the number of boys is proportional to the number of students.

## Exercises

Determine if the quantities in each pair of rates are proportional. Explain your reasoning and express each proportional relationship as a proportion.

- \$12 saved after 2 weeks; \$36 saved after 6 weeks
- \$9 for 3 magazines; \$20 for 5 magazines
- 135 miles driven in 3 hours; 225 miles driven in 5 hours
- 24 computers for 30 students; 48 computers for 70 students



**6-3****Homework Practice**6-2.6, 6-5.6,  
6-1.7**Proportions**

**Determine if the quantities in each pair of ratios are proportional. Explain your reasoning and express each proportional relationship as a proportion.**

- 18 vocabulary words learned in 2 hours; 27 vocabulary words learned in 3 hours
- \$15 for 5 pairs of socks; \$25 for 10 pairs of socks
- 20 out of 45 students attended the concert; 12 out of 25 students attended the concert
- 78 correct answers out of 100 test questions; 39 correct answers out of 50 test questions
- 15 minutes to drive 21 miles; 25 minutes to drive 35 miles

**ANIMALS** For Exercises 6–8, refer to the table on lengths of some animals with long tails. Determine if each pair of animals has the same body length to tail length proportions. Explain your reasoning.

Animal Lengths (mm)		
Animal	Head & Body	Tail
Brown Rat	240	180
Hamster	250	50
Lemming	125	25
Opossum	480	360
Prairie Dog	280	40

6. brown rat and opossum
7. hamster and lemming
8. opossum and prairie dog

**6-3****Problem-Solving Practice**6-2.6, 6-5.6,  
6-1.7**Proportions**

<p><b>1. FITNESS</b> Jessica can do 60 jumping-jacks in 2 minutes. Juanita can do 150 jumping-jacks in 5 minutes. Are these rates proportional? Explain your reasoning.</p>	<p><b>2. BAKING</b> A cookie recipe that yields 48 cookies calls for 2 cups of flour. A different cookie recipe that yields 60 cookies calls for 3 cups of flour. Are these rates proportional? Explain your reasoning.</p>
<p><b>3. MUSIC</b> A music store is having a sale where you can buy 2 new-release CDs for \$22 or you can buy 4 new-release CDs for \$40. Are these rates proportional? Explain your reasoning.</p>	<p><b>4. TRAVEL</b> On the Mertler's vacation to Florida, they drove 180 miles in 3 hours before stopping for lunch. After lunch they drove 120 miles in 2 hours before stopping for gas. Are these rates proportional? Explain your reasoning.</p>
<p><b>5. BOOKS</b> At the school book sale, Michael bought 3 books for \$6. Darnell bought 5 books for \$10. Are these rates proportional? Explain your reasoning.</p>	<p><b>6. SURVEY</b> One school survey showed that 3 out of 5 students own a pet. Another survey showed that 6 out of 11 students own a pet. Are these results proportional? Explain your reasoning.</p>

**6-4****Explore Through Reading**

6-5.6, 6-1.7

**Algebra: Solving Proportions****Get Ready for the Lesson**

Read the introduction at the top of page 334 in your textbook.

Write your answers below.

1. How many pairs of flip flops can you buy with \$20? \$25?
2. Write a proportion to express the relationship between the cost of 3 pairs of flip flops and the cost  $c$  of 7 pairs of flip flops.
3. How much will it cost to buy 6 pairs of flip flops?

**Read the Lesson**

4. In Example 1, explain why you multiply by 5 to solve the proportion.
5. Look at the final sentence in Example 4 on page 335—“So, about 400 out of 500 people can be expected to prefer eating at a restaurant.” Why is it important to use *can be expected* in this answer?

**Remember What You Learned**

6. Work with a partner. Study Examples 1–3 on pages 334 and 335. Write a proportion that needs to be solved for an unknown value. Exchange proportions and solve for the unknown value. Explain how you arrived at your solution.

## 6-4

## Study Guide



6-5.6, 6-1.7

## Algebra: Solving Proportions

To solve a proportion means to find the unknown value in the proportion. By examining how the numerators or denominators of the proportion are related, you can perform an operation on one fraction to create an equivalent fraction.

**Example 1** Solve  $\frac{3}{4} = \frac{b}{12}$ .

Find a value for  $b$  that would make the fractions equivalent.

$$\frac{3}{4} = \frac{b}{12}$$

$\begin{array}{c} \times 3 \\ \curvearrowright \\ \frac{3}{4} = \frac{b}{12} \\ \curvearrowleft \\ \times 3 \end{array}$

Since  $4 \times 3 = 12$ , multiply the numerator and denominator by 3.

$$b = 3 \times 3 \text{ or } 9$$

**Example 2** **NUTRITION** Three servings of broccoli contain 150 calories. How many servings of broccoli contain 250 calories?

Set up the proportion. Let  $a$  represent the number of servings that contain 250 calories.

$$\frac{150 \text{ calories}}{3 \text{ servings}} = \frac{250 \text{ calories}}{a \text{ servings}}$$

Find the unit rate.

$$\frac{150 \text{ calories}}{3 \text{ servings}} = \frac{50 \text{ calories}}{1 \text{ serving}}$$

$\begin{array}{c} \div 3 \\ \curvearrowright \\ \frac{150 \text{ calories}}{3 \text{ servings}} = \frac{50 \text{ calories}}{1 \text{ serving}} \\ \curvearrowleft \\ \div 3 \end{array}$

Rewrite the proportion using the unit rate and solve using equivalent fractions.

$$\frac{50 \text{ calories}}{1 \text{ serving}} = \frac{250 \text{ calories}}{5 \text{ servings}}$$

$\begin{array}{c} \times 5 \\ \curvearrowright \\ \frac{50 \text{ calories}}{1 \text{ serving}} = \frac{250 \text{ calories}}{5 \text{ servings}} \\ \curvearrowleft \\ \times 5 \end{array}$

So, 5 servings of broccoli contain 250 calories.

## Exercises

Solve each proportion.

1.  $\frac{2}{3} = \frac{8}{n}$

2.  $\frac{2}{4} = \frac{y}{8}$

3.  $\frac{3}{5} = \frac{b}{15}$

4.  $\frac{4}{5} = \frac{16}{w}$

5.  $\frac{d}{16} = \frac{3}{8}$

6.  $\frac{2}{y} = \frac{6}{9}$

7. **MUSIC** Jeremy spent \$33 on 3 CDs. At this rate, how much would 5 CDs cost?

**6-4****Homework Practice**

6-5.6, 6-1.7

**Algebra: Solving Proportions**

Solve each proportion.

1.  $\frac{2}{3} = \frac{n}{21}$

2.  $\frac{2}{x} = \frac{16}{40}$

3.  $\frac{80}{100} = \frac{b}{5}$

4.  $\frac{m}{2} = \frac{75}{50}$

5.  $\frac{6}{5} = \frac{42}{a}$

6.  $\frac{3}{d} = \frac{21}{56}$

7.  $\frac{4}{3} = \frac{f}{45}$

8.  $\frac{h}{12} = \frac{70}{120}$

9.  $\frac{3}{5} = \frac{27}{p}$

10.  $\frac{26}{21} = \frac{r}{63}$

11.  $\frac{17}{y} = \frac{102}{222}$

12.  $\frac{7}{10} = \frac{c}{25}$

13. **MAMMALS** A pronghorn antelope can travel 105 miles in 3 hours. If it continued traveling at the same speed, how far could a pronghorn travel in 11 hours?

14. **BIKES** Out of 32 students in a class, 5 said they ride their bikes to school. Based on these results, predict how many of the 800 students in the school ride their bikes to school.

15. **MEAT** Hamburger sells for 3 pounds for \$6. If Alicia buys 10 pounds of hamburger, how much will she pay?

16. **FOOD** If 24 extra large cans of soup will serve 96 people, how many cans should Ann buy to serve 28 people?

17. **BIRDS** The ruby throated hummingbird has a wing beat of about 200 beats per second. About how many wing beats would a hummingbird have in 3 minutes?

**6-4****Problem-Solving Practice**

6-5.6, 6-1.7

**Algebra: Solving Proportions**

<p><b>1. SCHOOL</b> The ratio of boys to girls in history class is 4 to 5. How many girls are in the class if there are 12 boys in the class? Explain.</p>	<p><b>2. FACTORIES</b> A factory produces 6 motorcycles in 9 hours. Write a proportion and solve it to find how many hours it takes to produce 16 motorcycles.</p>
<p><b>3. READING</b> James read 4 pages in a book in 6 minutes. How long would you expect him to take to read 6 pages?</p>	<p><b>4. COOKING</b> A recipe that will make 3 pies calls for 7 cups of flour. Write a proportion and solve it to find how many pies can be made with 28 cups of flour.</p>
<p><b>5. TYPING</b> Sara can type 90 words in 4 minutes. About how many words would you expect her to type in 10 minutes?</p>	<p><b>6. BASKETBALL</b> The Lakewood Wildcats won 5 of their first 7 games this year. There are 28 games in the season. About how many games would you expect the Wildcats to win this season? Explain your reasoning.</p>
<p><b>7. FOOD</b> Two slices of Dan's Famous Pizza have 230 Calories. How many Calories would you expect to be in 5 slices of the same pizza?</p>	<p><b>8. SHOPPING</b> Andy paid \$12 for 4 baseball card packs. Write a proportion and solve it to find how many baseball card packs he can purchase for \$21.</p>

# 6A

## Study Guide

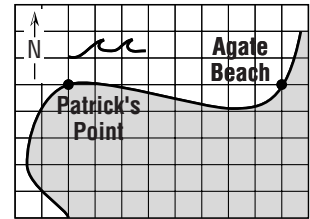


### Scale Drawings

A **scale drawing** represents something that is too large or too small to be drawn or built at actual size. Similarly, a **scale model** can be used to represent something that is too large or built too small for an actual-size model. The **scale** gives the relationship between the drawing/model measure and the actual measure.

**Example** On this map, each grid unit represents 50 yards.  
Find the distance from Patrick's Point to Agate Beach.

	<b>Scale</b>		<b>Patrick's Point to Agate Beach</b>		
map →	$\frac{1 \text{ unit}}{50 \text{ yards}}$	=	$\frac{8 \text{ units}}{x \text{ yards}}$	← map	
actual →				← actual	
	$1 \times x =$		$50 \times 8$	Cross products	
	$x =$		$400$	Simplify.	



It is 400 yards from Patrick's Point to Agate Beach.

### Exercises

Find the actual distance between each pair of cities. Round to the nearest tenth if necessary.

	Cities	Map Distance	Scale	Actual Distance
1.	Los Angeles and San Diego, California	6.35 cm	1 cm = 20 mi	
2.	Lexington and Louisville, Kentucky	15.6 cm	1 cm = 5 mi	
3.	Des Moines and Cedar Rapids, Iowa	16.27 cm	2 cm = 15 mi	
4.	Miami and Jacksonville, Florida	11.73 cm	$\frac{1}{2}$ cm = 20 mi	

Suppose you are making a scale drawing. Find the length of each object on the scale drawing with the given scale. Then find the scale factor.

5. an automobile 16 feet long; 1 inch:6 inches
6. a lake 85 feet across; 1 inch = 4 feet
7. a parking lot 200 meters wide; 1 centimeter:25 meters
8. a flag 5 feet wide; 2 inches = 1 foot

**6A****Skills Practice**

6-5.7

**Scale Drawings**

**ARCHITECTURE** The scale on a set of architectural drawings for a house is  $\frac{1}{2}$  inch =  $1\frac{1}{2}$  feet. Find the length of each part of the house.

	Room	Drawing Length	Actual Length
1.	Living Room	5 inches	
2.	Dining Room	4 inches	
3.	Kitchen	$5\frac{1}{2}$ inches	
4.	Laundry Room	$3\frac{1}{4}$ inches	
5.	Basement	10 inches	
6.	Garage	$8\frac{1}{3}$ inches	

**ARCHITECTURE** As part of a city building refurbishment project, architects have constructed a scale model of several city buildings to present to the city commission for approval. The scale of the model is 1 inch = 9 feet.

- The courthouse is the tallest building in the city. If it is  $7\frac{1}{2}$  inches tall in the model, how tall is the actual building?
- The city commission would like to install new flagpoles that are each 45 feet tall. How tall are the flagpoles in the model?
- In the model, two of the flagpoles are 4 inches apart. How far apart will they be when they are installed?
- The model includes a new park in the center of the city. If the dimensions of the park in the model are 9 inches by 17 inches, what are the actual dimensions of the park?
- Find the scale factor.



# 6A

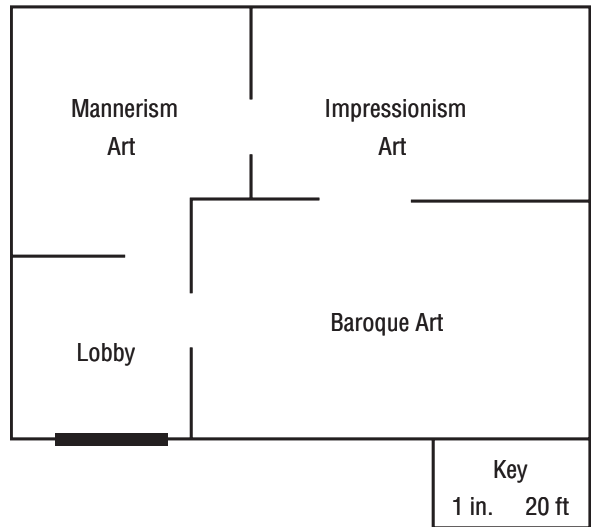
## Homework Practice



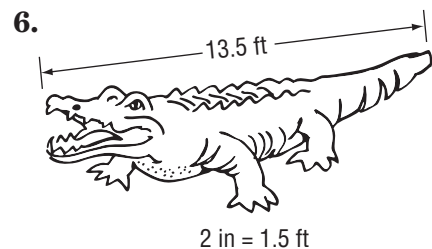
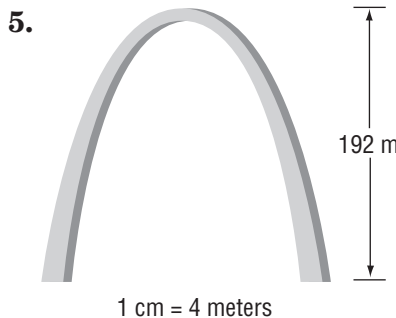
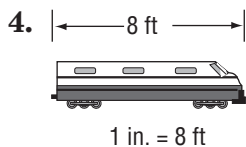
### Scale Drawings

For Exercises 1–3, use the diagram of a section of the art museum shown. Use a ruler to measure.

1. What is the actual length of the *Impressionism Art* room?
2. Find the actual dimensions of the *Baroque Art* room.
3. Find the scale factor for this blueprint.



Find the length of each model on the scale drawing with the given scale.



7. **SKYSCRAPER** A model of a skyscraper is made using a scale of 1 inch:75 feet. What is the height of the actual building if the height of the model is  $19\frac{2}{5}$  inches?
8. **GEOGRAPHY** Salem and Eugene, Oregon, are 64 miles apart. If the distance on the map is  $3\frac{1}{4}$  inches, find the scale of the map.
9. **PYRAMIDS** The length of a side of the Great Pyramid of Khufu at Giza, Egypt, is 751 feet. If you were to make a model of the pyramid to display on your desk, which would be an appropriate scale: 1 in. = 10 ft or 1 ft = 500 ft? Explain your reasoning.

**6A****Problem-Solving Practice****SCAS****6-5.7****Scale Drawings**

<p><b>1. CARS</b> A scale drawing of an automobile has a scale of 1 inch = <math>\frac{1}{2}</math> foot. The actual width of the car is 8 feet. What is the width on the scale drawing?</p>	<p><b>2. MODELS</b> A model ship is built to a scale of 1 centimeter: 5 meters. The length of the model is 30 centimeters. What is the length of the actual ship?</p>
<p><b>3. BUILDING</b> Jose wants to build a model of a 180-meter tall building. He will be using a scale of 1.5 centimeters = 3.5 meters. How tall will the model be? Round your answer to the nearest tenth.</p>	<p><b>4. TRAVEL</b> Susan is driving to Mount Shasta. On her map, she is a distance of <math>7\frac{3}{4}</math> inches away. The scale of the map is <math>\frac{1}{2}</math> inch = 50 miles. How far must Susan travel to reach her destination?</p>
<p><b>5. MAPS</b> A map of Levi's property is being made with a scale of 2 centimeters: 3 meters. What is the scale factor?</p>	<p><b>6. LANDSCAPING</b> A pond is being dug according to plans that have a scale of 1 inch = 6.5 feet. The maximum distance across the pond is 9.75 inches on the plans. What will be the actual maximum distance across the pond?</p>

**6-5****Study Guide**

6-3.1, 6-1.1

**Problem-Solving Investigation: Look for a Pattern**

When solving problems, one strategy that is helpful is to *look for a pattern*. In some problem situations, you can extend and examine a pattern in order to solve the problem.

You can use the *look for a pattern* strategy, along with the following four-step problem solving plan to solve a problem.

- 1 Understand** – Read and get a general understanding of the problem.
- 2 Plan** – Make a plan to solve the problem and estimate the solution.
- 3 Solve** – Use your plan to solve the problem.
- 4 Check** – Check the reasonableness of your solution.

**Example** **MEDICINE** Monisha has the flu. The doctor gave her medicine to take over the next 2 weeks. The first 3 days she is to take 2 pills a day. Then the remaining days she is to take 1 pill. How many pills will Monisha have taken at the end of the 2 weeks?

**Understand** You know she is to take the medicine for 2 weeks. You also know she is to take 2 pills the first 3 days and then only 1 pill the remaining days. You need to find the total number of pills.

**Plan** Start with the first week and look for a pattern.

**Solve**

Day	1	2	3	4	5	6	7
Number of Pills	2	2	2	1	1	1	1
Total Pills	2	$2 + 2 = 4$	$4 + 2 = 6$	$6 + 1 = 7$	$7 + 1 = 8$	$8 + 1 = 9$	$9 + 1 = 10$

After the first few days the number of pills increases by 1. You can add 7 more pills to the total for the first week,  $10 + 7 = 17$ . So, by the end of the 2 weeks, Monisha will have taken 17 pills to get over the flu.

**Check** You can extend the table for the next 7 days to check the answer.

**Exercise**

**TIME** Buses arrive every 30 minutes at the bus stop. The first bus arrives at 6:20 A.M. Hogan wants to get on the first bus after 8:00 A.M. What time will the bus that Hogan wants to take arrive at the bus stop?

**6-5****Skills Practice**

6-3.1, 6-1.1

**Problem-Solving Investigation: Look for a Pattern**

**Solve.** Use the look for a pattern strategy.

1. **NUMBER SENSE** Describe the pattern below, Then find the missing number.

1, 20, 400, \_\_\_\_\_, 160,000

2. **GEOMETRY** Use the pattern below to find the perimeter of the eighth figure.

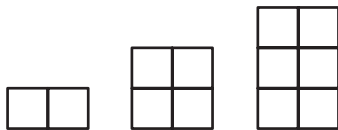
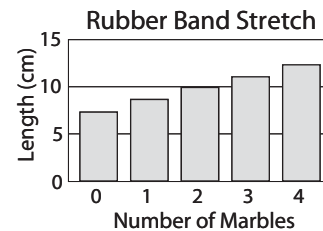


Figure 1      Figure 2      Figure 3

3. **PHYSICAL SCIENCE** A cup of marbles hangs from a rubber band. The length of the rubber band is measured as shown in the graph at the right. Predict the approximate length of the rubber band if 6 marbles are in the cup.



4. **ALLOWANCE** In 2002, Estella earned \$200 in allowance, and Kelsey earned \$150 in allowance. Each year Kelsey earned \$20 more in allowance, and Estella earned \$10 more. In what year will they earn the same amount of money? How much will it be?

**6-5****Homework Practice**

6-3.1, 6-1.1

**Problem-Solving Investigation: Look for a Pattern****Mixed Problem Solving**

Use the look for a pattern strategy to solve Exercises 1 and 2.

- MONEY** In 2005, Trey had \$7,200 in his saving-for-college account and Juan had \$8,000. Each year, Trey will add \$400 and Juan will add \$200. In what year will they both have the same amount of money in their accounts, not counting interest earned? How much will it be?
- BUTTONS** Draw the next two figures in the pattern below.



Use any strategy to solve Exercises 3–7. Some strategies are shown below.

**Problem-Solving Strategies**

- Guess and Check.
- Look for a pattern.
- Act it out.

- MUSIC** Last week Jason practiced playing his bassoon for 95 minutes. This week he practiced 5 more minutes than 3 times the number of minutes he practiced last week. How many minutes did Jason practice this week?

- NUMBER SENSE** Describe the pattern below. Then find the missing number.

5,000, 2,500, ■, 625, . . .

- TRAVEL** An express bus left the station at 6:30 a.m. and arrived at its destination at 12:00 noon. It traveled a distance of 260 miles and made only one stop for a half hour to drop off and pick up passengers. What was the average speed of the bus?

- MONEY** Len bought a \$24.99 pair of pants and paid a total of \$27.05, including tax. How much was the tax?

- PHOTOGRAPHY** Ms. Julian gives photography workshops. She collected \$540 in fees for a workshop attended by 12 participants. Ms. Julian spent \$15 per person for supplies for them and herself and \$6 per person for box lunches for them and herself. How much money did Ms. Julian have left as profit?

**6-5**

**Problem-Solving Practice**



6-3.1, 6-1.1

**Problem-Solving Investigation: Look for a Pattern**

**1. HEIGHT** Fernando is 2 inches taller than Jason. Jason is 1.5 inches shorter than Kendra and 1 inch taller than Nicole. Hao, who is 5 feet 10 inches tall, is 2.5 inches taller than Fernando. How tall is each student?

**2. FRUIT** The table below shows the results of a survey of students' favorite fruit. How many more students like apples than bananas?

Favorite Fruit							
A	B	G	B	A	B	A	O
O	A	G	G	G	A	A	B
G	O	A	B	O	B	O	O

A = apple B = banana G = grapes  
O = orange

**3. MONEY** Dominic's mother gave him \$20 to go to the grocery store. If the groceries cost \$12.56, how much change will he receive?

**4. BOOKS** An author has written 4 different books. Each book is available in hard bound, soft bound, and on tape. How many different items are available by this author?

**5. FOOTBALL** The varsity football team scored 24 points in last Friday's game. They scored a combination of 7-point touchdowns and 3-point field goals. How many touchdowns and how many field goals did they score?

**6. CYCLING** Jody and Lazaro are cycling in a 24-mile race. Jody is cycling at an average speed of 8 miles per hour. Lazaro is cycling at an average speed of 6 miles per hour. If they both started the race at the same time, who will finish first? How much faster will they finish the race?

**6-6****Explore Through Reading**6-3.1, 6-1.7,  
6-3.3, 6-1.8**Sequences and Expressions****Get Ready for the Lesson**

Read the introduction at the top of page 343 in your textbook.

Write your answers below.

1. Find the rate of slices to the number of pizzas for each row in the table.
2. Is the number of pizzas proportional to the number of slices? Explain your reasoning.
3. Make an ordered list of the number of slices and describe the pattern between consecutive numbers in this list.
4. What relationship appears to exist between the pattern found in Exercise 3 and the rates found in Exercise 1?

**Read the Lesson**

5. If you have a list of numbers, how can you tell if they are an arithmetic sequence?
6. In extending a sequence, how can you use an algebraic expression to find the tenth term?

**Remember What You Learned**

7. Work with a partner. Make up a sequence of numbers that follow a certain pattern. Exchange lists with your partner. For the list you receive from your partner, describe the pattern, write a function describing the pattern, and then find the tenth term in the pattern.

**6-6****Study Guide**6-3.1, 6-1.7,  
6-3.3, 6-1.8**Sequences and Expressions**

A **sequence** is a list of numbers in a specific order. Each number in the sequence is called a **term**. An **arithmetic sequence** is a sequence in which each term is found by adding the same number to the previous term.

**Example** Use words and symbols to describe the value of each term as a function of its position. Then find the value of the tenth term in the sequence.

<b>Position</b>	1	2	3	4	$n$
<b>Value of Term</b>	4	8	12	16	?

Study the relationship between each position and the value of its term.

Notice that the value of each term is 4 times its position number. So the value of the term in position  $n$  is  $4n$ .

To find the value of the tenth term, replace  $n$  with 10 in the algebraic expression  $4n$ .

Since  $4 \times 10 = 40$ , the value of the tenth term in the sequence is 40.

<b>Position</b>		<b>Value of Term</b>
1	$\times 4 =$	4
2	$\times 4 =$	8
3	$\times 4 =$	12
4	$\times 4 =$	16
$n$	$\times 4 =$	$4n$

**Exercises**

Use words and symbols to describe the value of each term as a function of its position. Then find the value of the tenth term in the sequence.

1. 

<b>Position</b>	3	4	5	6	$n$
<b>Value of Term</b>	1	2	3	4	?

2. 

<b>Position</b>	1	2	3	4	$n$
<b>Value of Term</b>	5	10	15	20	?

3. 

<b>Position</b>	4	5	6	7	$n$
<b>Value of Term</b>	11	12	13	14	?



**6-6****Homework Practice**6-3.1, 6-1.7,  
6-3.3, 6-1.8**Sequences and Expressions**

Use words and symbols to describe the value of each term as a function of its position. Then find the value of the sixteenth term in the sequence.

1.	<b>Position</b>	2	3	4	5	$n$
	<b>Value of Term</b>	8	12	16	20	■

2.	<b>Position</b>	8	9	10	11	$n$
	<b>Value of Term</b>	14	15	16	17	■

3.	<b>Position</b>	11	12	13	14	$n$
	<b>Value of Term</b>	4	5	6	7	■

4.	<b>Position</b>	21	22	23	24	$n$
	<b>Value of Term</b>	12	13	14	15	■

Determine how the next term in each sequence can be found. Then find the next two terms in the sequence.

5. 3, 16, 29, 42, ...

6. 29, 25, 21, 17, ...

7. 1.2, 3.5, 5.8, 8.1, ...

Find the missing number in each sequence.

8. 5, ■, 10,  $12\frac{1}{2}$ , ...

9. 11.5, 9.4, ■, 5.2

10. 40, ■,  $37\frac{1}{3}$ , 36, ...

11. **MEASUREMENT** There are 52 weeks in 1 year. In the space at the right, make a table and write an algebraic expression relating the number of weeks to the number of years. Then find Hana's age in weeks if she is 11 years old.

12. **COMPUTERS** There are about 8 bits of digital information in 1 byte. In the space at the right, make a table and write an algebraic expression relating the number of bits to the number of bytes. Then find the number of bits there are in one kilobyte if there are 1,024 bytes in one kilobyte.

**6-6****Problem-Solving Practice****6-3.1, 6-1.7,**  
**6-3.3, 6-1.8****Sequences and Expressions**

<p><b>1. AGE</b> There are 12 months in 1 year. If Juan is 11 years old, how many months old is he? Make a table then write an algebraic expression relating the number of months to the number of years.</p>	<p><b>2. MEASUREMENT</b> There are 12 inches in 1 foot. The height of Rachel's door is 7 feet. Find the height in inches. Make a table then write an algebraic expression relating the number of feet to inches.</p>
<p><b>3. RUNNING</b> There are 60 seconds in 1 minute. Pete can run all the way around the track in 180 seconds. Find how long it takes Pete to run around the track in minutes. Make a table then write an algebraic expression relating the number of seconds to the number of minutes.</p>	<p><b>4. FRUIT</b> There are 16 ounces in 1 pound. Chanda picked 9 pounds of cherries from her tree this year. Find the number of ounces of cherries Chanda picked. Make a table then write an algebraic expression relating the number of ounces to the number of pounds.</p>
<p><b>5. SPORTS</b> There are 3 feet in 1 yard. Tanya Streeter holds the world record for free-diving in the ocean. She dove 525 feet in <math>3\frac{1}{2}</math> minutes. Find the number of yards she dove. Make a table then write an algebraic expression relating the number of feet to the number of yards.</p>	<p><b>6. COOKING</b> There are 8 fluid ounces in 1 cup. A beef stew recipe calls for 3 cups of vegetable juice. Find the number of fluid ounces of vegetable juice needed for the recipe. Make a table then write an algebraic expression relating the number of fluid ounces to the number of cups.</p>

**6-7****Explore Through Reading**6-3.3, 6-1.4,  
6-1.8**Proportions and Equations****Get Ready for the Lesson**

Read the introduction at the top of page 349 in your textbook.

Write your answers below.

1. Write a sentence that describes the relationship between the number of hours she babysits and her earnings.
2. Is the relationship proportional? Explain.
3. What is the rule to find the amount Carli earns for babysitting  $h$  hours?
4. If  $e$  represents the amount Carli earns, what equation can you use to represent this situation?

**Read the Lesson**

5. What is the difference between an input value and an output value of a function?
6. Explain the steps involved in using an equation to represent a function.

**Remember What You Learned**

7. Work with a partner. Create a function table that can be represented with an equation. Exchange function tables with your partner. For the table you receive from your partner, write an equation to represent the function.

# 6-7

## Study Guide



### Proportions and Equations

A function table displays input and output values that represent a function. The function displayed in a function table can be represented with an equation.

**Example 1** Write an equation to represent the function displayed in the table.

Examine how the value of each input and output changes.

<b>Input, <math>x</math></b>	1	2	3	4	5
<b>Output, <math>y</math></b>	5	10	15	20	25

As each input increases by 1, the output increases by 5. That is, the constant rate of change is 5.

<b>Input, <math>x</math></b>	1	2	3	4	5
<b>Output, <math>y</math></b>	5	10	15	20	25

$\overset{+1}{\curvearrowright}$     $\overset{+1}{\curvearrowright}$     $\overset{+1}{\curvearrowright}$     $\overset{+1}{\curvearrowright}$   
 $\underset{+5}{\curvearrowleft}$     $\underset{+5}{\curvearrowleft}$     $\underset{+5}{\curvearrowleft}$     $\underset{+5}{\curvearrowleft}$

So, the equation that represents the function is  $y = 5x$ .

**Example 2** Theo earns \$6 an hour mowing lawns for his neighbors. Make a table and write an equation for the total amount  $t$  Theo earns for mowing  $h$  hours. How much will Theo earn for mowing lawns for 11 hours?

As the number of hours increases by 1, the total earned increases by 6.

So, the equation is  $t = 6h$ .

Let  $h = 11$  to find how much Theo will earn in 11 hours.

$t = 6h$   
 $t = 6 \times 11$  or \$66

Hours, $h$	Total earned, $t$
1	\$6
2	\$12
3	\$18
4	\$24

$+1 \left( \right) +6$   
 $+1 \left( \right) +6$   
 $+1 \left( \right) +6$

### Exercises

Write an equation to represent the function displayed in each table.

1. 

<b>Input, <math>x</math></b>	1	2	3	4	5
<b>Output, <math>y</math></b>	2	4	6	8	10

2. 

<b>Input, <math>x</math></b>	0	1	2	3	4
<b>Output, <math>y</math></b>	0	6	12	18	24

**MUSIC** Use the following information for Exercises 3–5.

A music store sells each used CD for \$4.

- Make a table to show the relationship between the number of  $c$  used CDs purchased and the total cost  $t$ .
- Write an equation to find  $t$ , the total cost in dollars for buying  $c$  used CDs.
- How much will it cost to buy 5 used CDs?

## 6-7

## Homework Practice

6-3.3, 6-1.4,  
6-1.8

## Proportions and Equations

Write an equation to represent the function displayed in each table.

1.

<b>Input, <math>x</math></b>	1	2	3	4	5
<b>Output, <math>y</math></b>	7	14	21	28	35

2.

<b>Input, <math>x</math></b>	0	1	2	3	4
<b>Output, <math>y</math></b>	0	9	18	27	36

3.

<b>Input, <math>x</math></b>	1	2	3	4	5
<b>Output, <math>y</math></b>	13	26	39	52	65

4.

<b>Input, <math>x</math></b>	10	20	30	40	50
<b>Output, <math>y</math></b>	1	2	3	4	5

5.

<b>Input, <math>x</math></b>	0	1	2	3	4
<b>Output, <math>y</math></b>	0	14	28	42	56

6.

<b>Input, <math>x</math></b>	4	8	12	16	20
<b>Output, <math>y</math></b>	1	2	3	4	5

7.

<b>Input, <math>x</math></b>	12	24	36	48	60
<b>Output, <math>y</math></b>	1	2	3	4	5

8.

<b>Input, <math>x</math></b>	6	12	18	24	30
<b>Output, <math>y</math></b>	1	2	3	4	5

**BATS** Use the following information for Exercises 9–11.

A Little Brown Myotis bat can eat 500 mosquitoes in an hour.

9. In the space at the right, make a table to show the relationship between the number of hours  $h$  and the number of mosquitoes eaten  $m$ .

10. Write an equation to find  $m$ , the number of mosquitoes a bat eats in  $h$  hours.

11. How many mosquitoes can a Little Brown Myotis bat eat in 7 hours?

12. **RECREATION** A community center charges the amount shown in the table for using specialized exercise equipment. Write a sentence and an equation to describe the data. How much will it cost to use the exercise equipment for 6 months?

Number of Months, $m$	Cost, $c$
1	\$20
2	\$40
3	\$60

**6-7****Problem-Solving Practice**6-3.3, 6-1.4,  
6-1.8**Proportions and Equations**

**FITNESS** For Exercises 1–3, use the following information.

Rosalia burns 250 Calories for each hour she does aerobics.

1. Make a table to show the relationship between the number of Calories  $c$  Rosalia burns doing aerobics for  $h$  hours.

2. Write an equation to find  $c$ , the number of Calories Rosalia burns in  $h$  hours.

3. If Rosalia goes to a 1-hour aerobic class 3 times a week, how many Calories will she burn each week doing aerobics?

4. **MUSICALS** The table below shows the admission price to the school musical. Write a sentence and an equation to describe the data.

Number of People, $h$	Total Admission, $t$
1	\$6
2	\$12
3	\$18

5. **MUSICALS** In Exercise 4, how much will it cost for a family of 5 to attend the musical?

6. **VIDEO GAMES** The table below shows the number of points earned for catching bugs in a video game. Write a sentence and an equation to describe the data.

Number of Bugs Caught, $b$	Total Points, $t$
1	25
2	50
3	75



# Chapter 6 Test

## Mastering the SC Standards

- 1** Mr. Cameron drives his boat on Lake Marion at a speed of 15 miles per hour. At this rate, how far will he travel in 3 hours?

(A) 18 miles  
 (B) 25 miles  
 (C) 45 miles  
 (D) 65 miles

**6-2.6**

- 2** What is the missing number in the ratio table below?

<b>Numerator</b>	1	2	3	4
<b>Denominator</b>	4	8	?	16

(A) 9  
 (B) 12  
 (C) 15  
 (D) 24

**6-2.6**

- 3** Ramon walks 9 miles in 3 hours. If he walks at the same rate, how many miles can he walk in 4 hours?

(A) 8 miles  
 (B) 11 miles  
 (C) 12 miles  
 (D) 13 miles

**6-2.6**

- 4** A group of hikers on Sassafras Mountain hikes 8 miles in 2 hours. What is their unit rate?

(A) 2 miles per hour  
 (B) 4 miles per hour  
 (C) 8 miles per hour  
 (D) 10 miles per hour

**6-5.6**

- 5** Alyssa packs a total of 30 boxes in 3 hours. At this rate, how many boxes can she pack in 5 hours?

(A) 10  
 (B) 30  
 (C) 50  
 (D) 80

**6-2.6**

- 6** It takes Sean 18 minutes to wash 6 dishes. What is his unit rate?

(A) 1 minute per dish  
 (B) 2 minutes per dish  
 (C) 3 minutes per dish  
 (D) 4 minutes per dish

**6-5.6**



# Chapter 6 Test (continued)

## Mastering the SC Standards

- 7** Carla and her family drive from Charleston to Columbia. The distance between the two cities is about 110 miles. If they travel at a constant rate of 55 miles an hour, how long will it take them to get there?

(A) 1 hour  
 (B) 2 hours  
 (C) 3 hours  
 (D) 4 hours

**6-2.6**

- 8** What is the missing number in the ratio table below?

<b>Numerator</b>	3	6	9	12
<b>Denominator</b>	6	12	18	?

(A) 16  
 (B) 20  
 (C) 22  
 (D) 24

**6-2.6**

- 9** At Melissa's dance school, there is 1 instructor for every 12 students. There are 72 students at the dance school. Which proportion can be used to find  $t$ , the number of instructors?

(A)  $\frac{t}{72} = \frac{1}{12}$   
 (B)  $\frac{t}{72} = \frac{12}{1}$   
 (C)  $\frac{1}{72} = \frac{12}{t}$   
 (D)  $\frac{t}{1} = \frac{12}{72}$

**6-5.6**

- 10** Yori buys 12 pens for \$3.60. How much does each pen cost?

(A) \$0.25  
 (B) \$0.29  
 (C) \$0.30  
 (D) \$0.40

**6-5.6**

- 11** The table below shows the amount of profit a convenience store makes for the number of breakfast bars sold.

Breakfast Bars	
Number Sold ( $n$ )	Profit (\$)
1	\$0.50
2	\$1.00
3	\$1.50
4	\$2.00

Which expression best represents the profit in relation to the number of breakfast bars sold?

(A)  $n + 0.50$   
 (B)  $n \times 0.50$   
 (C)  $2n$   
 (D)  $n + 2$

**6-3.1**

- 12** How far will a bus travel in 7 hours moving at a constant speed of 65 miles an hour?

(A) 72 miles  
 (B) 265 miles  
 (C) 356 miles  
 (D) 455 miles

**6-2.6**



**7****Anticipation Guide****Percent and Probability****STEP 1** *Before you begin Chapter 7*

- Read each statement.
- Decide whether you Agree (A) or Disagree (D) with the statement.
- Write A or D in the first column OR if you are not sure whether you agree or disagree, write NS (Not Sure).

STEP 1 A, D, or NS	Statement	STEP 2 A or D
	1. Percent means <i>hundredths</i> .	
	2. To write a fraction as a percent, multiply the fraction by $\frac{1}{100}$ .	
	3. In a circle graph the percents add up to 360%.	
	4. By comparing the size of the sections in a circle graph you can compare the data represented by those sections.	
	5. Moving the decimal point in a number two places to the left is the same as dividing that number by 100.	
	6. To write a decimal as a percent, first write the decimal as a fraction with a denominator of 100.	
	7. The probability that an event will occur is always a number from 0 to 100.	
	8. A tree diagram can be used to find the number of possible outcomes of an event.	
	9. To have an accurate survey of a group of people, all people in the group must be surveyed.	
	10. 85 is a good estimate of 48% of 150.	

**STEP 2** *After you complete Chapter 7*

- Reread each statement and complete the last column by entering an A (Agree) or a D (Disagree).
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a separate sheet of paper to explain why you disagree. Use examples, if possible.

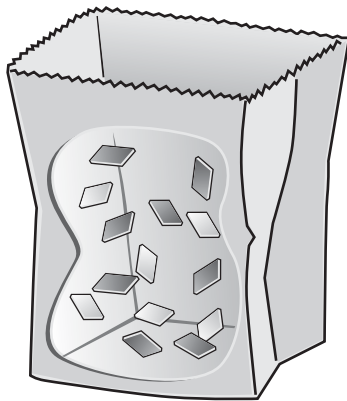
## 7

## Family Activity

## State Test Practice

Fold the page along the dashed line. Work each problem on another piece of paper. Then unfold the page to check your work.

1. Devon reaches into a bag containing six yellow tiles and 8 green tiles. What is the probability that he will pull out a green tile?



- A  $\frac{8}{16}$   
 B  $\frac{8}{14}$   
 C  $\frac{6}{14}$   
 D  $\frac{6}{8}$

**Fold here.**

**Solution**

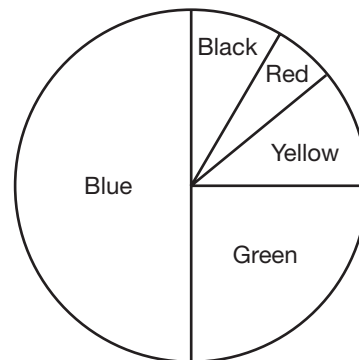
1. *Hint: The probability of a specific event occurring is the number of times it would be possible for the specific event to occur over the total number of events.*

The bag contains 8 green tiles and 6 yellow tiles, or a total of 14 tiles. The probability of choosing a green one is the number of green tiles (8) over the total number of tiles (14), which can be represented as  $\frac{8}{14}$ .

The answer is **B**.

2. A survey was conducted at a local middle school. One hundred students were asked to name their favorite color. Here are the results.

**Favorite Colors at Blues Middle School**



About what percentage of the students said green is their favorite color?

- A 20%  
 B 25%  
 C 33%  
 D 50%

**Solution**

2. Green represents one-fourth of the circle shown in the graph, which means that  $\frac{1}{4}$  of the students chose green as their favorite color. One-fourth, or one quarter of the circle is 25%. You can also calculate the percentage from the fraction by either dividing the numerator by the denominator and multiplying by 100% or setting up a ratio for the percentage, in this case:

$$\frac{1}{4} = \frac{?}{100}$$

The answer is **B**.

**7-1****Explore Through Reading**

6-2.1, 6-1.7

**Percents and Fractions****Get Ready for the Lesson****Read the introduction at the top of page 365 in your textbook.****Write your answers below.**

1. What ratio compares the number of students who prefer grape fruit bars to the total number of students?
2. Draw a decimal model to represent this ratio.
3. What fraction represents this ratio?

**Read the Lesson**

4. Write the two steps to use to write a percent as a fraction.
5. Look at the graph at the top of page 365. What is the sum of the number of students? Look at Example 3. Based on the information given, what percentage of cell phone owners said that they do not use the text messaging feature? How do you know?
6. Look at Example 2 on page 366. Why is 125% written as a mixed number?

**Remember What You Learned**

7. Write a fraction as a percent using the steps shown in Examples 4 and 5 on pages 366 and 367. Choose any fraction you like different from those in the Examples.

Step	Equation(s)
Set up a proportion.	
Write the cross products.	
Multiply.	
Divide.	
Conclusion.	So, _____ is equivalent to _____.

## 7-1

## Study Guide



6-2.1, 6-1.7

## Percents and Fractions

To write a percent as a fraction, write it as a fraction with a denominator of 100. Then simplify.

**Example 1** Write 15% as a fraction in simplest form.

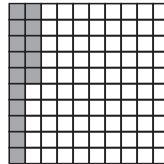
15% means 15 out of 100.

$$15\% = \frac{15}{100}$$

Definition of percent.

$$= \frac{\overset{3}{\cancel{15}}}{\underset{20}{\cancel{100}}} \text{ or } \frac{3}{20}$$

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

**Example 2** Write 180% as a fraction in simplest form.

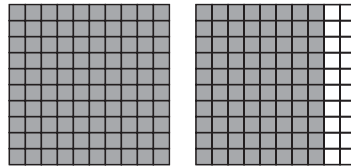
180% means 180 out of 100.

$$180\% = \frac{180}{100}$$

Definition of percent.

$$= \frac{\overset{9}{\cancel{180}}}{\underset{5}{\cancel{100}}} \text{ or } 1\frac{4}{5}$$

Simplify.



You can also write fractions as percents. To write a fraction as a percent, write a proportion and solve.

**Example 3** Write  $\frac{2}{5}$  as a percent.

$$\frac{2}{5} = \frac{n}{100}$$

Set up a proportion.

$$\frac{2}{5} = \frac{\overset{\times 20}{40}}{\underset{\times 20}{100}}$$

Since  $5 \times 20 = 100$ , multiply 2 by 20 to find  $n$ .

$$\text{So, } \frac{2}{5} = \frac{40}{100} \text{ or } 40\%$$

**Example 4** Write  $\frac{7}{4}$  as a percent.

$$\frac{7}{4} = \frac{n}{100}$$

Set up a proportion.

$$\frac{7}{4} = \frac{\overset{\times 25}{175}}{\underset{\times 25}{100}}$$

Since  $4 \times 25 = 100$ , multiply 7 by 25 to find  $n$ .

$$\text{So, } \frac{7}{4} = \frac{175}{100} \text{ or } 175\%$$

**Exercises**

Write each percent as a fraction in simplest form.

1. 20%

2. 35%

3. 70%

4. 60%

5. 150%

6. 225%

Write each fraction as a percent.

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

8.  $\frac{2}{100}$

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

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

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

12.  $\frac{13}{100}$

**7-1**

**Homework Practice**



6-2.1, 6-1.7

**Percents and Fractions**

Write each percent as a fraction in simplest form.

- 1. 60%
- 2. 18%
- 3. 4%
- 4. 35%
- 5. 10%
- 6. 1%
- 7. 175%
- 8. 258%
- 9. 325%

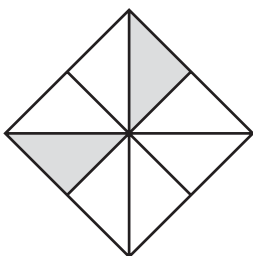
10. **ENERGY** The United States uses 24% of the world's supply of energy. What fraction of the world's energy is this?

Write each fraction as a percent.

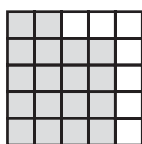
- 11.  $\frac{6}{10}$
- 12.  $\frac{2}{5}$
- 13.  $\frac{9}{5}$
- 14.  $\frac{6}{4}$
- 15.  $\frac{7}{100}$
- 16.  $\frac{4}{100}$

Write a percent to represent the shaded portion of each model.

17.



18.



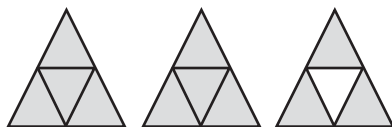
19.



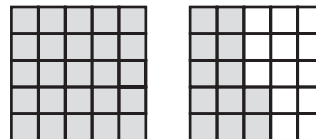
20.



21.



22.



23. **ANALYZE TABLES** The table shows what fraction of a vegetable garden contains each kind of vegetable. What percent of the garden contains other kinds of vegetables?

Plant	Beans	Corn	Tomatoes	Other
Fraction	$\frac{1}{5}$	$\frac{1}{2}$	$\frac{1}{4}$	■

**7-1****Problem-Solving Practice**

6-2.1, 6-1.7

**Percents and Fractions**

<p><b>1. TOYS</b> The Titanic Toy Company has a 4% return rate on its products. Write this percent as a fraction in simplest form.</p>	<p><b>2. MUSIC</b> There are 4 trombones out of 25 instruments in the Landers town band. What percent of the instruments are trombones?</p>
<p><b>3. SHOPPING</b> Alicia's favorite clothing store is having a 30% off sale. What fraction represents the 30% off sale?</p>	<p><b>4. FOOD</b> At Ben's Burger Palace, 45% of the customers order large soft drinks. What fraction of the customers order large soft drinks?</p>
<p><b>5. BASKETBALL</b> In a recent NBA season, Shaquille O'Neal of the Los Angeles Lakers made 60% of his field goals. What fraction of his field goals did Shaquille make?</p>	<p><b>6. SCHOOL</b> In Janie's class, 7 out of 25 students have blue eyes. What percent of the class has blue eyes?</p>
<p><b>7. TESTS</b> Michael answered <math>\frac{17}{20}</math> questions correctly on his test. What percent of the questions did Michael answer correctly?</p>	<p><b>8. RESTAURANTS</b> On Saturday afternoon, <math>\frac{41}{50}</math> telephone calls taken at The Overlook restaurant were for dinner reservations. What percent of the telephone calls were for dinner reservations?</p>

**7-3****Explore Through Reading**6-2.1, 6-2.3,  
6-1.7**Percents and Decimals****Get Ready for the Lesson**

Read the introduction at the top of page 377 in your textbook.  
Write your answers below.

1. What percent does the entire circle graph represent?
2. What fraction represents the section of the graph labeled math?
3. Write the fraction from Exercise 2 as a decimal.

**Read the Lesson**

Complete each of the following sentences.

4. To rewrite a fraction with a denominator of 100 as a decimal, move the decimal point of the numerator \_\_\_\_\_ places to the \_\_\_\_\_.
5. To rewrite a fraction with a denominator of \_\_\_\_\_ as a decimal, move the decimal point of the numerator 3 places to the left.
6. Look at Example 6 on page 378. Why do you multiply the numerator and denominator by 10?

**Remember What You Learned**

7. Look at Example 5 on page 378. Explain why you first write the decimal as mixed number. Then explain what happens at the next step.

**7-3****Study Guide**6-2.1, 6-2.3,  
6-1.7**Percents and Decimals**

To write a percent as a decimal, first rewrite the percent as a fraction with a denominator of 100. Then write the fraction as a decimal.

**Example 1 Write 23% as a decimal.**

$$23\% = \frac{23}{100}$$

$$= 0.23$$

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

Write the fraction as a decimal.

**Example 2 Write 127% as a decimal.**

$$127\% = \frac{127}{100}$$

$$= 1.27$$

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

Write the fraction as a decimal.

To write a decimal as a percent, first write the decimal as a fraction with a denominator of 100. Then write the fraction as a percent.

**Example 3 Write 0.44 as a percent.**

$$0.44 = \frac{44}{100}$$

$$= 44\%$$

Write the decimal as a fraction.

Write the fraction as a percent.

**Example 4 Write 2.65 as a percent.**

$$2.65 = \frac{265}{100}$$

$$= \frac{265}{100}$$

$$= 265\%$$

Write 2 and 65 hundredths as a mixed number.

Write the mixed number as an improper fraction.

Write the fraction as a percent.

**Exercises****Write each percent as a decimal.**

1. 39%

2. 57%

3. 82%

4. 135%

5. 112%

6. 0.4%

**Write each decimal as a percent.**

7. 0.86

8. 0.36

9. 0.65

10. 0.2

11. 1.48

12. 2.17



**7-3****Homework Practice****6-2.1, 6-2.3,  
6-1.7****Percents and Decimals****Express each percent as a decimal.**

1. 29%                      2. 63%                      3. 4%                      4. 9%
5. 148%                      6. 106%                      7. 10%                      8. 32%

**9. ENERGY** The United States gets about 39% of its energy from petroleum. Write 39% as a decimal.

**10. SCIENCE** About 8% of the earth's crust is made up of aluminum. Write 8% as a decimal.

**Express each decimal as a percent.**

11. 0.45                      12. 0.12                      13. 1.68                      14. 2.73
15. 0.2                      16. 0.7                      17. 0.95                      18. 0.46

**19. POPULATION** In 2000, the number of people 65 years and older in Arizona was 0.13 of the total population. Write 0.13 as a percent.

**20. GEOGRAPHY** About 0.41 of Hawaii's total area is water. What percent is equivalent to 0.41?

**Replace each ● with <, >, or = to make a true sentence.**

21. 26% ● 0.3                      22. 0.9 ● 9%                      23. 4.7 ● 47%

**24. ANALYZE TABLES** A batting average is the ratio of hits to at bats. Batting averages are expressed as a decimal rounded to the nearest thousandth. Show two different ways of finding how much greater Derek Jeter's batting average was than Jason Giambi's batting average. Express as a percent.

New York Yankees, 2005 Batting Statistics	
Player	Batting Average
Jason Giambi	0.286
Derek Jeter	0.307
Hideki Matsui	0.297
Jorge Posada	0.257

Source: ESPN

**7-3****Problem-Solving Practice**6-2.1, 6-2.3,  
6-1.7**Percents and Decimals**

<p><b>1. COMMUTING</b> According to the U.S. census, 76% of U.S. workers commute to work by driving alone. Write 76% as a decimal.</p>	<p><b>2. BASEBALL</b> A player's batting average was 0.29 rounded to the nearest hundredth. Write 0.29 as a percent.</p>
<p><b>3. ELECTIONS</b> In a recent U.S. midterm elections, 39% of eligible adults voted. What is 39% written as a decimal?</p>	<p><b>4. BASKETBALL</b> In a recent season, Jason Kidd of the New Jersey Nets had a field goal average of 0.40 rounded to the nearest hundredth. What is 0.40 written as a percent?</p>
<p><b>5. SPORTS</b> When asked to choose their favorite sport, 27% of U.S. adults who follow sports selected professional football. What decimal is equivalent to 27%?</p>	<p><b>6. AGE</b> Lawrence is 18 years old and his brother Luther is 12 years old. This means that Lawrence is 1.5 times older than Luther. What percent is equivalent to 1.5?</p>
<p><b>7. WATER</b> About 5% of the surface area of the U.S. is water. What decimal represents the amount of the U.S. surface area taken up by water?</p>	<p><b>8. POPULATION</b> China accounts for 0.21 of the world's population. What percent of the world's population lives in China?</p>

**7-4****Explore Through Reading**

6-6.4, 6-1.6

**Probability****Get Ready for the Lesson**

Read the introduction at the top of page 381 in your textbook.

Write your answers below.

1. Write a ratio that compares the number of yellow carnations to the total number of carnations.
2. What percent of the carnations are yellow?
3. Does Morgan have a good chance of selecting a yellow carnation?
  
4. What would happen to her chances of picking a yellow carnation if one each of a green, lilac, orange, dark purple, and teal carnation were added to the flowers shown?
  
5. What happens to her chances if there is only one yellow carnation and one pink carnation?

**Read the Lesson**

For Exercises 6–8, see the Key Concept box at the bottom of page 381.

6. In the equation, what does  $P(\text{event})$  represent? In terms of the example at the top of the page 381, what is the event?
7. In terms of question 1, what would be a favorable outcome?
8. In terms of the carnations shown, what are the possible outcomes?
  
9. In Example 4 at the bottom of page 383, how do you read the equation  $P(\text{blue eyes}) + P(\text{not blue eyes}) = 100\%$ ? What are “blue eyes” and “not blue eyes” called?

**Remember What You Learned**

10. A bouquet of flowers contains 6 pink roses, 3 purple roses, and 4 red roses. What is the probability that Morgan would pick a purple rose if her eyes were closed? Write an equation using the symbols from the lesson.

## 7-4

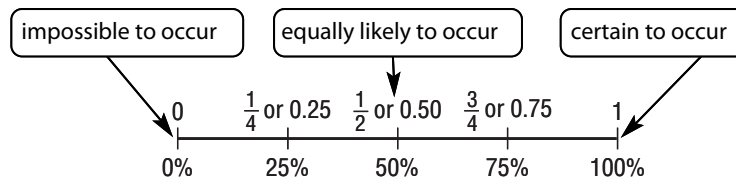
## Study Guide



6-6.4, 6-1.6

## Probability

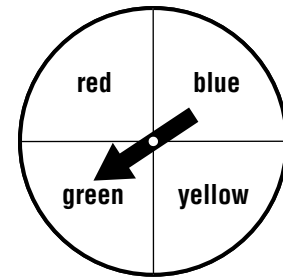
When tossing a coin, there are two possible **outcomes**, heads and tails. Suppose you are looking for heads. If the coin lands on heads, this would be a favorable outcome or **simple event**. The chance that some event will happen (in this case, getting heads) is called **probability**. You can use a ratio to find probability. The probability of an event is a number from 0 to 1, including 0 and 1. The closer a probability is to 1, the more likely it is to happen.



**Example 1** There are four equally likely outcomes on the spinner. Find the probability of spinning green or blue.

$$\begin{aligned} P(\text{green or blue}) &= \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}} \\ &= \frac{2}{4} \text{ or } \frac{1}{2} \end{aligned}$$

The probability of landing on green or blue is  $\frac{1}{2}$ , 0.50, or 50%.



**Complementary events** are two events in which either one or the other must happen, but both cannot happen at the same time. The sum of the probabilities of complementary events is 1.

**Example 2** There is a 25% chance that Sam will win a prize. What is the probability that Sam will not win a prize?

$$\begin{aligned} P(\text{win}) + P(\text{not win}) &= 1 \\ 0.25 + P(\text{not win}) &= 1 \\ \frac{-0.25}{P(\text{not win})} &= \frac{-0.25}{0.75} \end{aligned}$$

Replace  $P(\text{win})$  with 0.25.  
Subtract 0.25 from each side.

So, the probability that Sam won't win a prize is 0.75, 75%, or  $\frac{3}{4}$ .

## Exercises

- There is a 90% chance that it will rain. What is the probability that it will not rain?

**One pen is chosen without looking from a bag that has 3 blue pens, 6 red, and 3 green. Find the probability of each event. Write each answer as a fraction, a decimal, and a percent.**

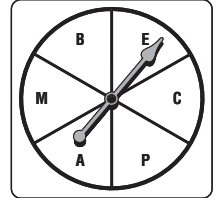
- $P(\text{green})$
- $P(\text{blue or red})$
- $P(\text{yellow})$

**7-4****Homework Practice**

6-6.4, 6-1.6

**Probability**

The spinner shown is spun once. Find each probability. Write each answer as a fraction, a decimal, and a percent.

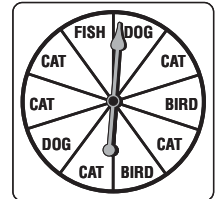


1.  $P(C)$
2.  $P(G)$
3.  $P(M \text{ or } P)$
4.  $P(B, E, \text{ or } A)$
5.  $P(\text{not vowel})$
6.  $P(\text{not } M)$

Eight cards are marked 3, 4, 5, 6, 7, 8, 9, and 10 such that each card has exactly one of these numbers. A card is picked without looking. Find each probability. Write each answer as a fraction, a decimal, and a percent.

7.  $P(9)$
8.  $P(5 \text{ or } 7)$
9.  $P(\text{greater than } 5)$
10.  $P(\text{less than } 3)$
11.  $P(\text{odd})$
12.  $P(4, 7, \text{ or } 8)$
13.  $P(\text{not } 6)$
14.  $P(\text{not } 5 \text{ and not } 10)$

The spinner is spun once. Write a sentence stating how likely it is for each event to happen. Justify your answer.



15. fish
16. cat
17. bird, cat, or fish
18. **PLANTS** Of the water lilies in the pond, 43% are yellow. The others are white. A frog randomly jumps onto a lily. Describe the complement of the frog landing on a yellow lily and find its probability.

**7-4**

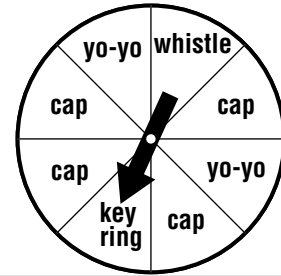
**Problem-Solving Practice**



**Probability**

Write each answer as a fraction, a decimal, and a percent.

**PARTY** For Exercises 1 and 2, the spinner shown is spun once. The spinner shows the prizes a person can win at a party.



<p><b>1.</b> What is the probability that a person will spin a cap? a whistle? a cap or yo-yo?</p>	<p><b>2.</b> What is the probability that a person will spin a stuffed animal? Explain. What is the probability that a person will win a prize?</p>
<p><b>3. WEATHER</b> The weather report says there is an 85% chance it will be very hot tomorrow. Should you get ready to use the air conditioner? Explain.</p>	<p><b>4. EATING HABITS</b> 7% of Americans are vegetarians. If you ask a random person whether he or she is a vegetarian, what is the probability that the person is not a vegetarian? Explain.</p>
<p><b>5. SCHOOL</b> Theresa is taking a multiple-choice test and does not know an answer. She can guess answer A, B, C, D, or E. What is the probability that Theresa will guess correctly? incorrectly?</p>	<p><b>6. NUMBER CUBE</b> You roll a number cube. How likely is it that you will roll a number less than 1? less than 7? Explain.</p>
<p><b>7. FOOD</b> Mrs. Phillips has 10 identical cans without labels. She knows that she had 1 can of peas, 5 cans of corn, 1 can of carrots, and 3 cans of beets. She opens one can. What is the probability it is carrots? corn or beets?</p>	<p><b>8.</b> In Exercise 7, how likely is it Mrs. Phillips will open a can of corn? a can of peas? Explain.</p>

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## 7-5

## Study Guide



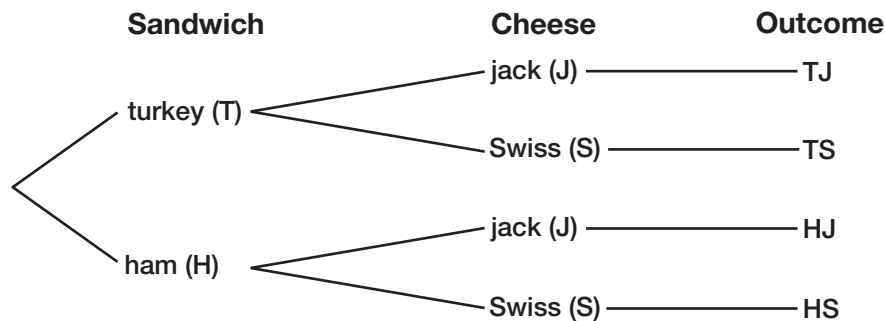
6-6.4, 6-1.1

## Constructing Sample Spaces

The **Fundamental Counting Principle** is another way to find the number of possible outcomes. This principle states that if there are  $m$  outcomes for a first choice and  $n$  outcomes for a second choice, then the total number of possible outcomes can be found by finding  $m \times n$ .

**Example 1** How many sandwiches are possible from a choice of turkey or ham with jack cheese or Swiss cheese?

Draw a tree diagram.



There are four possible sandwiches.

**Example 2** Using the Fundamental Counting Principle, how many sandwiches are possible from a choice of roast beef, turkey, or ham, with a choice of jack, cheddar, American, or Swiss cheese? Find the probability of choosing a ham with jack cheese sandwich.

There are twelve possible sandwiches. To determine the number of possible outcomes, multiply the number of first choices, 3, by the number of second choices, 4, to determine that there are 12 possible outcomes. So,  $P(\text{ham, jack}) = \frac{1}{12}$ , or 0.083, or 8.3%.

## Exercises

First use the Fundamental Counting Principle to determine the number of possible outcomes. Then, check your result and find the sample space by drawing a tree diagram. Finally, find the probability.

- buy a can or a bottle of grape or orange soda  
Find  $P(\text{bottle, grape})$ .
- toss a coin and roll a number cube  
Find  $P(4, \text{tails})$ .
- wear jeans or shorts with a blue, white, black, or red T-shirt. Find  $P(\text{jeans, white T-shirt})$ .





**7-5****Problem-Solving Practice**

6-6.4, 6-1.1

**Constructing Sample Spaces**

<p><b>1. OUTINGS</b> Olivia and Candace are deciding between Italian or Chinese food and then whether to go to a movie, walk in the park, or go for a bike ride. Using the Fundamental Counting Principle, how many choices do they have?</p>	<p><b>2. PETS</b> Terence is going to get a parrot. He can choose among a yellow, green, or multi-colored female or male parrot. Draw a tree diagram showing all the ways Terence can choose. What is the probability he will choose a yellow female?</p>
<p><b>3. CAKE</b> Julia is ordering a birthday cake. She can have a circular or rectangular chocolate or vanilla cake with chocolate, vanilla, or maple frosting. Draw a tree diagram showing all the possible ways Julia can order her cake. How many options does she have?</p>	<p><b>4. GAMES</b> Todd plays a game in which you toss a coin and roll a number cube. Use the Fundamental Counting Principle to determine the number of possible outcomes. What is <math>P(\text{heads, odd number})</math>?</p>
<p><b>5. SCHOOL</b> Melissa can choose two classes. Her choices are wood shop, painting, chorus, and auto shop. List all the ways two classes can be chosen.</p>	<p><b>6. SHOPPING</b> Kaya has enough allowance to purchase two new baseball caps from the five he likes. How many ways can he choose?</p>

**7-6****Explore Through Reading**

6-6.1, 6-1.7

***Making Predictions*****Get Ready for the Lesson**

Complete the Mini Lab at the top of page 394 in your textbook.

Write your answers below.

1. When working in a group, how did your group predict the number of students in your school with green eyes?
  
2. Compare your group's prediction with the class prediction. Which do you think is more accurate and why?

**Read the Lesson**

3. Write the three characteristics of a good sample.
  
4. Using the characteristics listed above, do you think that a classroom is a good sample of an entire school? Explain.
  
5. If the question of the survey is, "What is your favorite television program?" would you change the sample in any way? If so, how would you change it?
  
6. In Examples 1 and 2 on page 395, how is the prediction used?

**Remember What You Learned**

7. Work with a partner. Find the results of a survey that is of interest to you. For example, to find surveys on favorite TV programs, go to a search engine on the Internet and enter "survey TV programs." Choose one survey. Do you think the survey is a good survey? If so, why? If not, why not and how would you change it?

**7-6****Study Guide**

6-6.1, 6-1.7

**Making Predictions**

A **survey** is a method of collecting information. The group being surveyed is the **population**. To save time and money, part of the group, called a **sample**, is surveyed.

A good sample is:

- selected at **random**, or without preference,
- representative of the population, and
- large enough to provide accurate data.

**Example 1** Every sixth student who walked into the school was asked how he or she got to school.

- 1 What is the probability that a student at the school rode a bike to school?

$$P(\text{ride bike}) = \frac{\text{number of students that rode a bike}}{\text{number of students surveyed}}$$

$$= \frac{10}{40} \text{ or } \frac{1}{4}$$

So,  $P(\text{ride bike}) = \frac{1}{4}$ , 0.25, or 25%.

School Transportation	
Method	Students
walk	10
ride bike	10
ride bus	15
get ride	5

- 2 There are 360 students at the school. Predict how many bike to school.

Write a proportion. Let  $s$  = number of students who will ride a bike.

$$\frac{10}{40} = \frac{s}{360}$$

You can solve the proportion to find that of the 360 students, 90 will ride a bike to school.

**Example 2**

**SCHOOL** Use the following information and the table shown. Every tenth student entering the school was asked which one of the four subjects was his or her favorite.

1. Find the probability that any student attending school prefers science.
2. There are 400 students at the school. Predict how many students would prefer science.

Favorite Subject	
Subject	Students
Language Arts	10
Math	10
Science	15
Social Studies	5

**7-6****Homework Practice**

6-6.1, 6-1.7

**Making Predictions**

**QUIZ SHOW** For Exercises 1 and 2, use the following information.

On a quiz show, a contestant correctly answered 9 of the last 12 questions.

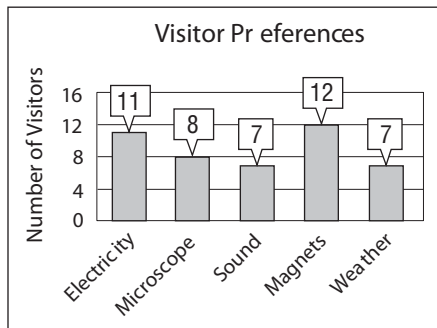
1. Find the probability of the contestant correctly answering the next question.
2. Suppose the contestant continues on the show and tries to correctly answer 24 questions. About how many questions would you predict the contestant to correctly answer?

**CHORES** For Exercises 3–6, use the table to predict the number of students out of 528 that would say each of the following was their least favorite chore.

3. clean my room
4. wash dishes
5. walk the dog
6. take out the garbage

Least Favorite Chore	
Chore	Number of Students
Clean my room	7
Take out the garbage	4
Wash dishes	5
Walk the dog	3
Vacuum or dust	5

7. **SCIENCE** Refer to the bar graph below. A science museum manager asked some of the visitors at random during a typical day which exhibit they preferred. If there are 630 visitors on a typical day, predict the number of visitors who prefer the magnets exhibit. Compare this to the number of visitors who prefer the weather exhibit.



# 7-6

## Problem-Solving Practice



6-6.1, 6-1.7

### Making Predictions

**MOVIES** For Exercises 1–3, use the table of results of Jeremy’s survey of favorite kinds of movies.

Favorite Movie Type	
Type	People
Drama	12
Foreign	3
Comedy	20
Action	15

**SLEEP** For Exercises 4–7, use the table of results of the Better Sleep Council’s survey of Americans to find the most important factors for good sleep.

Most Important Factors for Good Sleep	
Type	People
Good Mattress	32
Daily Exercise	20
Good Pillows	8
Healthy Diet	11
Other Factors	29

<p><b>1. MOVIES</b> How many people did Jeremy use for his sample?</p>	<p><b>2.</b> If Jeremy were to ask any person to name his or her favorite type of movie, what is the probability that it would be comedy?</p>
<p><b>3.</b> If Jeremy were to survey 250 people, how many would you predict would name comedy?</p>	<p><b>4. SLEEP</b> Predict how many people out of 400 would say that a good mattress is the most important factor.</p>
<p><b>5.</b> What is the probability that any person chosen at random would not say that a healthy diet is the most important factor?</p>	<p><b>6.</b> Suppose 250 people were chosen at random. Predict the number of people that would say good pillows are the most important factor.</p>
<p><b>7.</b> What is the probability that any person chosen at random would say that daily exercise is the most important factor for a good night sleep?</p>	<p><b>8. ICE CREAM</b> Claudia went to an ice cream shop to conduct a survey. She asked every tenth person who entered the shop to name his or her favorite dessert. Did Claudia select a good sample? Explain.</p>

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**7-7****Study Guide****Problem-Solving Investigation: Solve a Simpler Problem**

When solving problems, one strategy that is helpful is to *solve a simpler problem*. Using some of the information presented in the problem, you may be able to set up and solve a simpler problem.

You can use the *solve a simpler problem* strategy, along with the following four-step problem solving plan to solve a problem.

- 1 Understand** – Read and get a general understanding of the problem.
- 2 Plan** – Make a plan to solve the problem and estimate the solution.
- 3 Solve** – Use your plan to solve the problem.
- 4 Check** – Check the reasonableness of your solution.

**Example 1** **PUZZLES** Steven and Darshelle are putting together a 500 piece puzzle. So far they have 40% of the puzzle complete. How many pieces are left for them to fit into the puzzle?

**Understand** We know the total number of pieces in the puzzle and that 40% of the pieces are already put together in the puzzle. We need to find the number of pieces left to fit in the puzzle.

**Plan** Solve a simpler problem by finding  $100\% - 40\%$  or  $60\%$  of the 500 pieces. First find  $10\%$  of 500 and then use the result to find  $60\%$  of 500.

**Solve** Since  $10\%$ , or  $\frac{1}{10}$  of 500 is 50.  
So,  $60\%$ , or  $\frac{6}{10}$  of 500 is  $6 \times 50$  or 300.

Steven and Darshelle still have 300 pieces left to fit in the puzzle.

**Check** We know that  $40\%$  or 4 out of every 10 pieces of the puzzle are already put together in the puzzle. Since  $500 \div 10 \times 4 = 200$  pieces and  $200 + 300 = 500$ , the answer is correct.

**Exercises**

**SCHOLARSHIPS** Crosswood Elementary School received \$450 in donations for its scholarship fund. If  $30\%$  of the contributions were from local businesses, how much money did the local businesses contribute?

**7-7****Skills Practice**

6-1.1

***Problem-Solving Investigation: Solve a Simpler Problem***

**Solve.** Use the solve a simpler problem strategy.

- 1. SCHOOLS** A total of 350 students voted on whether a marlin or a panther should be the new school's mascot. If 30% of the students voted for the panther as the mascot, how many of the students voted for the panther?
  
- 2. READING** Over the summer, Maggie plans to read one book the first week and double the number of books each week for the next 5 weeks. How many books will Maggie read in the sixth week?
  
- 3. GEOGRAPHY** The total area of Michigan is 96,810 square miles. Of that, about 40% is water. About how much of Michigan's area is land?
  
- 4. ANIMALS** A spider travels at a speed of 1.17 miles per hour. At this rate, about how far can a spider travel in 3 hours?



**7-7****Homework Practice****Problem-Solving Investigation: Solve a Simpler Problem****Mixed Problem Solving**

Use the solve a simpler problem strategy to solve Exercises 1–3.

- ART** An artist plans to make 1 clay pot the first week and triple the number of clay pots each week for 5 weeks. How many clay pots will the artist make the fifth week?
- GEOGRAPHY** The total area of Wisconsin is 65,498 square miles. Of that, about 80% is land area. About how much of Wisconsin is not land area?
- SCIENCE** Sound travels through sea water at a speed of about 1,500 meters per second. At this rate, how far will sound travel in 2 minutes?

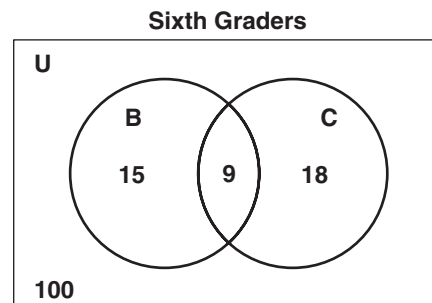
Use any strategy to solve Exercises 4–8. Some strategies are shown below.

Problem-Solving Strategies
<ul style="list-style-type: none"> <li>• Guess and check.</li> <li>• Solve a simpler problem.</li> </ul>



- MUSIC** Tanya scored 50 out of 50 points in her latest piano playing evaluation. She scored 42, 48, and 45 on previous evaluations. What score does she need on the next evaluation to have an average score of 45?

- EXERCISE** At the community center, 9 boys and 9 girls are playing singles table tennis. If each girl plays against each boy exactly once, how many games are played?
- CLOCK** The clock in the bell tower rings every half hour. How many times will it ring in one week?
- VENN DIAGRAMS** The Venn diagram shows information about the sixth graders in the school.



U = all sixth graders  
 B = sixth graders in the band  
 C = sixth graders in the chorus

How many more sixth graders in the school do not participate in band or chorus than do participate in band or chorus?

- MONEY** Kono wants to give \$69 to charity. He will give each of 3 charities an equal amount of money. How much money will each charity receive?

**7-7**

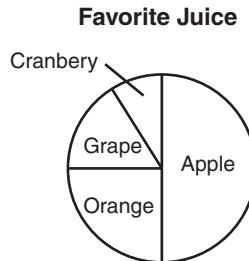
**Problem-Solving Practice**



**Problem-Solving Investigation: Solve a Simpler Problem**

**1. FOOD** Is \$8 enough money to buy a dozen eggs for \$1.29, one pound of ground beef for \$3.99, and a gallon of milk for \$2.09? Explain.

**2. SURVEY** The circle graph shows the results of a favorite juice survey. What percents best describe the data?



**3. MONEY** A total of 32 students are going on a field trip. Each student must pay \$4.75 for travel and \$5.50 for dining. About how much money should the teacher collect in all from the students?

**4. TRAVEL** Mr. Ishikawa left Houston at 3:00 p.m. and arrived in Dallas at 8:00 p.m., driving a distance of approximately 240 miles. During his trip, he took a one-hour dinner break. What was Mr. Ishikawa’s average speed?

**5. BAKE SALE** Oakdale Middle School received 240 contributions for its bake sale. If 30% of the contributions were pies, how many pies did the school receive?

**6. BABYSITTING** About how much more did Cara earn babysitting in 2008 than in 2007?

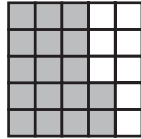
<b>Cara’s Babysitting Earnings</b>	
<b>Year</b>	<b>Earnings</b>
2006	\$98.50
2007	\$149.00
2008	\$218.75



# Chapter 7 Test

## Mastering the SC Standards

- 1** What percent of the figure below is shaded?



- (A) 18%  
 (B) 36%  
 (C) 68%  
 (D) 80%

6-2.1

- 2** Lian has a garden with 16 plants. There are 12 yellow jessamine flowers and 4 sunflowers. What percentage of the plants are yellow jessamines?

- (A) 33%  
 (B) 50%  
 (C) 60%  
 (D) 75%

6-2.1

- 3** In Jamal's class,  $\frac{4}{5}$  of students brought cans for the food drive. What percentage of the class brought cans?

- (A) 60%  
 (B) 75%  
 (C) 80%  
 (D) 86%

6-2.1

- 4** In a random survey of 50 students, each student was asked to name his or her favorite sport. The chart below shows the responses. Using this information, how many of the 800 students in the school would choose baseball as their favorite sport?

Favorite Sport	Number of Students
Basketball	12
Football	16
Golf	6
Baseball	5
Hockey	8
Track	3

- (A) 48  
 (B) 80  
 (C) 192  
 (D) 256

6-6.1

- 5** Emma got a 28% discount on a dress that normally sold for \$70. Which of the following is a good estimate of how much Emma saved?

- (A) \$2.00  
 (B) \$3.00  
 (C) \$21.00  
 (D) \$28.00

6-2.1



# Chapter 7 Test (continued)

## Mastering the SC Standards

For questions 6 and 7, use the information in the chart below.

Awan is making a circle graph of his monthly budget. He puts the information into a chart.

Awan's Budget	
Rent	40%
Food	15%
Car	10%
Utilities	20%
Savings	15%

**6** What fraction of Awan's circle graph would he shade for the rent section?

- (A)  $\frac{1}{10}$
- (B)  $\frac{3}{20}$
- (C)  $\frac{1}{5}$
- (D)  $\frac{2}{5}$

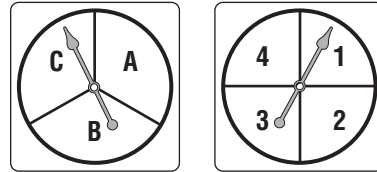
6-2.1

**7** What decimal part of Awan's monthly budget does he spend on food?

- (A) 0.15
- (B) 0.40
- (C) 1.5
- (D) 15.0

6-2.1

**8** Two spinners are shown below.

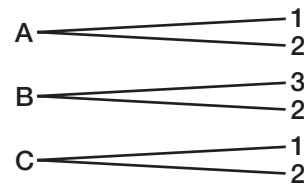


Spinner 1

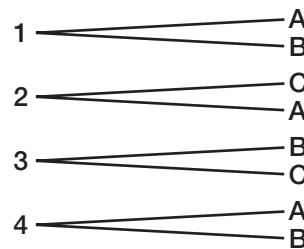
Spinner 2

Which tree diagram shows all the possible outcomes of spinning both spinners?

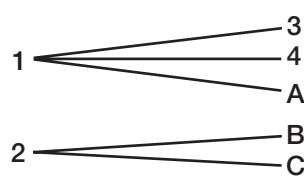
(A) SPINNER 1                      SPINNER 2



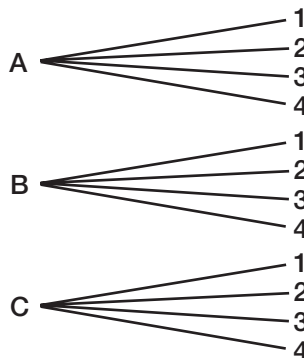
(B) SPINNER 1                      SPINNER 2



(C) SPINNER 1                      SPINNER 2



(D) SPINNER 1                      SPINNER 2



6-6.4



# Chapter 8 Test

## Mastering the SC Standards (optional)

- 1** Keith brought a 2-liter bottle of juice to a party. What is this amount in milliliters?

(A) 200 mL  
 (B) 20 mL  
 (C) 2 mL  
 (D) 2,000 mL

**Preparation for 7-5.5, 6-1.7**

- 2** On Saturday, Rachel practiced playing her violin from 9:00 A.M. to 11:00 A.M. She practiced again in the afternoon from 1:30 P.M. to 2:30 P.M. How many total minutes did Rachel practice her violin on Saturday?

(A) 60 min  
 (B) 120 min  
 (C) 160 min  
 (D) 180 min

**6-1.7**

- 3** Chloe used 3 cups of flour in a recipe. How many ounces of flour did she use?

(A) 24 oz  
 (B) 32 oz  
 (C) 40 oz  
 (D) 48 oz

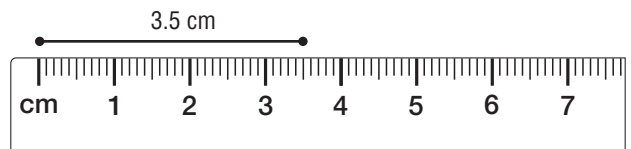
**Preparation for 7-5.5, 6-1.7**

- 4** Congaree National Park is home to some tall trees. One of them is the National Champion Loblolly Pine, which is about 168 feet tall. How tall is it in yards?

(A) 46 yards  
 (B) 51 yards  
 (C) 56 yards  
 (D) 504 yards

**Preparation for 7-5.5, 6-1.7**

- 5** Measure the line below in centimeters using the ruler. What is its length in meters?



(A) 0.035 meters  
 (B) 0.35 meters  
 (C) 3 meters  
 (D) 4 meters

**Preparation for 7-5.5, 6-1.7**

- 6** About how many centimeters are in 8 inches?

(A) 20  
 (B) 24  
 (C) 80  
 (D) 96

**Preparation for 7-5.5, 6-1.7**



# Chapter 8 Test (continued)

## Mastering the SC Standards (optional)

- 7** Which is the most reasonable temperature of the water in a pot that will be used to cook spaghetti?

(A) 5°C  
 (B) 10°C  
 (C) 100°C  
 (D) 200°C

**6-1.7**

- 8** Toshiro plans to compete in a 10-kilometer race. What is the distance of the race in meters?

(A) 500 m  
 (B) 1,000 m  
 (C) 5,000 m  
 (D) 10,000 m

**Preparation for 7-5.5, 6-1.7**

- 9** José makes a new rectangle by doubling the length of the previous rectangle he made. The chart shows the length, width, perimeter, and area for the first four rectangles he made.

Width (ft)	Length (ft)	Perimeter (ft)	Area (ft <sup>2</sup> )
4	6	20	24
4	12	32	48
4	24	56	96
4	48	104	192

If José continues the pattern, what will be the perimeter of the next rectangle he makes?

(A) 4 ft  
 (B) 96 ft  
 (C) 200 ft  
 (D) 384 ft

**6-3.1, 6-1.8**

- 10** Darnel buys a guitar case for his guitar. The guitar is 42 inches long. What is 42 inches expressed in feet and inches?

(A) 2 ft 6 in.  
 (B) 3 ft 6 in.  
 (C) 2 ft 3 in.  
 (D) 2 ft 4 in.

**Preparation for 7-5.5, 6-1.7**

## 9

**Anticipation Guide****Geometry: Angles and Polygons****STEP 1** *Before you begin Chapter 9*

- Read each statement.
- Decide whether you Agree (A) or Disagree (D) with the statement.
- Write A or D in the first column OR if you are not sure whether you agree or disagree, write NS (Not Sure).

STEP 1 A, D, or NS	Statement	STEP 2 A or D
	1. The most common unit of measure for angles is the degree.	
	2. Two angles whose sum is $180^\circ$ are complementary angles.	
	3. A protractor is used to measure angles and to draw angles of a given measure.	
	4. Vertical angles are angles opening either up or down.	
	5. Angles with the same measure are called similar angles.	
	6. An obtuse triangle is any triangle containing one obtuse angle.	
	7. A triangle can contain at most one acute angle.	
	8. Triangles, squares, and rectangles are all examples of two-dimensional figures.	
	9. Figures that have the same shape but different size are called congruent figures.	
	10. All squares are similar figures.	

**STEP 2** *After you complete Chapter 9*

- Reread each statement and complete the last column by entering an A (Agree) or a D (Disagree).
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a separate sheet of paper to explain why you disagree. Use examples, if possible.

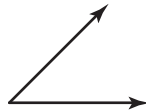
## 9

## Family Activity

## State Test Practice

Fold the page along the dashed line. Work each problem on another piece of paper. Then unfold the page to check your work.

1. Using the L shaped right angle which has a measure of  $90^\circ$  as a benchmark angle, estimate the measure of the angle below.



- A  $110^\circ$   
 B  $100^\circ$   
 C  $20^\circ$   
 D  $45^\circ$

**Fold here.**

**Solution**

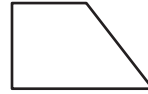
1. *Hint: You can use the corner of a piece of paper to visualize a right, or  $90^\circ$ , angle.*

The angle above is acute, or less than  $90^\circ$ , so Options A and B can be eliminated.

If you draw in a right angle, the current angle appears to be about half of the right angle. Of the two remaining options,  $20^\circ$  is less than one-third of  $90^\circ$ , and  $45^\circ$  is half of  $90^\circ$ . It makes sense that the angle is approximately  $45^\circ$ .

The answer is **D**.

2. Which of the following is not true of trapezoids?



- A Trapezoids have at least one pair of parallel lines.  
 B Trapezoids must contain at least one right angle.  
 C Trapezoids are quadrilaterals.  
 D The interior angles of a trapezoid must total  $360^\circ$ .

**Solution**

2. *Hint: A trapezoid, by definition, is a quadrilateral with at least one pair of parallel sides.*

From the definition of a trapezoid, we know that it must have four sides and that at least one pair of sides must be parallel, so Options A and C are true. We also know that the sum of the angles of a quadrilateral is always  $360^\circ$ , so Option D is true.

The trapezoid shown in the diagram has two  $90^\circ$  angles, but the presence of  $90^\circ$  angles is not included in the definition. I can draw a quadrilateral that meets the definition of a trapezoid that does not have  $90^\circ$  angles (see below), so Option B is not true.



The answer is **B**.



**9-3****Explore Through Reading**

6-4.9, 6-1.3

**Angle Relationships****Get Ready for the Lesson**

Complete the Mini Lab at the top of page 479 in your textbook.

Write your answers below.

1. What do you notice about the measure of  $\angle 1$  and  $\angle 3$ ?  $\angle 2$  and  $\angle 4$ ?
2. **MAKE A CONJECTURE** Describe the relationship between opposite angles formed by intersecting lines.
3. Find the sum of the measures of  $\angle 3$  and  $\angle 4$  and of  $\angle 2$  and  $\angle 3$ .
4. What type of angle is formed by  $\angle 3$  and  $\angle 4$ ?  $\angle 2$  and  $\angle 3$ ?
5. **MAKE A CONJECTURE** Describe the relationship between the angles that form a straight angle.

**Read the Lesson**

6. In Example 1, what relationship exists between the angles labeled  $x^\circ$  and  $140^\circ$ ?
7. Given the measure of one of two supplementary angles, explain how you can use the definition of supplementary angles to find the missing angle measure.

**Remember What You Learned**

8. Work with a partner. Each of you should draw a pair of complementary angles and a pair of supplementary angles. In each set of drawings, label one of the angles with its measure and label the other angle ' $x^\circ$ .' Switch drawings with your partner and find the missing angle measure in each drawing.

# 9-3

## Study Guide



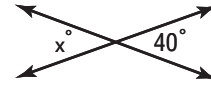
### Angle Relationships

**Vertical angles** are the opposite angles formed by intersecting lines. Vertical angles are **congruent angles**, or angles with the same measure.

**Example 1** Find the value of  $x$  in the figure at the right.

The angle labeled  $x^\circ$  and the angle labeled  $40^\circ$  are vertical angles. Therefore, they are congruent.

So, the value of  $x$  is 40.

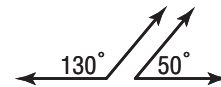


Two angles are **complementary** if the sum of their measures is  $90^\circ$ .  
Two angles are **supplementary** if the sum of their measures is  $180^\circ$

**Example 2** Classify the pair of angles at the right as **complementary**, **supplementary**, or **neither**.

$$130^\circ + 50^\circ = 180^\circ$$

The angles are supplementary.



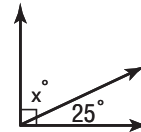
**Example 3** Find the value of  $x$  in the figure at the right.

Since the angles form a right angle, they are complementary.

$$x^\circ + 25^\circ = 90^\circ \quad \text{Definition of complementary angles}$$

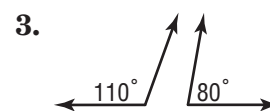
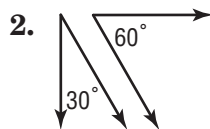
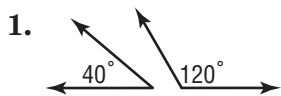
$$65^\circ + 25^\circ = 90^\circ \quad \text{THINK What measure added to } 25^\circ \text{ equals } 90^\circ?$$

So, the value of  $x$  is 65.

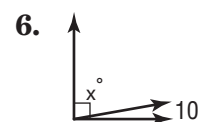
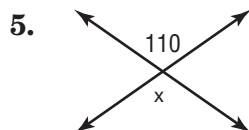
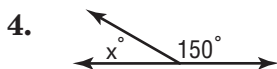


### Exercises

Classify each pair of angles as **complementary**, **supplementary**, or **neither**.



Find the value of  $x$  in each figure.



**9-3**

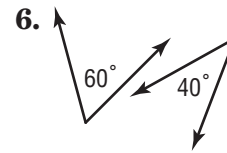
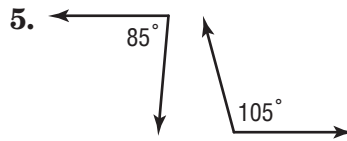
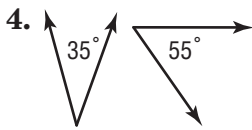
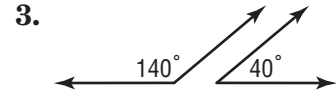
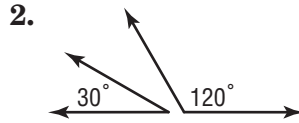
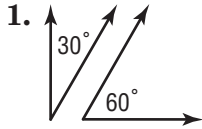
**Homework Practice**



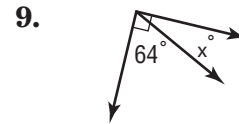
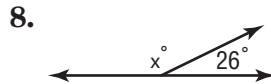
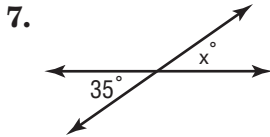
6-4.9, 6-1.3

**Angle Relationships**

Classify each pair of angles as *complementary*, *supplementary*, or *neither*.



Find the value of  $x$  in each figure.



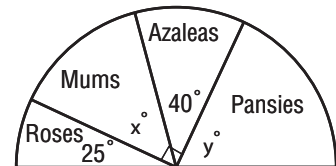
10. Angles  $A$  and  $B$  are complementary. Find  $m\angle B$  if  $m\angle A = 71^\circ$ .

11. Angles  $C$  and  $D$  are supplementary. Find  $m\angle C$  if  $m\angle D = 88^\circ$ .

**GARDENS** A semicircular garden is divided into four sections as show.

12. What is the value of  $x$ ?

13. What is the value of  $y$ ?



**9-3**

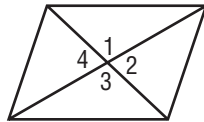
**Problem-Solving Practice**



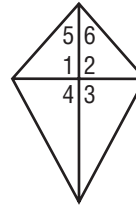
**Angle Relationships**

**KITES** For Exercises 1–6, use the designs shown below. They are the designs of two different kites that Steve is going to build.

**Kite 1**



**Kite 2**



<p><b>1.</b> In Kite 1, if the measure of <math>\angle 1</math> is <math>95^\circ</math>, what is the measure of <math>\angle 3</math>? Explain.</p>	<p><b>2.</b> In Kite 1, if the measure of <math>\angle 2</math> is <math>80^\circ</math>, what is the measure of angle <math>\angle 3</math>? Explain.</p>
<p><b>3.</b> In Kite 1, name two pairs of supplementary angles.</p>	<p><b>4.</b> In Kite 2, if the measure of <math>\angle 2</math> is <math>90^\circ</math>, what is the measure of <math>\angle 4</math>? Explain.</p>
<p><b>5.</b> In Kite 2, <math>\angle 5</math> and <math>\angle 6</math> are complementary angles. If the measure of <math>\angle 5</math> is <math>45^\circ</math>, what is the measure of <math>\angle 6</math>?</p>	<p><b>6.</b> In Kite 2, what is the sum of the measures of <math>\angle 1</math>, <math>\angle 2</math>, <math>\angle 3</math>, and <math>\angle 4</math>? Explain.</p>

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## 9-6

## Study Guide



6-1.1, 6-1.8

### Problem-Solving Investigation: Draw a Diagram

When solving problems, one strategy that is helpful is to *draw a diagram*. A problem may often describe a situation that is easier to solve visually. You can draw a diagram of the situation, and then use the diagram to solve the problem.

You can draw a diagram, along with the following four-step problem solving plan to solve a problem.

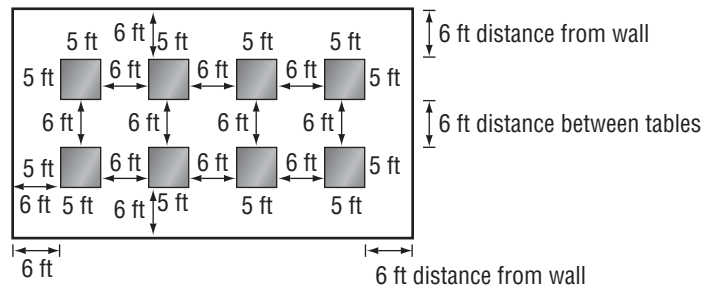
- 1 Understand** – Read and get a general understanding of the problem.
- 2 Plan** – Make a plan to solve the problem and estimate the solution.
- 3 Solve** – Use your plan to solve the problem.
- 4 Check** – Check the reasonableness of your solution.

**Example** **LIBRARY** The school library is putting tables in an open area that is 28 feet by 50 feet. Each table is a square with sides measuring 5 feet, and the tables must be 6 feet apart from each other and the wall. How many tables can fit in this area?

**Understand** You know all the dimensions. You need to find how many tables will fit in this area.

**Plan** Draw a diagram to see how many tables will fit.

**Solve**



The diagram shows that 8 tables will fit in this area in the library.

**Check** Make sure the dimensions meet the requirements. The distance across is 50 feet and the distance down is 28 feet. So, the answer is correct.

### Exercises

**PICTURE FRAME** La Tasha is decorating a picture frame by gluing gem stones around the frame. The picture frame is 7 inches by  $5\frac{1}{2}$  inches. Each gem stone is  $\frac{1}{2}$ -inch wide and La Tasha glues them 1 inch apart and 1 inch from the edge. How many gem stones can La Tasha fit on the frame?



**9-6****Homework Practice**

6-1.1, 6-1.8

**Problem-Solving Investigation: Draw a Diagram****Mixed Problem Solving**

Use the draw a diagram strategy to solve Exercises 1 and 2.

- 1. RUNNING** Five runners were far ahead in the marathon. Juanita crossed the finish line after Owen and Molly. Molly was first. Juanita was between Greta and Owen. Kenji was last. In what order did the runners cross the finish line?
- 2. PLANTS** A nursery is planting seedlings in a plot that is 10 feet by 14 feet. How many seedlings will fit if each seedling is in a 1-foot square peat pot and each peat pot needs to be planted 3 feet apart from another?

Use any strategy to solve Exercises 3–7. Some strategies are shown below.

**Problem-Solving Strategies**

- Guess and check.
- Make an organized list.
- Look for a pattern.
- Draw a diagram.

- 3. PATTERNS** Complete the pattern: 2, 3, 5, 9,   ,   ,   .
- 4. ANIMALS** Jacy is building a fence to create a hexagonal dog pen. Each of the six sides needs four posts. How many posts are needed?

- 5. FOOD** A lunch shop offers 2 kinds of soups, 3 kinds of sandwiches, and 3 kinds of beverages. How many combinations of one soup, one sandwich, and one beverage are possible?

- 6. GEOMETRY** An official doubles tennis court has a length of 78 feet and a width of 36 feet. How many times greater is the length than the width of the court to the nearest tenth?

- 7. BASKETBALL** The table gives the frequency of free throw shots made by a team over the course of five games. Find the mean number of free throw shots made by the team for games 1–5.

Game	Tally	Frequency
1		3
2		5
3		7
4		5
5		1

**9-6****Problem-Solving Practice**

6-1.1, 6-1.8

**Problem-Solving Investigation: Draw a Diagram**

**1. TIME** School is out at 3:30 P.M., swimming practice is  $1\frac{1}{2}$  hours, dinner takes 30 minutes, and you go to bed at 9:30 P.M. How much free time will you have if you study for 2 hours for a math exam?

**2. POPULATION** Did more people live in Austin and Fort Worth combined than in Dallas? Explain.

Five Largest Texas Cities	
City	Population
Houston	2,012,626
San Antonio	1,236,249
Dallas	1,210,393
Austin	681,804
Fort Worth	603,337

**3. GEOMETRY** A kite has two pairs of congruent sides. If two sides are 56 centimeters and 34 centimeters, what is the perimeter of the kite?

**4. MONEY** Chad has 8 coins in his pocket that total \$1.85. He only has quarters and dimes. How many of each coin does Chad have?

**5. PATTERNS** A number is doubled and then 9 is subtracted. If the result is 15, what was the original number?

**6. FURNITURE** A furniture store sells one type of sofa in tan, navy blue, red, or plaid. It is also available with or without a sofa bed. In how many different ways can this sofa be ordered?



**9-7****Explore Through Reading**6-4.7, 6-4.8,  
6-1.7**Similar and Congruent Figures****Get Ready for the Lesson**

Read the introduction at the top of page 502 in your textbook.  
Write your answers below.

1. How many different-sized stars are displayed?
2. Compare the size and shape of these triangles.

**Read the Lesson**

3. Tell whether each characteristic is true for congruent and similar figures.  
Write *congruent*, *similar*, or *both*.
  - a. have the same shape
  - b. may or may not have the same size
  - c. must have the same size
4. Look up the definition of *correspond* in the dictionary. Explain how it relates to the definition of *corresponding sides*.

**Remember What You Learned**

5. Complete the following table. Draw an original figure in the box on the left. Then, for the original figure, draw a figure that is similar, a figure that is congruent, and a figure that is neither similar or congruent.

Original Figure	Similar	Congruent	Similar

# 9-7

## Study Guide



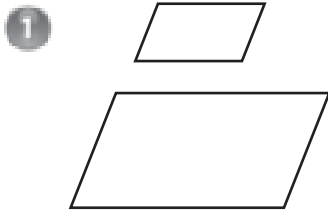
6-4.7, 6-4.8,  
6-1.7

### Similar and Congruent Figures

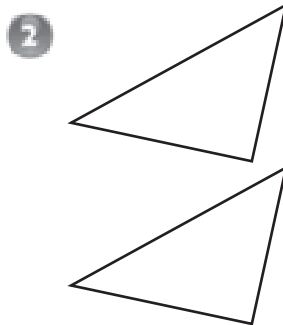
Figures that have the same size and shape are **congruent figures**.

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

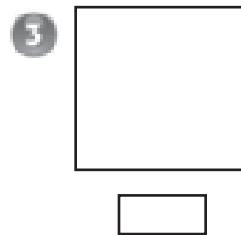
**Examples** Tell whether each pair of figures is *similar*, *congruent*, or *neither*.



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

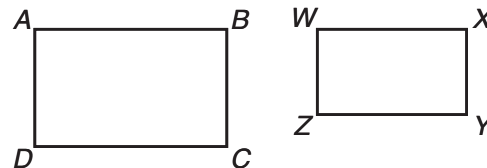


The triangles have the same shape and size, so they are congruent.



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

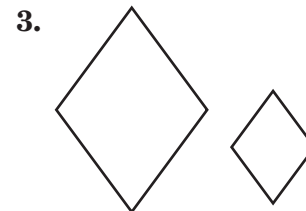
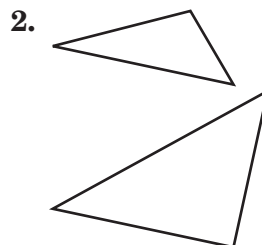
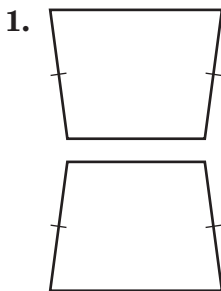
**Example 4** The rectangles at the right are similar. What side of rectangle  $ABCD$  corresponds to side  $ZY$ ?



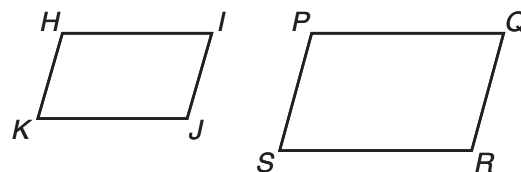
**Corresponding sides** represent the same side of similar figures. So, side  $DC$  corresponds to side  $ZY$ .

### Exercises

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



For Exercises 4 and 5, refer to the similar parallelograms at the right.



- What side of parallelogram  $HIJK$  corresponds to side  $QR$ ?
- What side or parallelogram  $PQRS$  corresponds to side  $HK$ ?

**9-7**

**Homework Practice**

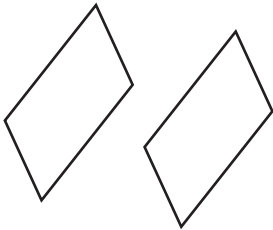


6-4.7, 6-4.8,  
6-1.7

**Similar and Congruent Figures**

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

1.



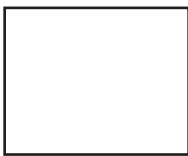
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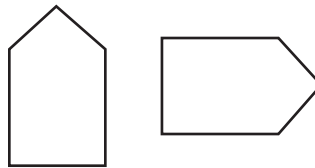
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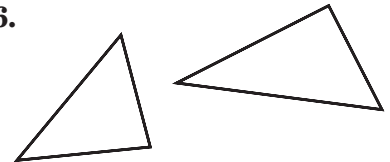
4.



5.

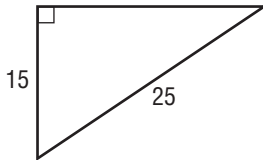


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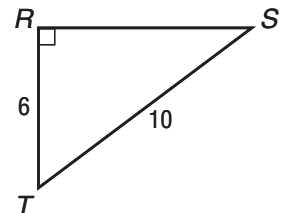
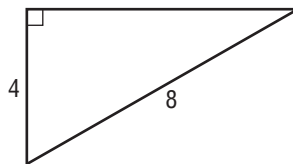


State whether each triangle is similar to triangle *RST*.

7.

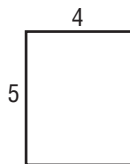


8.

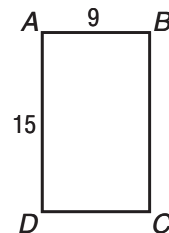
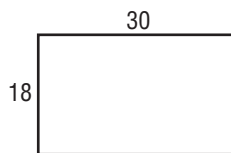


State whether each rectangle is similar to rectangle *ABCD*.

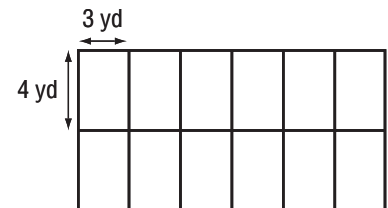
9.



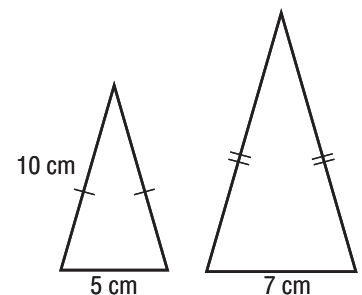
10.



11. **GARDENING** A community garden is sectioned off into 12 congruent individual plots with rope as shown in the diagram. Find the total length of rope used. Then find the total length of rope needed if the garden is sectioned off into six congruent rectangles.



12. **MOBILE** Anh is making a mobile. She will make two sizes of similar triangles from colored wire as shown in the diagram. Find the total length of wire needed to make the larger triangle.



**9-7**

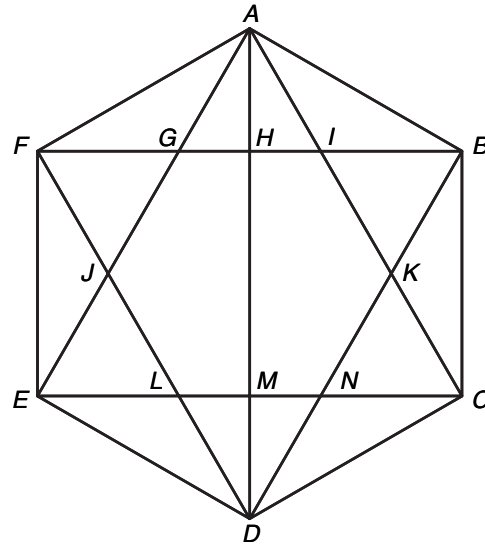
**Problem-Solving Practice**



6-4.7, 6-4.8,  
6-1.7

**Similar and Congruent Figures**

**TILING** For Exercises 1–6, use the following information. Amy is using the design at the right to tile a hexagon-shaped floor. Before deciding which colors to use, she wants to identify all similar and congruent shapes.



<p>1. Suppose Amy cut a red tile the size of <math>\triangle ACE</math>. What other triangle in the design would that tile fit? In other words, what triangle is congruent to <math>\triangle ACE</math>?</p>	<p>2. Amy is looking for congruent quadrilaterals that are neither squares nor rectangles. Can you identify them?</p>
<p>3. Find a triangle that is similar to but not congruent to <math>\triangle BCK</math>.</p>	<p>4. Amy’s friend suggested that she cut four congruent white triangular tiles and place them in the design so that they are not overlapping and do not share common sides. Is that possible? If so, name the four triangles.</p>
<p>5. Can you help Amy find a shape that is either similar or congruent to <math>AKDJ</math>?</p>	<p>6. Is the hexagon <math>GIKNLJ</math> similar to <math>ABCDEF</math>? How do you know?</p>

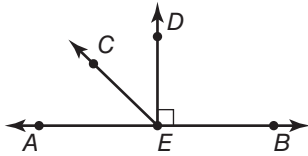
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# Chapter 9 Test

## Mastering the SC Standards

Use the figure below to answer questions 1 and 2.



**1** Which two angles are complementary?

- (A)  $\angle BED$  and  $\angle DEC$
- (B)  $\angle BED$  and  $\angle DEA$
- (C)  $\angle BEC$  and  $\angle AEC$
- (D)  $\angle DEC$  and  $\angle CEA$

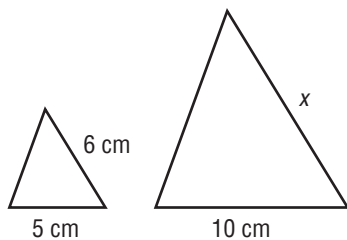
6-4.9

**2** Which two angles are supplementary?

- (A)  $\angle BED$  and  $\angle DEC$
- (B)  $\angle BED$  and  $\angle CEA$
- (C)  $\angle BEC$  and  $\angle AEC$
- (D)  $\angle DEC$  and  $\angle CEA$

6-4.9

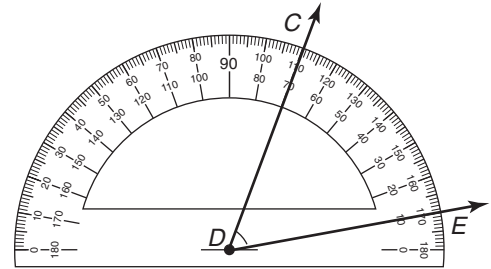
**3** These two triangles are similar. What is the value of  $x$ ?



- (A) 11 cm
- (B) 12 cm
- (C) 13 cm
- (D) 14 cm

6-4.7

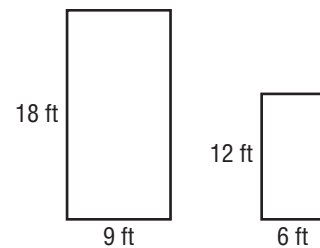
**4** What is the measure of  $\angle D$  to the nearest degree?



- (A)  $25^\circ$
- (B)  $60^\circ$
- (C)  $75^\circ$
- (D)  $90^\circ$

6-4.9

**5** The rectangles shown below are similar.



What is the ratio of a side length of the smaller rectangle to the corresponding side length of the larger rectangle?

- (A) 2 to 3
- (B) 4 to 5
- (C) 5 to 3
- (D) 6 to 5

6-4.7



# Chapter 9 Test (continued)

## Mastering the SC Standards

- 6** The palmetto tree was added to the South Carolina state flag on January 28, 1861. Which term best describes the shape of the South Carolina flag?



- (A) trapezoid  
 (B) quadrilateral  
 (C) rhombus  
 (D) square

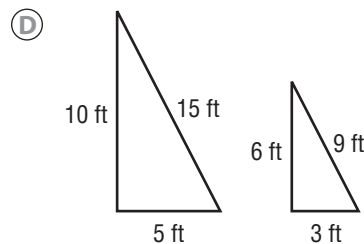
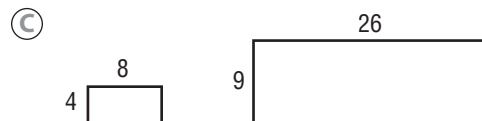
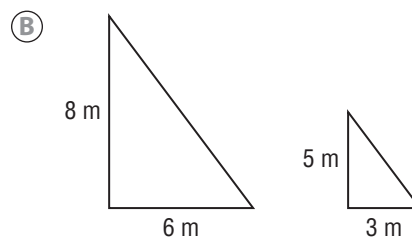
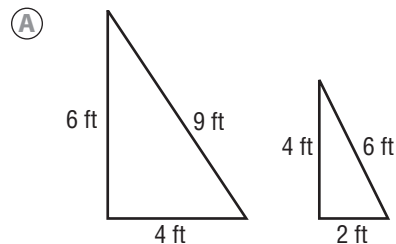
**6-4.2**

- 7** Paulo is sketching a room for his beginning architecture class. In his drawing,  $\angle A$  measures  $60^\circ$ .  $\angle B$  is supplementary to  $\angle A$ . What is the measure of  $\angle B$ ?

- (A)  $30^\circ$   
 (B)  $60^\circ$   
 (C)  $120^\circ$   
 (D)  $300^\circ$

**6-4.9**

- 8** Which of the following pairs of shapes are similar figures?



**6-4.8**

**10****Anticipation Guide****Measurement: Perimeter, Area, and Volume****STEP 1** *Before you begin Chapter 10*

- Read each statement.
- Decide whether you Agree (A) or Disagree (D) with the statement.
- Write A or D in the first column OR if you are not sure whether you agree or disagree, write NS (Not Sure).

<b>STEP 1</b> A, D, or NS	<b>Statement</b>	<b>STEP 2</b> A or D
	1. The area of a rectangle will double if the length and width are both doubled.	
	2. The perimeter of a rectangle can be found by adding two times the length and two times the width.	
	3. The circumference of a circle is the distance around the circle.	
	4. The radius of a circle is two times the diameter.	
	5. To find the area of a parallelogram, multiply the length of the longer side by the length of the shorter side.	
	6. In the formula for the area of a triangle, $A = \frac{1}{2}bh$ , $b$ is the length of the base and $h$ is the height of the triangle.	
	7. Volume is measured in cubic units.	
	8. A rectangular prism with a volume of 42 must have dimensions of 2, 3, and 7.	
	9. To find the surface area of a rectangular prism, multiply the area of the base by 6 (the number of faces of the prism).	
	10. A possible unit for the surface area of a rectangular prism is square inches.	

**STEP 2** *After you complete Chapter 10*

- Reread each statement and complete the last column by entering an A (Agree) or a D (Disagree).
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a separate sheet of paper to explain why you disagree. Use examples, if possible.

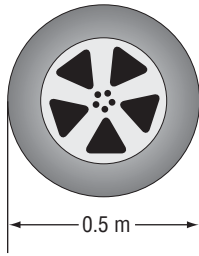
## 10

## Family Activity

## State Test Practice

Fold the page along the dashed line. Work each problem on another piece of paper. Then unfold the page to check your work.

1. Emilio knows that his car tire has a diameter of 0.5 m. He wants to know how far the wheel will go in three complete spins. How can he find this?



- A He can multiply the diameter by  $\pi$  and then by 3.  
 B He can divide the diameter by  $\pi$  and then multiply by 3.  
 C He can multiply the diameter by 3.  
 D He cannot determine how far the wheel will go in 3 turns.

**Fold here.**

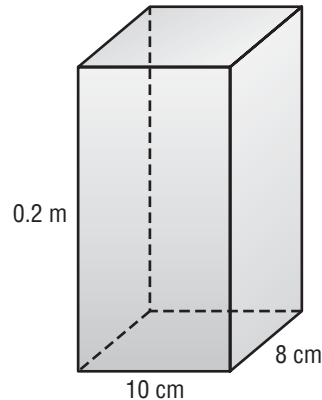
**Solution**

1. *Hint: The circumference of a circle is the distance around the circle. The formula for circumference is  $\pi d$  or  $2\pi r$ .*

Each point around the circle will touch the ground once in a complete spin, so the circumference of the circle is the distance the tire will go in one spin. The circumference can be found by multiplying the diameter by pi ( $\pi$ ), so for each spin, the tire will travel  $\pi d$  meters. For three spins, the circumference should be multiplied by three, or  $3\pi d$ . The option that describes this process is Option A, or the diameter multiplied by pi ( $\pi$ ) and then multiplied by 3.

The answer is **A**.

2. Find the volume of the following rectangular prism.



- A  $V = 1,600 \text{ cm}^2$   
 B  $V = 1,600 \text{ cm}^3$   
 C  $V = 16 \text{ cm}^2$   
 D  $V = 16 \text{ cm}^3$

**Solution**

2. *Hint: Before you calculate the volume, make sure that all of the dimensions are converted to the same units.*

The height should be converted to centimeters so that the units are consistent. There are 100 cm in a meter, so 0.2 m is equivalent to 20 cm.

The volume of a rectangular prism can be calculated using this formula:

$$V = \ell \times w \times h.$$

In this case the volume is:

$$V = 8 \text{ cm} \times 10 \text{ cm} \times 20 \text{ cm} = 1600 \text{ cm}^3$$

Notice that the units are cubed, because you are multiplying  $\text{cm} \times \text{cm} \times \text{cm} = \text{cm}^3$ . The units for volume will always be cubic.

The answer is **B**.



**10-1****Explore Through Reading**

6-5.5, 6-1.7

**Perimeter****Get Ready for the Lesson**

Complete the Mini Lab at the top of page 522 in your textbook.

Write your answers below.

1. Write the ratio  $\frac{\text{distance around}}{\text{side length}}$  in simplest form for squares A through D.  
What do you notice about these ratios?

2. **MAKE A CONJECTURE** Write an expression for the distance around a square that has a side length of  $x$  centimeters.

**Read the Lesson**

3. The formula for the perimeter of a square is  $P = 4s$ . What does that tell you about the sides of a square?
4. The perimeter of a rectangle is equal to  $2\ell + 2w$ . What does the formula tell you about the lengths and widths of a rectangle?
5. Can you use the formula for the perimeter of a rectangle to find the perimeter of a square? Why or why not?

**Remember What You Learned**

6. Think of a way to remember the formula for the perimeter of a rectangle,  $P = 2\ell + 2w$ . For example, use the letters of the variables as the first letters of words in a sentence.

# 10-1 Study Guide



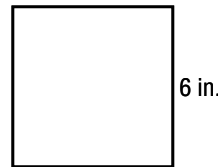
## Perimeter

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
Square	The perimeter $P$ of a square is four times the measure of any of its sides $s$ .	$P = 4s$
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 $w$ .	$P = \ell + \ell + w + w$ $P = 2\ell + 2w$

### Example 1 Find the perimeter of the square.

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

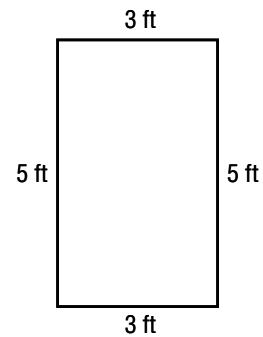


The perimeter of the square is 24 inches.

### Example 2 Find the perimeter of the rectangle.

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

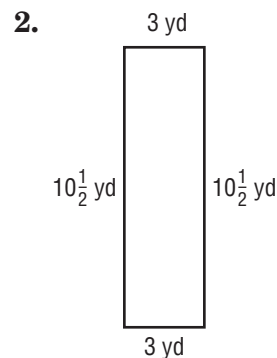
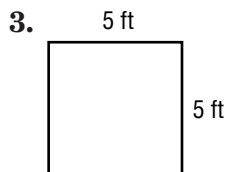
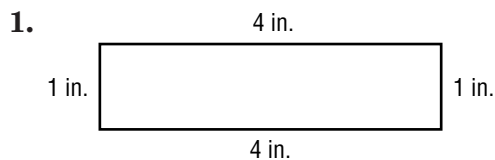
$P = 2\ell + 2w$  Write the formula.  
 $P = 2(5) + 2(3)$  Replace  $\ell$  with 5 and  $w$  with 3.  
 $P = 10 + 6$  Multiply.  
 $P = 16$  Add.



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

### Exercises

Find the perimeter of each square or rectangle.

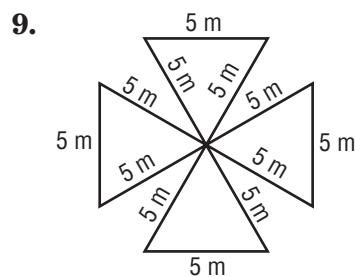
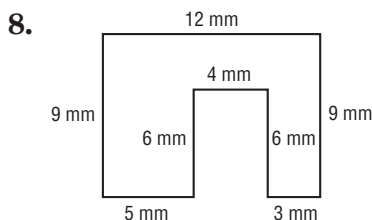
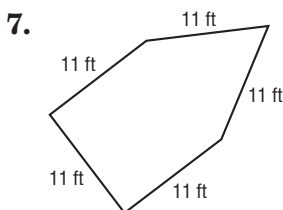
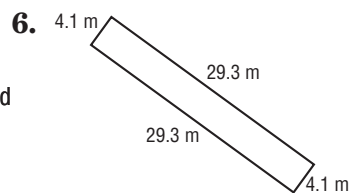
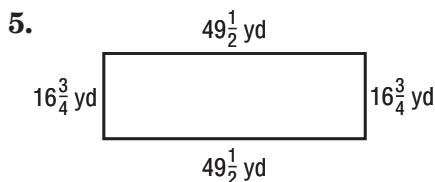
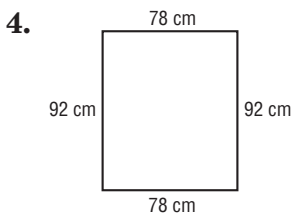
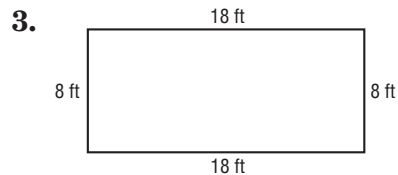
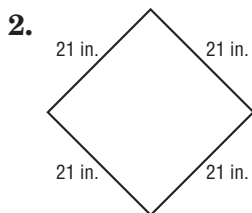
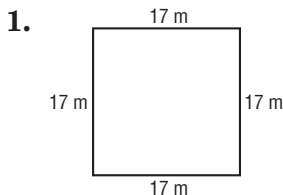


# 10-1 Homework Practice

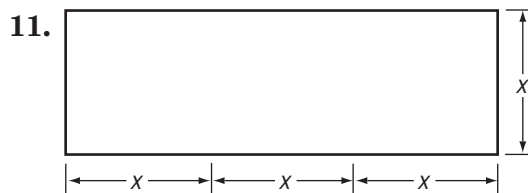
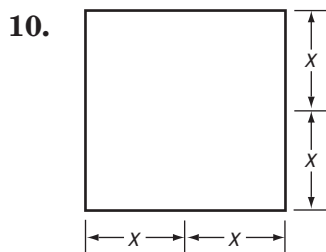


## Perimeter

Find the perimeter of each figure.

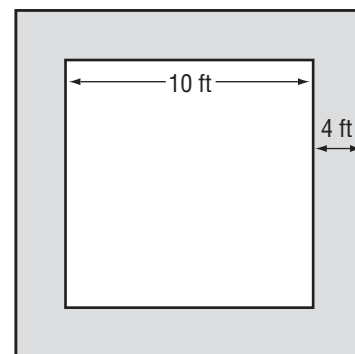


How many segments  $x$  units long are needed for the perimeter of each figure?



12. **POOLS** A 4-foot wide walkway surrounds a 10-foot square wading pool. What is the perimeter of the walkway?

13. **RUGS** Jan wants to sew a fringe border on all sides of a rectangular rug for her bedroom. The rug is 3.4 feet wide and 5.5 feet long. How many feet of fringe does she need?



**10-1****Problem-Solving Practice**

6-5.5, 6-1.7

**Perimeter**

<p><b>1. GEOGRAPHY</b> The state of Colorado is nearly rectangular. It is about 589 kilometers by 456 kilometers. What is the approximate perimeter of Colorado?</p>	<p><b>2. FRAMING</b> How many inches of matting are needed to frame an 8 inch by 11 inch print?</p>
<p><b>3. GARDENING</b> Jessica wants to put a fence around her 10.8 foot by 13 foot rectangular garden. How many feet of fencing will she need?</p>	<p><b>4. SEWING</b> Amy is making pillows to decorate her bed. She is going to make three square pillows that are each 2 feet by 2 feet. She wants to use the same trim around each pillow. How many feet of trim will she need for all three pillows?</p>
<p><b>5. JOGGING</b> Before soccer practice, Jovan warms up by jogging around a soccer field that is 100 yards by 130 yards. How many yards does he jog if he goes around the field four times?</p>	<p><b>6. POSTER</b> Ted is making a stop sign poster for a talk on safety to a first grade class. He will put a strip of black paper around the perimeter of the stop sign. Each of the stop sign's eight sides is 16 inches. How long a strip of paper will he need?</p>
<p><b>7. FLAG</b> Jo is making a triangular banner. Each of the three sides is <math>14\frac{2}{3}</math> inches long. If she puts a braided trim around the banner, how much trim will she need?</p>	<p><b>8. PYRAMIDS</b> The Great Pyramid at Giza, Egypt, has a square base, with each side measuring 250 yards. If you could walk once all the way around the pyramid at its base, how far could you walk? Explain.</p>

**10-2****Explore Through Reading**6-5.1, 6-5.2,  
6-1.7***Circles and Circumference*****Get Ready for the Lesson**

Read the introduction at the top of page 528 in your textbook.

Write your answers below.

1. Describe the relationship between the diameter and radius of each hoop.
  
  
  
  
  
  
  
  
  
  
2. Describe the relationship between the circumference and diameter of each hoop.

**Read the Lesson**

3. What is the real value of  $\pi$ ? What does it mean that the real value never ends?
  
  
  
  
  
  
  
  
  
  
4. Why is the symbol  $\approx$  used in the solutions of the circumference problems in the examples?
  
  
  
  
  
  
  
  
  
  
5. What are the two formulas that you can use to find the circumference of a circle? When would you use each of them?

**Remember What You Learned**

6. Make a model of a circle and its parts using materials from your home. Label the center, radius, diameter, and circumference.

## 10-2

## Study Guide

6-5.1, 6-5.2,  
6-1.7

## Circles and Circumference

The **circumference** is the distance around a circle.

The **radius,  $r$** , is the distance from the center to any point on a circle.

The **diameter,  $d$** , is the distance across a circle through its center.

The circumference of a circle is equal to  $\pi$  times its diameter or  $\pi$  times twice its radius.  $C = \pi d$  or  $C = 2\pi r$

**Example 1** Estimate the circumference of a circle whose diameter is 4 meters.

$$C = \pi d \quad \text{Write the formula.}$$

$$\approx 3 \times 4 \quad \text{Replace } \pi \text{ with 3 and } d \text{ with 4.}$$

$$\approx 12 \quad \text{Multiply.}$$

The circumference of the circle is about 12 meters.

**Example 2** Find the circumference of a circle whose radius is 13 inches. Use 3.14 for  $\pi$ . Round to the nearest tenth.

$$C = 2\pi r \quad \text{Write the formula.}$$

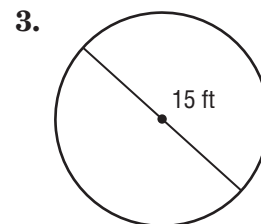
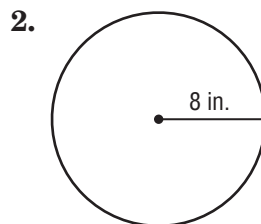
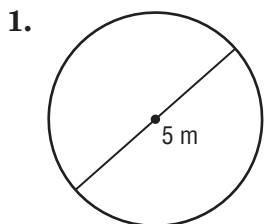
$$= 2 \times 3.14 \times 13 \quad \text{Replace } r \text{ with 13 and } \pi \text{ with 3.14.}$$

$$= 81.64 \quad \text{Multiply.}$$

Rounded to the nearest tenth, the circumference is about 81.6 inches.

## Exercises

Estimate the circumference of each circle.



- The radius of a circle measures 16 miles. Find the measure of its circumference to the nearest tenth. Use 3.14 for  $\pi$ .
- Find the circumference of a circle whose diameter is 12 yards. Use 3.14 for  $\pi$ . Round to the nearest tenth.
- Find the circumference of a circle with a radius of 7 inches. Use 3.14 for  $\pi$ . Round to the nearest tenth.

**10-2 Homework Practice**6-5.1, 6-5.2,  
6-1.7**Circles and Circumference****Find the radius or diameter of each circle with the given dimensions.**

1.  $d = 18$  in.

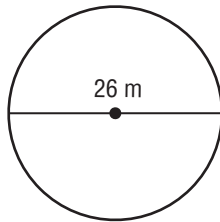
2.  $d = 29$  m

3.  $r = 21$  ft

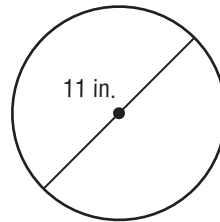
4.  $r = 13$  mm

**Estimate the circumference of each circle.**

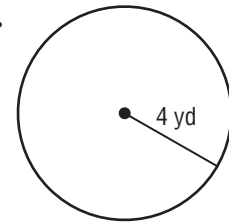
5.



6.



7.



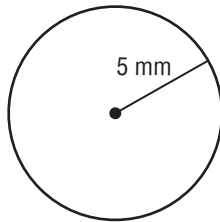
8.  $d = 31$  mm

9.  $r = 29$  cm

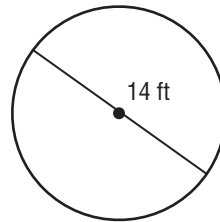
10.  $d = 32$  yd

**Find the circumference of each circle. Use 3.14 for  $\pi$ . Round to the nearest tenth.**

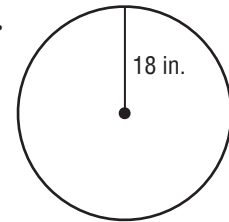
11.



12.



13.



14.  $r = 22$  cm

15.  $r = 15$  yd

16.  $d = 31$  m

17. **PLANTS** The world's largest flower, the Giant Rafflesia, is 91 centimeters in diameter. Use a calculator to find the circumference of a Giant Rafflesia to the nearest tenth.

18. **GEOLOGY** Ubehebe Crater in Death Valley has a diameter of a little more than  $\frac{1}{2}$  mile. If Latisha walks around its rim at a rate of 2 miles per hour, about how long will it take her to walk all the way around the crater? Find your answer to the nearest tenth. Use 3.14 for  $\pi$ .



# Mini-Project

(Use with Lesson 10-2)

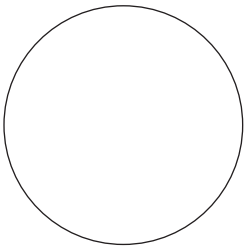


6-5.1, 6-5.2,  
6-1.7

## Circumference

Place a piece of string around the circumference of each circle. Measure the string to the nearest eighth of an inch. Record the measurement. Then draw the diameter and measure it to the nearest eighth of an inch. Use the formula  $C = \pi d$  to calculate the circumference. Use  $\frac{22}{7}$  as an approximation of  $\pi$ .

1.

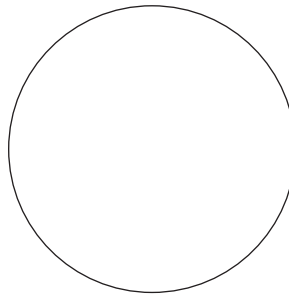


Circumference = \_\_\_\_\_

Diameter = \_\_\_\_\_

$\pi d$  = \_\_\_\_\_

2.

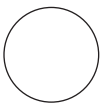


Circumference = \_\_\_\_\_

Diameter = \_\_\_\_\_

$\pi d$  = \_\_\_\_\_

3.

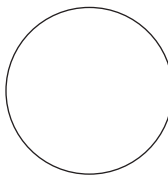


Circumference = \_\_\_\_\_

Diameter = \_\_\_\_\_

$\pi d$  = \_\_\_\_\_

4.



Circumference = \_\_\_\_\_

Diameter = \_\_\_\_\_

$\pi d$  = \_\_\_\_\_

**Compare the two circumference measures for each circle.**

5. Which method is better for determining the circumference? \_\_\_\_\_

\_\_\_\_\_

Why? \_\_\_\_\_

\_\_\_\_\_



## Area of Circles

The area  $A$  of a circle equals the product of pi ( $\pi$ ) and the square of its radius  $r$ .

$$A = \pi r^2$$

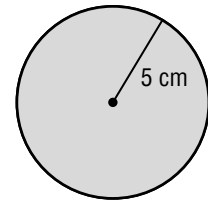
**Example 1** Find the area of the circle.

$$A = \pi r^2 \quad \text{Area of circle}$$

$$A \approx 3.14 \cdot 5^2 \quad \text{Replace } \pi \text{ with } 3.14 \text{ and } r \text{ with } 5.$$

$$A \approx 78.5$$

The area of the circle is approximately 78.5 square centimeters.

**Example 2** Find the area of a circle that has a diameter of 9.4 millimeters.

$$A = \pi r^2 \quad \text{Area of a circle}$$

$$A \approx 3.14 \cdot 4.7^2 \quad \text{Replace } \pi \text{ with } 3.14 \text{ and } r \text{ with } 9.4 \div 2 \text{ or } 4.7.$$

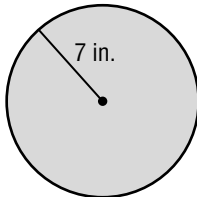
$$A \approx 69.4$$

The area of the circle is approximately 69.4 square millimeters.

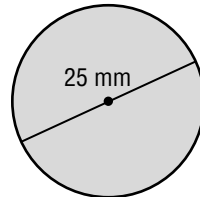
**Exercises**

Find the area of each circle. Use 3.14 for  $\pi$ . Round to the nearest tenth.

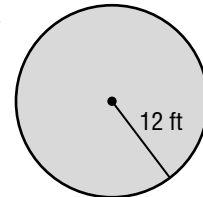
1.



2.



3.



4. radius = 2.6 cm

5. radius = 14.3 in.

6. diameter =  $5\frac{1}{2}$  yd

7. diameter =  $4\frac{3}{4}$  mi

8. diameter = 7.9 mm

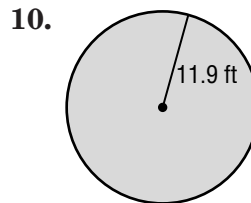
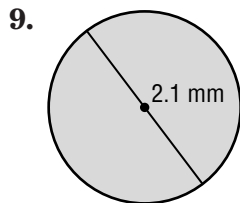
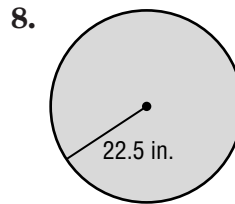
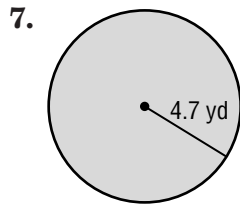
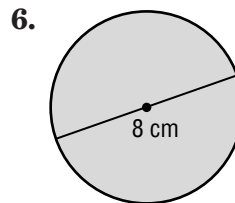
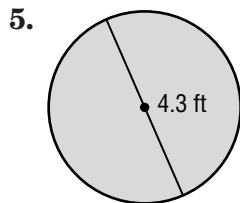
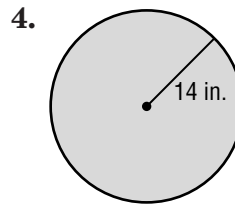
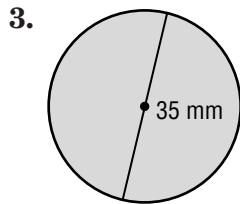
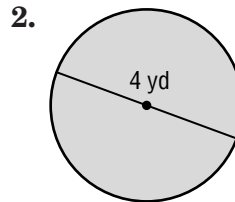
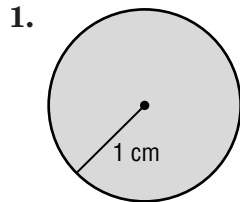
9. radius =  $2\frac{1}{5}$  ft

**10A****Skills Practice**

6-5.2

**Area of Circles**

Find the area of each circle. Use 3.14 for  $\pi$ .  
Round to the nearest tenth.



11. radius = 5.7 mm

12. radius = 8.2 ft

13. diameter =  $3\frac{1}{4}$  in.

14. diameter = 15.6 cm

15. radius = 1.1 in.

16. diameter =  $12\frac{3}{4}$  yd

**10A**

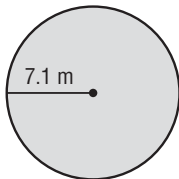
**Homework Practice**



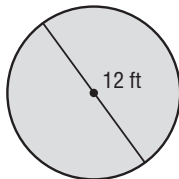
**Area of Circles**

Find the area of each circle. Use 3.14 for  $\pi$ . Round to the nearest tenth if necessary.

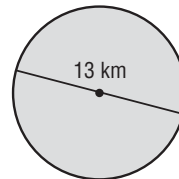
1.



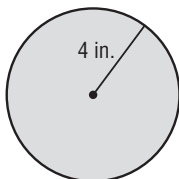
2.



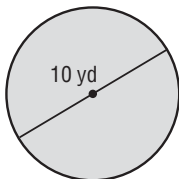
3.



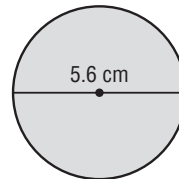
4.



5.



6.



7. diameter = 9.4 mm

8. diameter =  $3\frac{1}{2}$  ft

9. radius =  $6\frac{1}{4}$  in.

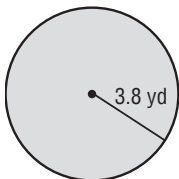
10. radius =  $4\frac{3}{4}$  yd

11. diameter =  $15\frac{1}{2}$  mi

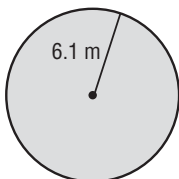
12. radius = 7.9 km

Estimate to find the approximate area of each circle.

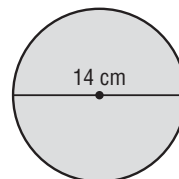
13.



14.

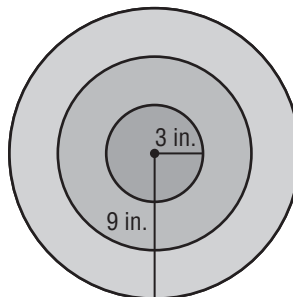


15.



16. **SPOTLIGHT** A spotlight can be adjusted to effectively light a circular area of up to 6 meters in diameter. To the nearest tenth, what is the maximum area that can be effectively lit by the spotlight?

17. **ARCHERY** The bull's eye on an archery target has a radius of 3 inches. The entire target has a radius of 9 inches. To the nearest tenth, find the area of the target outside of the bull's eye.



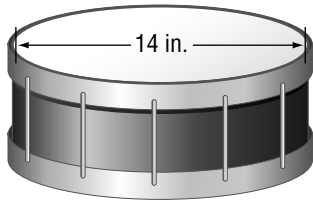
**10A****Problem-Solving Practice****Area of Circles**

- 1. POOLS** Susan designed a circular pool with a diameter of 25 meters. What is the area of the bottom of the pool? Round to the nearest tenth.

- 2. MONEY** Find the area of the coin to the nearest tenth.

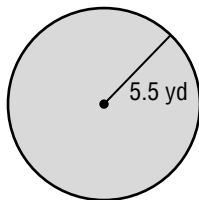


- 3. DRUMS** What is the area of the drumhead on the drum shown below? Round to the nearest tenth.



- 4. PIZZA** Estimate the area of the top of a round pizza that has a diameter of 16 inches. Round to the nearest tenth.

- 5. GARDENING** Jane needs to buy mulch for the garden with the dimensions shown in the figure. For how much area does Jane need to buy mulch? Round to the nearest tenth.



- 6. UTILITIES** What is the area of the top surface of a circular manhole cover that has a radius of 30 centimeters? Use 3.14 for  $\pi$ .

**10-4 Explore Through Reading**

6-5.5, 6-1.7

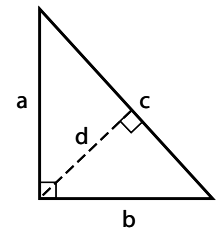
**Area of Triangles****Get Ready for the Lesson**

Read the introduction at the top of page 540 in your textbook.  
Write your answers below.

1. Compare the two triangles.
2. What figure is formed by the two triangles?
3. **MAKE A CONJECTURE** Describe the relationship that exists between the area of one triangle and the area of the entire figure.

**Read the Lesson**

4. Look at the figure at the right. Explain how the height can be  $a$ ,  $b$ , or  $d$ .



5. Using models, demonstrate that congruent triangles have the same area.
6. Look at the illustrations of  $h$  on page 540. What is the symbol found where  $h$  and  $b$  meet? How does that affect the length of  $h$ ?

**Remember What You Learned**

7. Work with a partner. Using models, demonstrate that the area of a triangle is one-half the product of the base  $b$  and the height  $h$  of the triangle.

# 10-4 Study Guide

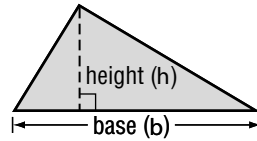


## Area of Triangles

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

**Symbols**  $A = \frac{bh}{2}$

**Model**



**Examples** Find the area of each triangle.

**1**

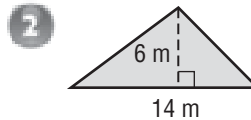
$$A = \frac{bh}{2} \quad \text{Area of a triangle}$$

$$A = \frac{5 \times 8}{2} \quad \text{Replace } b \text{ with 5 and } h \text{ with 8.}$$

$$A = \frac{40}{2} \quad \text{Simplify the numerator.}$$

$$A = 20 \quad \text{Divide.}$$

The area of the triangle is 20 square units.



$$A = \frac{bh}{2} \quad \text{Area of a triangle}$$

$$A = \frac{14 \times 6}{2} \quad \text{Replace } b \text{ with 14 and } h \text{ with 6.}$$

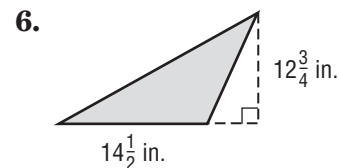
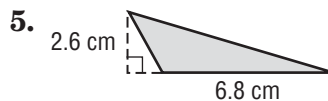
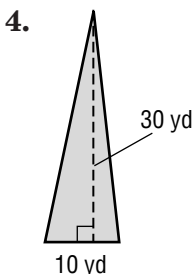
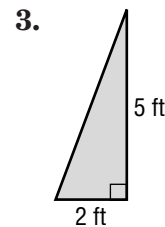
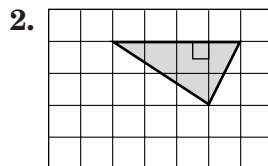
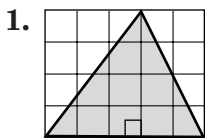
$$A = \frac{84}{2} \quad \text{Simplify the numerator.}$$

$$A = 42 \quad \text{Divide.}$$

The area of the triangle is 42 square meters.

**Exercises**

Find the area of each triangle.

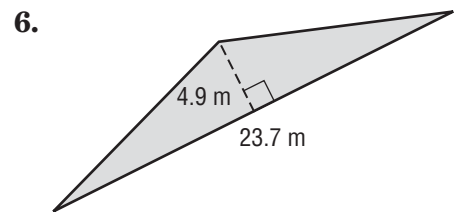
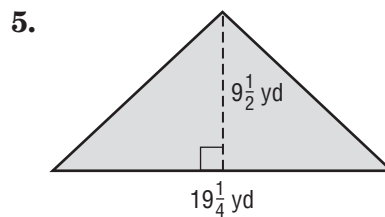
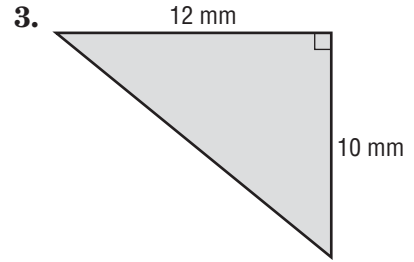
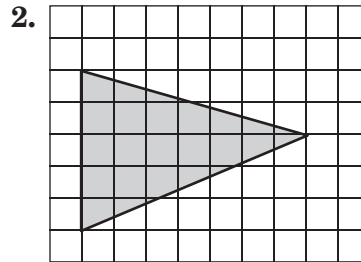
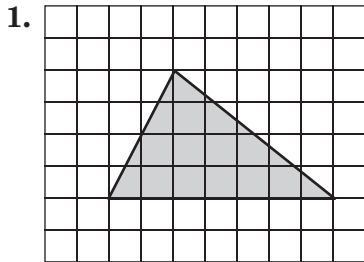


# 10-4 Homework Practice



## Area of Triangles

Find the area of each triangle.

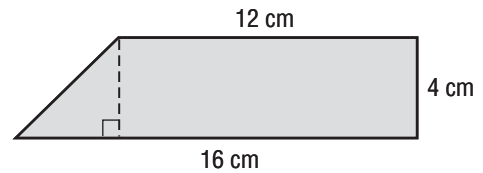


7. height: 15 ft  
base: 38 ft

8. height: 22 cm  
base: 17 cm

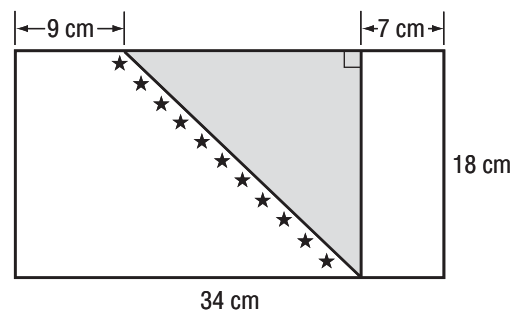
9. height: 12 in.  
base: 21 in.

10. **COMPLEX FIGURES** Find the area of the figure at the right.



11. **MURALS** Raul is painting a mural of an ocean scene. The triangular sail on a sailboat has a base of 4 feet and a height of 6 feet. Raul will paint the sail using a special white paint. A can of this paint covers 10 square feet. How many cans of white paint will Raul need?

12. **FLAGS** What is the area of the triangle on the flag of Bosnia and Herzegovina?





# Mini-Project

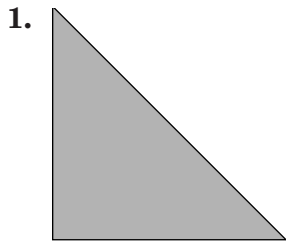
(Use with Lesson 10-4)



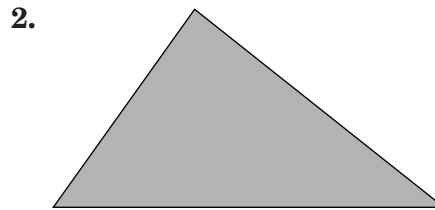
6-5.5, 6-1.7

## Areas of Triangles

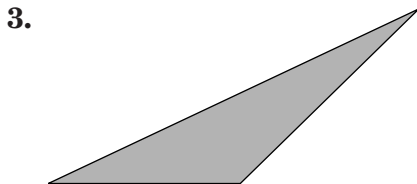
Use a metric ruler to measure the base and height of each triangle. If the height is not shown, sketch it. Label these segments with their measurements to the nearest millimeter. Use your measurements to calculate the area to the nearest square millimeter.



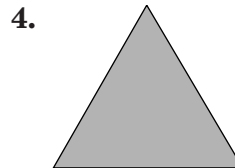
Area = \_\_\_\_\_



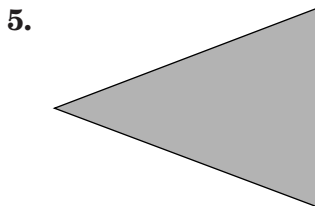
Area = \_\_\_\_\_



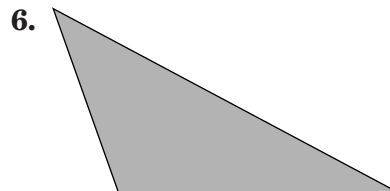
Area = \_\_\_\_\_



Area = \_\_\_\_\_



Area = \_\_\_\_\_



Area = \_\_\_\_\_



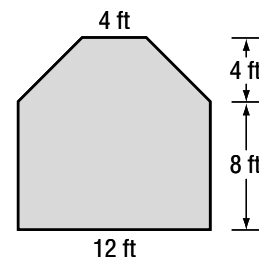


**Area of Composite Figures**

**Composite figures** are made of triangles, quadrilaterals, semicircles, and other two-dimensional figures. To find the area of a composite figure, separate it into figures whose areas you know how to find, and then add the areas.

**Example 1** Find the area of the figure at the right in square feet.

The figure can be separated into a rectangle and a trapezoid. Find the area of each.



Area of Rectangle

$$A = \ell w$$

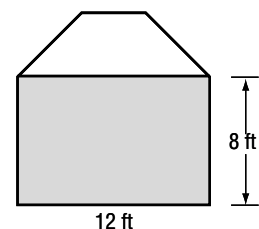
Area of a rectangle

$$A = 12 \cdot 8$$

Replace  $\ell$  with 12 and  $w$  with 8.

$$A = 96$$

Multiply.



Area of Trapezoid

$$A = \frac{1}{2}h(b_1 + b_2)$$

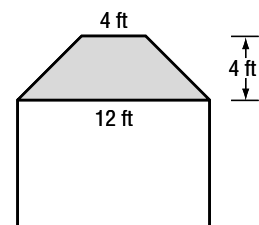
Area of a trapezoid

$$A = \frac{1}{2}(4)(4 + 12)$$

Replace  $h$  with 4,  $b_1$  with 4, and  $b_2$  with 12.

$$A = 32$$

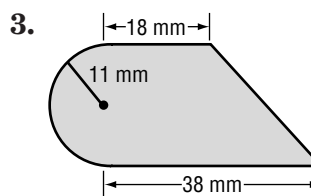
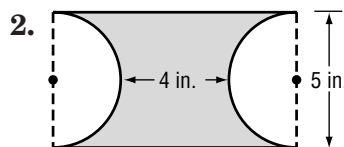
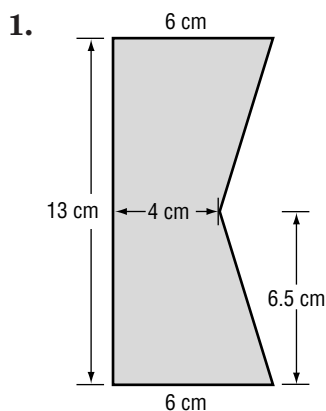
Multiply.



The area of the figure is  $96 + 32$  or 128 square feet.

**Exercises**

Find the area of each figure. Use 3.14 for  $\pi$ . Round to the nearest tenth if necessary.



# 10B

## Skills Practice

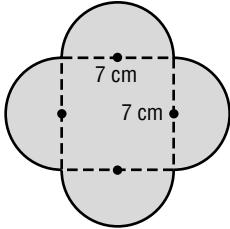


6-5.4, 6-5.5

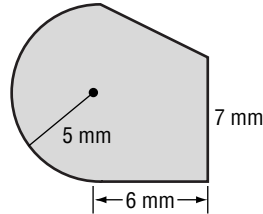
### Area of Composite Figures

Find the area of each figure. Use 3.14 for  $\pi$ . Round to the nearest tenth if necessary.

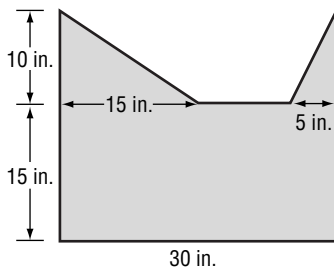
1.



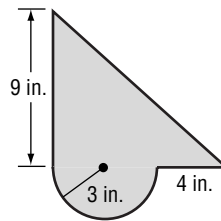
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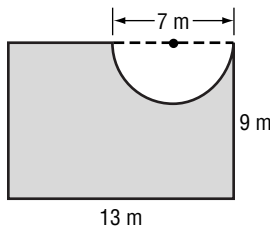
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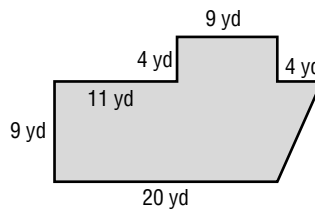
4.



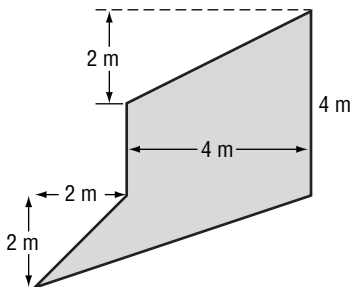
5.



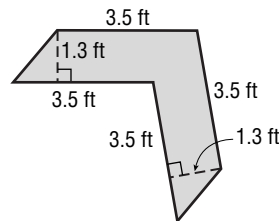
6.



7.



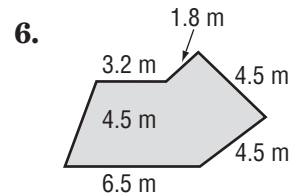
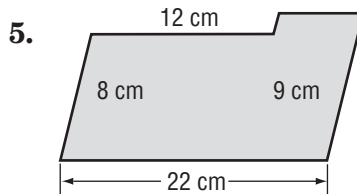
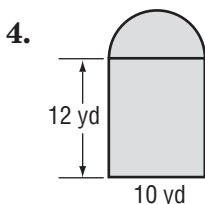
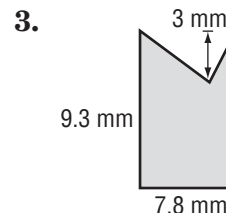
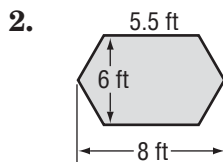
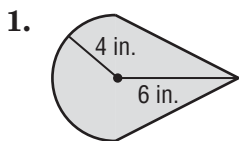
8.



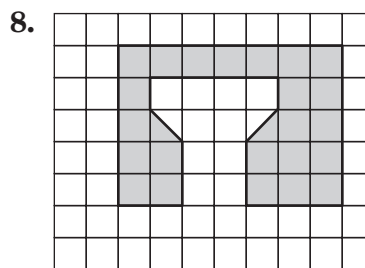
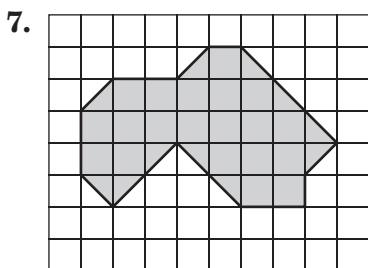


**Area of Composite Figures**

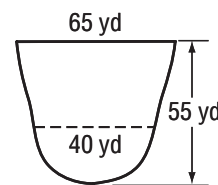
Find the area of each figure. Round to the nearest tenth if necessary.



In each diagram below, one square unit represents 5 square meters. Find the area of each figure.

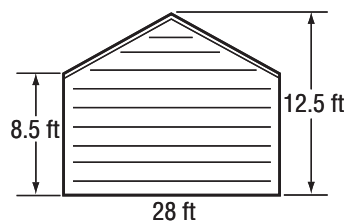


9. **AUDITORIUM** The diagram at the right gives the dimensions of an auditorium. If new carpet is needed for the auditorium, what will be the area of the carpet? Round to the nearest square yard.



**SIDING** For Exercises 10 and 11, use the diagram that shows one end of a cottage.

10. Each end of the cottage needs new siding. Find the total area that needs new siding.



11. The siding material costs \$75 for a bundle of siding that covers an area of 100 square feet. What will be the total cost to put siding on both ends of the cottage? Justify your answer.

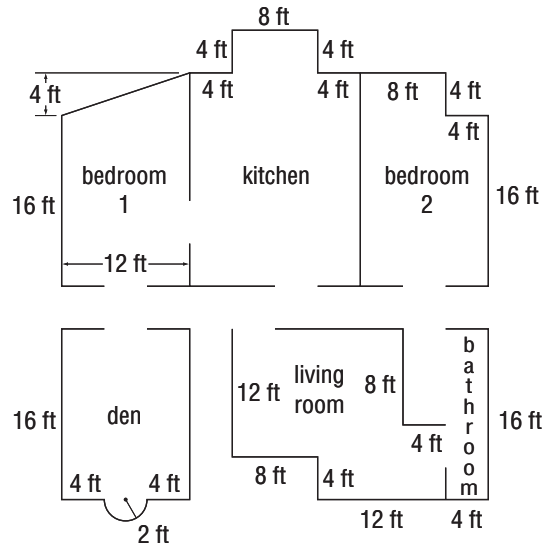
**10B**

**Problem-Solving Practice**



**Area of Composite Figures**

**ARCHITECTURE** For Exercises 1–6 use Jaco’s preliminary design of his vacation house at the right. Round to the nearest tenth if necessary.



<p><b>1.</b> What type of figure is bedroom 1? Find the area of bedroom 1.</p>	<p><b>2.</b> What is the area of the bedroom 2? What figures did you use to find the area?</p>
<p><b>3.</b> What is the area of the bathroom? What are the dimensions of the figures you used to find this area?</p>	<p><b>4.</b> What is the area of the living room? How many figures did you use to find this area?</p>
<p><b>5.</b> What is the area of the den? What would the area of the den be if the semicircular window were removed and replaced with a flat window?</p>	<p><b>6.</b> What is the area of the kitchen? If Jaco adds a rectangular cooking island in the middle of the kitchen with dimensions 6 feet by 4 feet, how many square feet of space will be left?</p>

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**10-5 Study Guide****Problem-Solving Investigation: Make a Model**

When solving problems, one strategy that is helpful is to *make a model*. If a problem gives data that can be displayed visually, it may be useful to make a model of the situation. The model can then be used in order to solve the problem.

You can use the *make a model* strategy, along with the following four-step problem solving plan to solve a problem.

- 1 Understand** – Read and get a general understanding of the problem.
- 2 Plan** – Make a plan to solve the problem and estimate the solution.
- 3 Solve** – Use your plan to solve the problem.
- 4 Check** – Check the reasonableness of your solution.

**Example** **DISPLAYS** A grocery store employee is making a pyramid display of boxes of a new cereal. If he doesn't want to have more than 4 rows in his display, what is the least number of cereal boxes he can use?

**Understand** The cereal boxes need to be stacked in the shape of a pyramid. There should only be 4 rows in the pyramid. We need to know the minimum number of boxes of cereal needed to make a pyramid.

**Plan** Make a model to find the number of cereal boxes needed.

**Solve** Use a rectangle to represent each cereal box.



The least number of boxes needed is  $4 + 3 + 2 + 1$ , or 10 boxes.

**Check** Count the number of boxes in the model. There are 10 boxes.

**Exercises**

**TILING** Michael has 18 decorative square tiles to make a design on a kitchen backsplash. He wants to arrange them in a rectangular shape with the least perimeter possible. How many tiles will be in each row?

**10-5****Skills Practice**

6-1.1, 6-1.8

***Problem-Solving Investigation: Make a Model***

**Solve.** Use the **make a model** strategy.

- 1. PATIO** Jarnail has 24 square brick pavers to arrange for a small patio to place his grill. He wants to place them in a rectangular shape with the least perimeter possible. How many bricks will be in each row?
  
- 2. CRAFTS** Jessica is making a collage of her friend's school pictures on a poster board. Each picture is 2 inches by 3 inches and the poster board is 8 inches by 16 inches. What are the most pictures that Jessica can fit on the poster board if none of them overlap and all the pictures are facing the same direction?
  
- 3. BOOKS** A bookstore arranges its best-seller books in the front window. In how many different ways can four best-seller books be arranged in a row?
  
- 4. BASEBALLS** A sports store owner is making a display with 200 baseballs. He is placing them in the shape of a square pyramid. The bottom layer has 64 baseballs placed in the shape of a square. For each consecutive layer of baseballs, one baseball is placed where 4 baseballs meet. How many layers will be in the pyramid? How many baseballs will be left over?

# 10-5 Homework Practice

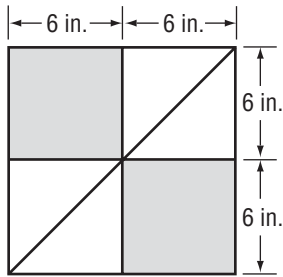


## Problem-Solving Investigation: Make a Model

### Mixed Problem Solving

Use the make a model strategy to solve Exercises 1 and 2.

- QUILTING** Ms. Mosely is sewing together blocks of fabric in a pattern of small squares and triangles to make a quilt that is 3 feet square. How many small squares will she need? How many small triangles will she need?



- DISPLAY** Anaba is stacking cereal boxes in a pyramid-shaped display. The bottom layer has 10 boxes. There are two fewer boxes in each layer than the layer below. How many boxes are in the display?

Use any strategy to solve Exercises 3–6. Some strategies are shown below.

Problem-Solving Strategies
• Use the four-step plan.
• Look for a pattern.
• Make a model.

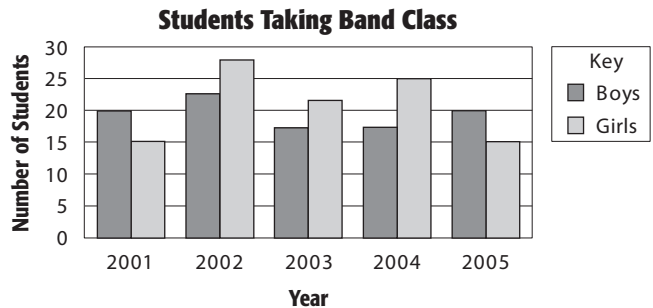
- PATTERNS** Draw the next figure.



- ART** Kris folded a piece of construction paper into thirds and then in half. He punched a hole through all layers. How many holes will there be when he unfolds the paper?

- LOANS** Mr. Kartini bought a boat on credit. His loan, including interest, is \$9,860. If he makes monthly payments of \$85, how many years will it take him to pay off the loan?

- MUSIC** Refer to the graph. How many fewer girls took band class in 2005 than in 2004?



# 10-5 Problem-Solving Practice



## Problem-Solving Investigation: Make a Model

**1. VIDEO GAMES** The table shows the prices of 4 different video games. If Jaleesa got \$50 for her birthday and she wants to buy 2 video games with the money, what are two possible games she can buy?

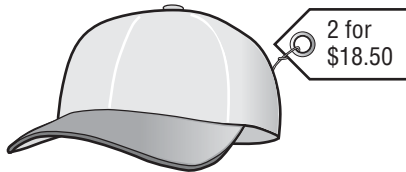
Video Game Prices	
Super Hero	\$24.60
Princess Castle	\$32.20
Batter-Up Baseball	\$18.75
Money for Nothing	\$28.50

**2. ROLLER COASTERS** The list below shows how many roller coaster rides 20 kids rode at an amusement park.

5 10 0 12 8 7 2 6 4 1  
0 6 3 11 5 9 13 8 14 3

Make a frequency table to find how many more kids rode roller coasters 5 to 9 times than 10 to 14 times.

**3. SHOPPING** How many hats can be purchased with \$90 if the hats can only be bought in pairs?



**4. MONEY** Lorenzo bought a CD player for \$9 less than the regular price. If he paid \$32, what was the regular price?

**5. MONEY** Brady collected \$2 from each student to buy a gift for their teacher. If 27 people contributed, how much money was collected?

**6. GAMES** Sara tosses a beanbag onto an alphabet board. It is equally likely that the bag will land on any letter. Find the probability that the beanbag will land on one of the letters in her name.



**10-7****Explore Through Reading**

6-5.3, 6-1.7

**Surface Area of Rectangular Prisms****Get Ready for the Lesson**

Complete the Mini Lab at the top of page 555 in your textbook.  
Write your answers below.

1. Find the area of each face of the prism.
2. What is the sum of the areas of the faces of the prism?

**Read the Lesson**

3. Describe in words each step shown for finding the surface area of a rectangular prism.

$$S = 2lw + 2lh + 2wh$$

$$S = 2(17 \times 5) + 2(17 \times 6) + 2(5 \times 6)$$

$$S = 2(85) + 2(102) + 2(30)$$

$$S = 170 + 204 + 60$$

$$S = 434$$

4. What is the unit of measure for surface area?
5. What is the difference between a rectangular prism and a net of the prism?
6. What is the difference between the surface area of a rectangular prism and the volume of the prism?

**Remember What You Learned**

7. Using a net, demonstrate that the surface area of a rectangular prism is equal to  $2lw + 2lh + 2wh$ .

# 10-7

## Study Guide



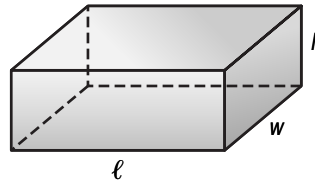
6-5.3, 6-1.7

### Surface Area of Rectangular Prisms

The **surface area**  $S$  of a rectangular prism with length  $\ell$ , width  $w$ , and height  $h$  is the sum of the areas of the faces.

**Symbols**  $S = 2\ell w + 2\ell h + 2wh$

**Model**



**Example** Find the surface area of the rectangular prism.

Find the area of each face.

top and bottom

$$2(\ell w) = 2(8 \times 5) = 80$$

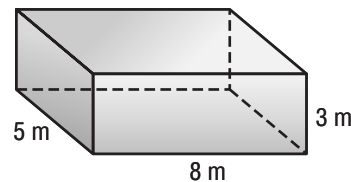
front and back

$$2(\ell h) = 2(8 \times 3) = 48$$

two sides

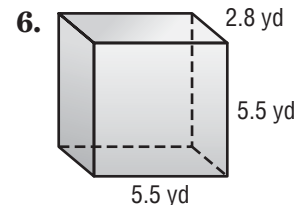
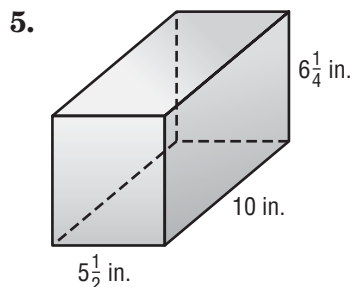
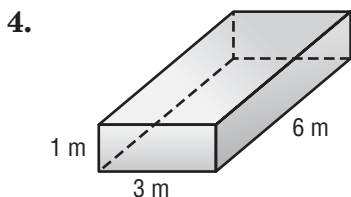
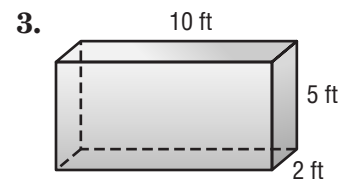
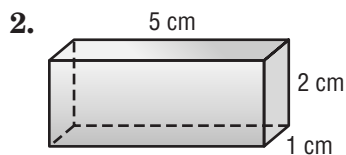
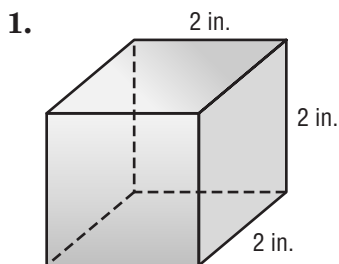
$$2(wh) = 2(5 \times 3) = 30$$

Add to find the surface area. The surface area is  $80 + 48 + 30$  or 158 square meters.



### Exercises

Find the surface area of each rectangular prism.

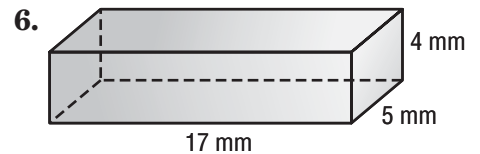
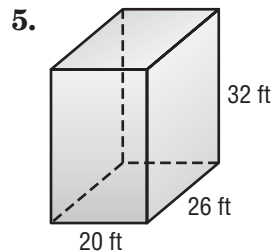
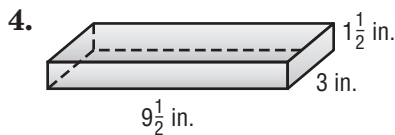
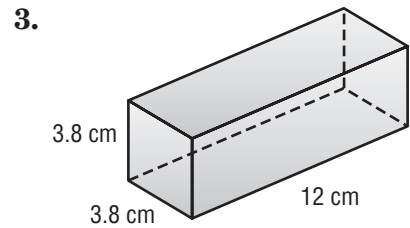
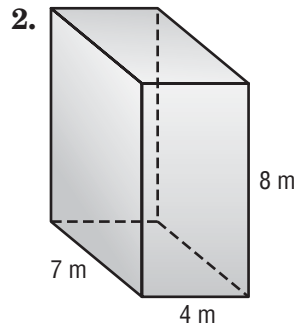
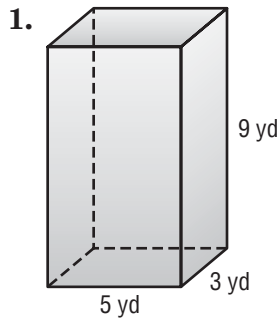


**10-7****Homework Practice**

6-5.3, 6-1.7

**Surface Area of Rectangular Prisms**

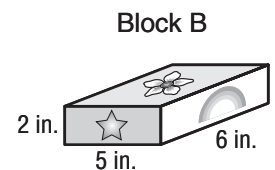
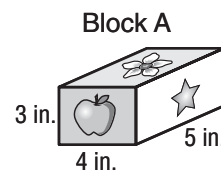
Find the surface area of each rectangular prism.



7. **GIFTS** Eric is covering a calculator with gift wrap. The calculator is 15 centimeters long, 8 centimeters wide, and 2 centimeters high. What is the minimum surface area of the paper that will cover the calculator?

8. **ESTIMATION** Alicia estimates that the surface area of a rectangular prism with a length of 11 meters, a width of 5.6 meters, and a height of 7.2 meters is about 334 cubic feet. Is her estimate reasonable? Explain your reasoning.

9. **BLOCKS** Find the surface area of each play block. Which block has the greater surface area? Does the same block have a greater volume? Explain.



**10-7****Problem-Solving Practice**

6-5.3, 6-1.7

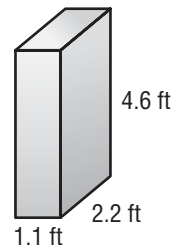
**Surface Area of Rectangular Prisms**

- 1. GIFTS** Fatima is wrapping a gift box for her nephew's birthday. The box's dimensions are 16 inches long by 10 inches wide by 5 inches high. What is the surface area of the box?

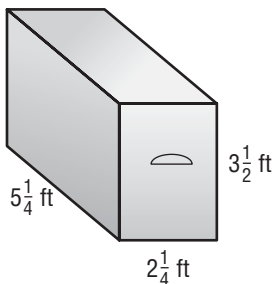
- 2. FOOD** Antoine is wrapping a block of cheese that is 22 centimeters long by 6 centimeters high by 10 centimeters wide with plastic wrap. What is the surface area of the cheese block?

- 3. PAINTING** Kyle is painting the front door of his house. The dimensions of the door are 80 inches by 36 inches by 2 inches. If he paints all of the surfaces, how much area will he paint? Explain.

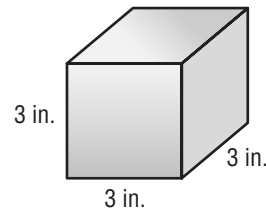
- 4. CARPENTRY** Bryan is sanding a set of speaker boxes that he built for his room. What is the surface area of each box?



- 5. CARPENTRY** Cindy is putting oak veneer (thin wood covering) on the entire surface of her hope chest. How much veneer will she need?



- 6. TOY MAKING** Trey is covering blocks of wood with wallpaper to make building blocks for his baby sister. If he covers all the surfaces, how much wallpaper will he need? Think of a short way to solve this problem and explain.



## Surface Area of Rectangular Prisms

The sum of the areas of all the surfaces, or faces, of a three-dimensional figure is the **surface area**. The surface area  $S$  of a rectangular prism with length  $\ell$ , width  $w$ , and height  $h$  is found using the following formula.

$$S = 2\ell w + 2\ell h + 2wh$$

### Example Find the surface area of the rectangular prism.

You can use the net of the rectangular prism to find its surface area. There are three pairs of congruent faces in a rectangular prism:

- top and bottom
- front and back
- two sides

#### Faces

#### Area

top and bottom  $(4 \cdot 3) + (4 \cdot 3) = 24$

front and back  $(4 \cdot 2) + (4 \cdot 2) = 16$

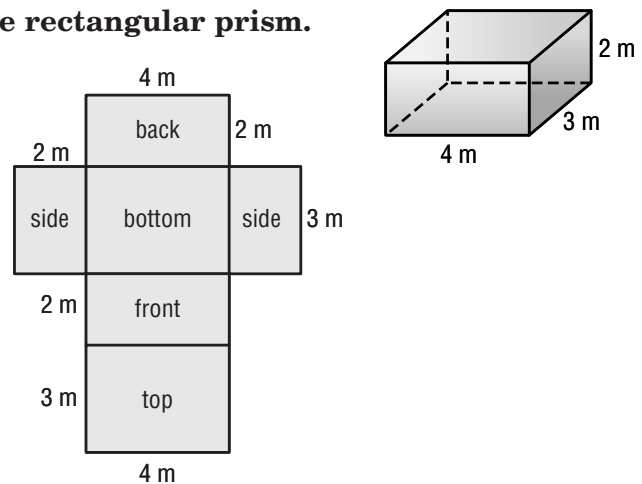
two sides  $(2 \cdot 3) + (2 \cdot 3) = 12$

Sum of the areas  $24 + 16 + 12 = 52$

Alternatively, replace  $\ell$  with 4,  $w$  with 3, and  $h$  with 2 in the formula for surface area.

$$\begin{aligned} S &= 2\ell w + 2\ell h + 2wh \\ &= 2 \cdot 4 \cdot 3 + 2 \cdot 4 \cdot 2 + 2 \cdot 3 \cdot 2 && \text{Follow order of operations.} \\ &= 24 + 16 + 12 \\ &= 52 \end{aligned}$$

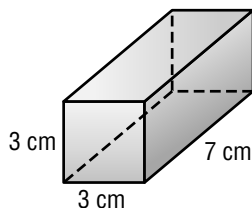
So, the surface area of the rectangular prism is 52 square meters.



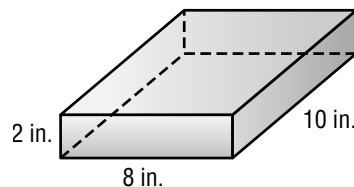
### Exercises

Find the surface area of each rectangular prism.

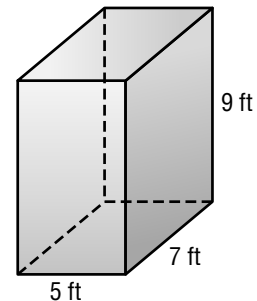
1.



2.



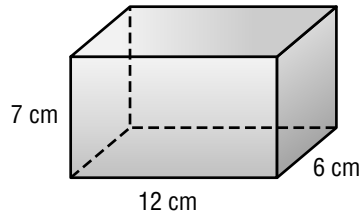
3.



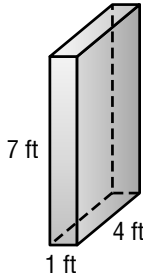
**10C****Skills Practice****Surface Area of Rectangular Prisms**

Find the surface area of each rectangular prism. Round to the nearest tenth if necessary.

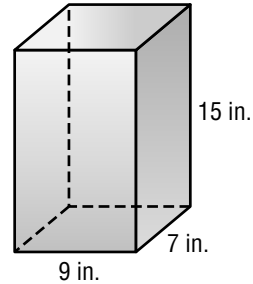
1.



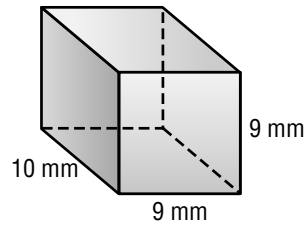
2.



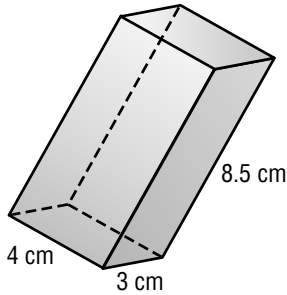
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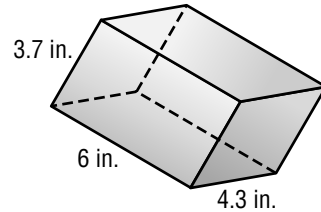
4.



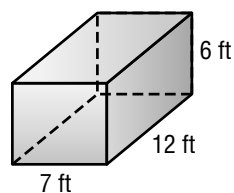
5.



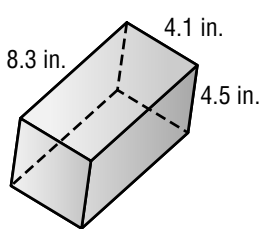
6.



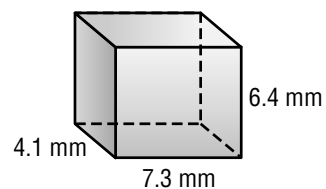
7.



8.



9.



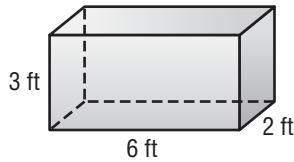
10. A cube has a surface area of 126 square feet. What is the area of one face?

11. Find the surface area of a rectangular prism that has a length of 8 inches, a width of 3 inches, and a height of 6 inches.

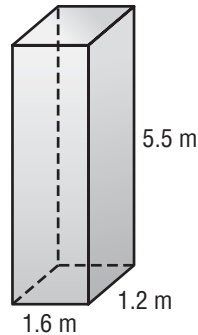
### Surface Area of Rectangular Prisms

Find the surface area of each rectangular prism. Round to the nearest tenth if necessary.

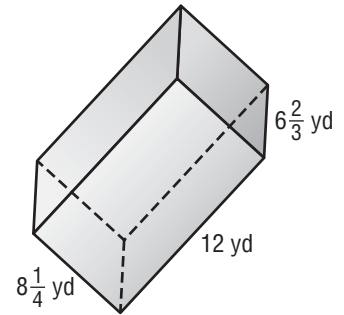
1.



2.



3.

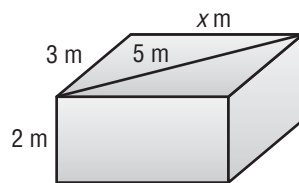


4. length = 20 cm  
width = 18 cm  
height = 25 cm

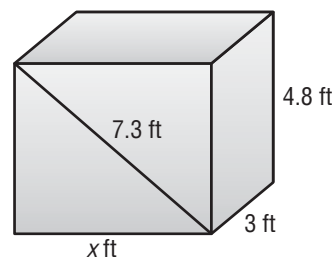
5. length = 31.5 in.  
width = 12.2 in.  
height = 24.8 in.

6. length = 5.3 mm  
width = 1.1 mm  
height = 3.4 mm

7.

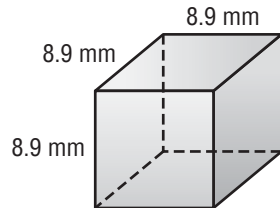


8.

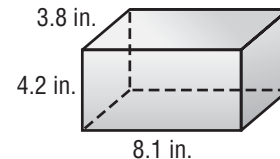


**ESTIMATION** Estimate the surface area of each prism.

9.



10.



11. **BIRTHDAY GIFT** When wrapping a birthday gift for his mother, Kenji adds an additional 2.5 square feet of gift wrap to allow for overlap. How many square feet of gift wrap will Kenji use to wrap a gift 3.5 feet long, 18 inches wide, and 2 feet high?

**For Exercises 12 and 13, use the following information.**

A company needs to package hazardous chemicals in special plastic containers that hold 80 cubic feet of chemicals.

12. Find the whole number dimensions of the container that would use the least amount of plastic.
13. If the plastic costs \$0.10 per square foot, how much would it cost to make 24 containers?

## 10C

## Problem-Solving Practice

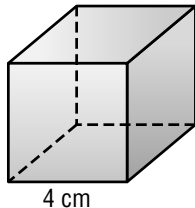


## Surface Area of Rectangular Prisms

- 1. PACKAGING** A packaging company needs to know how much cardboard will be required to make boxes 18 inches long, 12 inches wide, and 10 inches high. How much cardboard will be needed for each box if there is no overlap in the construction?

- 2. INSULATION** Jane needs to buy insulation for the inside of a truck container. The container is a rectangular prism 15 feet long, 8 feet wide, and  $7\frac{1}{2}$  feet high. How much insulation should Jane buy if all inside surfaces except the floor are to be insulated?

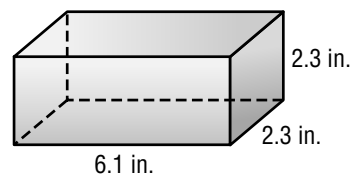
- 3. ICE** Suppose the length of each edge of a cube of ice is 4 centimeters. Find the surface area of the cube.



- 4. ICE** Suppose you cut the ice cube from Exercise 3 in half horizontally into two smaller rectangular prisms. Find the surface area of one of the two smaller prisms.

- 5. CONTAINERS** What is the total surface area of the inside and outside of a container in the shape of a rectangular prism with length of 5 meters, width of 3 meters, and height of 2.2 meters?

- 6. TOYS** Oscar is making a play block for his baby sister by gluing fabric over the entire surface of a foam block. How much fabric will Oscar need?







# Chapter 10 Test

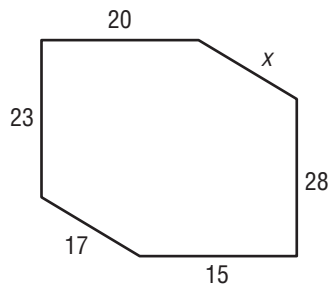
## Mastering the SC Standards

- 1** Which equation could be used to find the area, in square centimeters, of a circle with a diameter of 14 centimeters? Use 3.14 for  $\pi$ .

- (A)  $3.14 \times 14$   
 (B)  $3.14 \times 14^2$   
 (C)  $3.14 \times 7$   
 (D)  $3.14 \times 7^2$

**6-5.2**

- 2** The polygon below has a perimeter of 125 units.

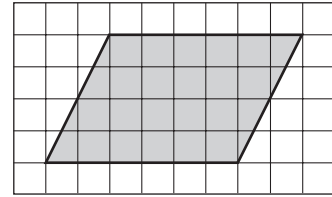


Which expression can be used to find the length of  $x$ ?

- (A)  $125 + 83$   
 (B)  $125 \div 6$   
 (C)  $125 - 103$   
 (D)  $125 \times 83$

**6-5.5**

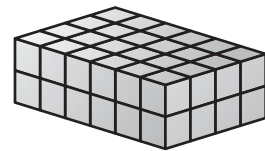
- 3** What is the area, in square units, of the parallelogram?



- (A)  $12 \text{ units}^2$   
 (B)  $18 \text{ units}^2$   
 (C)  $22 \text{ units}^2$   
 (D)  $24 \text{ units}^2$

**Preparation for 6-5.5**

- 4** Which expression represents a strategy Keiko could use to find the surface area of the figure below?



- (A)  $2(2 \times 4) + 2(4 \times 6) + 2(6 \times 2)$   
 (B)  $(2 \times 4) + (4 \times 6) + (6 \times 2)$   
 (C)  $2(2 + 4) \times 2(4 + 6) \times 2(6 + 2)$   
 (D)  $2 \times 4 \times 6$

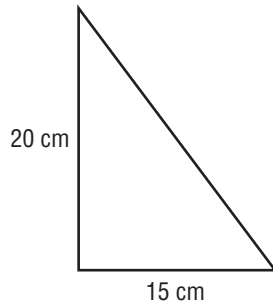
**6-5.3**



# Chapter 10 Test (continued)

## Mastering the SC Standards

- 5** A sailboat has a mainsail that is the shape of a right triangle, as shown below. What is the area of the mainsail?



- (A)  $35 \text{ cm}^2$   
 (B)  $75 \text{ cm}^2$   
 (C)  $150 \text{ cm}^2$   
 (D)  $300 \text{ cm}^2$

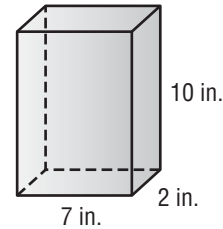
**6-5.4**

- 6** The radius of a circle is 4 centimeters. Which choice below shows the diameter and circumference of this circle, using 3.14 for  $\pi$ ?

- (A)  $d = 2 \text{ cm}; C = 3.14 \text{ cm}$   
 (B)  $d = 3.14 \text{ cm}; C = 6.28 \text{ cm}$   
 (C)  $d = 4 \text{ cm}; C = 12.56 \text{ cm}$   
 (D)  $d = 8 \text{ cm}; C = 25.12 \text{ cm}$

**6-5.1**

- 7** What is the volume of the figure below?



- (A)  $19 \text{ in}^3$   
 (B)  $70 \text{ in}^3$   
 (C)  $140 \text{ in}^3$   
 (D)  $240 \text{ in}^3$

**Preparation for 7-5.2, 6-1.1**

- 8** If the diameter of a circle is 40 millimeters, what is the length of the radius?

- (A) 10 mm  
 (B) 20 mm  
 (C) 60 mm  
 (D) 80 mm

**6-5.1**

- 9** Alina dug her garden in the shape of a pentagon. The lengths of four of the sides are 6 ft, 5 ft, 5 ft, and 7 ft. If Alina purchased exactly 28 feet of fence for her garden, which expression could be used to find  $x$ , the length of the fifth side?

- (A)  $28 + 23$   
 (B)  $28 - 23$   
 (C)  $28 \times 23$   
 (D)  $28 \div 23$

**6-5.5**

**11****Anticipation Guide****Integers and Transformations****STEP 1** *Before you begin Chapter 11*

- Read each statement.
- Decide whether you Agree (A) or Disagree (D) with the statement.
- Write A or D in the first column OR if you are not sure whether you agree or disagree, write NS (Not Sure).

<b>STEP 1</b> A, D, or NS	<b>Statement</b>	<b>STEP 2</b> A or D
	1. An integer is any positive or negative whole number, or 0.	
	2. A positive integer plus a negative integer will always equal a negative integer.	
	3. To subtract $-5$ from 9, add 9 and 5.	
	4. The product of two integers with the same sign is always positive.	
	5. The quotient of any integer divided by a negative integer is negative.	
	6. In the ordered pair $(-4, 9)$ , $-4$ is the $x$ -coordinate and 9 is the $y$ -coordinate.	
	7. To locate the ordered pair $(3, -5)$ on the coordinate plane, move 3 units up and 5 units to the left.	
	8. When a figure is translated, the size and shape stays the same.	
	9. When a figure is reflected, the size and shape stays the same.	
	10. Translating a figure is the same as reflecting it over two parallel lines.	

**STEP 2** *After you complete Chapter 11*

- Reread each statement and complete the last column by entering an A (Agree) or a D (Disagree).
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a separate sheet of paper to explain why you disagree. Use examples, if possible.

**11****Family Activity****State Test Practice**

Fold the page along the dashed line. Work each problem on another piece of paper. Then unfold the page to check your work.

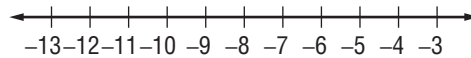
1. Identify points  $A$ ,  $B$ , and  $C$  on the number line below.



- A**  $-6, -4, -1$   
**B**  $-7, -4, -1$   
**C**  $-5, -3, -1$   
**D**  $-7, -3, -1$

2. Use the number line below to help you find the sum of this problem:

$$-8 + (-4) =$$



- A**  $-4$   
**B**  $-12$   
**C**  $-11$   
**D** This problem cannot be solved.

**Fold here.**

**Solution**

1. *Hint: Use the numbers provided to determine the location of the points.*

Counting from  $-5$ , point  $A$  is two spaces to the left, which is  $-7$ . Point  $B$  is one space to the right of  $-5$ , so it corresponds with  $-4$ . Point  $C$  is the same for all of the answer options, and is located one space to the left of  $0$ , or  $-1$ .

Point  $A$  is located at  $-7$ .  
 Point  $B$  is located at  $-4$ .  
 Point  $C$  is located at  $-1$ .

The answer is **B**.

**Solution**

2. *Hint: When you add a negative number, it is the same as subtracting the number.*

Starting at the point  $-8$ , we are adding  $-4$ , which is the same as subtracting  $4$ , so the answer should be smaller, or more negative, than  $-8$ . In order to subtract, move to the left on the number line  $4$  spaces. The result is  $-12$ .

$$-8 + -4 = -8 - 4 = -12$$

The answer is **B**.

**11-1****Explore Through Reading**6-2.2, 6-2.3,  
6-1.6**Ordering Integers****Get Ready for the Lesson**

Read the introduction at the top of page 572 in your textbook. Write your answers below.

1. Write an integer to represent the amount of money that each person has in his or her account at the Snack Emporium.
2. Order the integers from least to greatest.
3. Who has the least money in his or her Snack Emporium account?

**Read the Lesson**

4. What symbol is used to show *greater than*? Write a mathematical statement using this symbol.
5. What symbol is used to show *less than*? Write a mathematical statement using this symbol.
6. How is a number line helpful when ordering integers from least to greatest?

**Remember What You Learned**

7. Describe a real-world situation in which you would have to order integers from least to greatest or greatest to least. Create integers for this situation. Then order them from least to greatest and greatest to least.

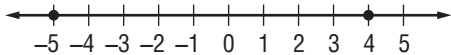
**11-1****Study Guide**6-2.2, 6-2.3,  
6-1.6**Ordering Integers**

The inequality symbol ' $>$ ' means *is greater than*.

The inequality symbol ' $<$ ' means *is less than*.

**Example 1** Replace  $\bullet$  with  $<$  or  $>$  to make the statement  $4 \bullet -5$  true.

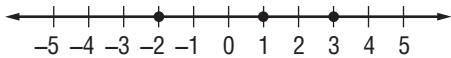
Graph 4 and  $-5$  on a number line. Then compare.



Since 4 is to the right of  $-5$ ,  $4 > -5$  is a true statement.

**Example 2** Order the integers 1,  $-2$ , and 3 from least to greatest.

Graph each integer on a number line. Then compare.



The order from least to greatest is  $-2$ , 1, and 3.

**Exercises**

Replace each  $\bullet$  with  $<$  or  $>$  to make a true statement.

1.  $-2 \bullet 0$

2.  $3 \bullet -3$

3.  $-9 \bullet 8$

4.  $-8 \bullet -3$

5.  $11 \bullet 3$

6.  $-2 \bullet 10$

Order each set of integers from least to greatest.

7.  $-2, 3, 0, -1, 1$

8.  $3, -3, -2, 1, -1$

9.  $5, -7, -2, 1, 9$

10.  $-2, 1, 5, -5, 0$

**11-1****Homework Practice****6-2.2, 6-2.3,  
6-1.6****Ordering Integers**Replace each ● with  $<$  or  $>$  to make a true sentence.

1.  $18 \bullet 23$

2.  $-9 \bullet -1$

3.  $-3 \bullet -5$

4.  $8 \bullet -2$

5.  $6 \bullet -3$

6.  $0 \bullet 8$

7.  $6 \bullet -7$

8.  $-23 \bullet -16$

Order each set of integers from least to greatest.

9. 10, -5, 3, 16, -1, 0, and 1

10. -2.5, 4, 23, -1, 5, -3, and 0.66

11. 1, -2.5, 0.75, 3, and -0.75

12. 63, -34, 36, -27, -13, and 12

Order each set of integers from greatest to least.

13. 8, 43, -25, 12, -14, and 3

14. -8, 32, 55, -32, -19, and -3

15. -100, -89, -124, -69, and -52

16. 6, 17, -20, 15, -19, and 26

**ROLLER COASTERS** The table shows how several roller coasters compare to the Mantis. Refer to the table to answer Exercises 17–20.

17. Which roller coaster has the greatest lift height?

18. What is the median lift height for the roller coasters listed? Round to the nearest tenth.

Roller Coaster	Lift Heights (ft)	Vertical Drop (ft)
Gemini	-20	-19
Magnum XL-200	60	58
Top Thrill Dragster	275	263
Mantis	0	0
Millenium Force	165	163
Mean Streak	16	18
Raptor	-8	-18

Source: Cedar Point

19. Arrange the given roller coasters from least to greatest lift height.

20. What is the median of the data for vertical drop?

**11-1****Problem-Solving Practice**6-2.2, 6-2.3,  
6-1.6**Ordering Integers**

1. **BUSES** Melanie, Byron, and Chin are all waiting at the bus stop. Melanie's bus leaves at 10 minutes after noon. Byron's bus leaves at 15 minutes before noon. Chin's bus leaves at 5 after noon. Arrange the three according to who will leave the bus stop first.

3. **GOLF** In a golf match, Jesse scored 5 over par, Neil scored 3 under par, Felipo scored 2 over par, and Dawson scored an even par. Order the players from least to greatest score.

5. **WEATHER** Use the table in Exercise 4. Compare the temperatures of Anchorage and Fairbanks using  $<$  or  $>$ .

2. **INTERNET** Darnell pays for 500 minutes of Internet use a month. The table indicates his Internet usage over the past 4 months. Positive values indicate the number of minutes he went over his allotted time and negative values indicate the number of minutes he was under. Arrange the months from least to most minutes used.

Month	Time
June	-20
July	65
August	-50
September	20

4. **WEATHER** The table shows the average normal January temperature of four cities in Alaska. Compare the temperatures of Barrow and Fairbanks, using  $<$  or  $>$ .

City	Temperature (°F)
Anchorage	15
Barrow	-13
Fairbanks	-10
Juneau	24

6. **WEATHER** Use the table from Exercise 4. Write the temperatures of the four cities in order from highest to lowest temperature.



**11-2 Explore Through Reading**

6-2.2, 6-1.1

**Adding Integers****Get Ready for the Lesson**

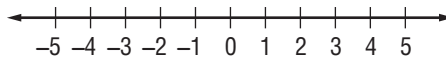
Complete the activity at the top of page 577 in your textbook.  
Write your answers below.

1. If he started on the red square with the star, how many squares to the right from where he started is he at the end?

**Read the Lesson**

For Exercises 2 and 3, look at the cards at the top of page 577 that Viviana selected for her first three turns.

2. Suppose you were using counters to find the result. Write directions that would show the result of his first three turns.
3. Suppose you were using a number line. Write directions that would show the result of his first three turns.
4. Using a number line, show that a zero pair results in 0.



5. Look at the Key Concept box at the bottom of page 578. It says that the sum of a positive integer and a negative integer is sometimes negative, sometimes positive, and sometimes 0. How can you tell which it will be?

**Remember What You Learned**

6. Work with a partner. Use the three rules for adding integers you have learned in this lesson to make up addition problems and sums to show each rule. Then have your partner prove your addition sum is correct by solving the problem using a number line or counters.

# 11-2 Study Guide

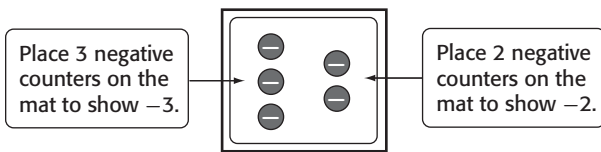


## Adding Integers

- The sum of two positive integers is always positive.
- The sum of two negative integers is always negative.
- The sum of a positive integer and a negative integer is sometimes positive, sometimes negative, and sometimes zero.

### Example 1 Find $-3 + (-2)$ .

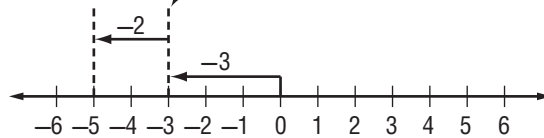
**Method 1** Use counters.



So,  $-3 + (-2) = -5$ .

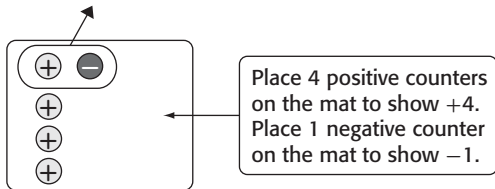
**Method 2** Use a number line.

Start at 0. Move 3 units to the left to show  $-3$ . From there, move 2 units to the left to show  $-5$ .



### Example 2 Find $4 + (-1)$ .

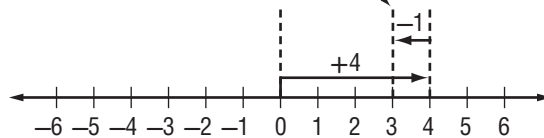
**Method 1** Use counters.



So,  $4 + (-1) = 3$ .

**Method 2** Use a number line.

Start at 0. Move 4 units to the right to show  $+4$ . From there, move 1 unit to the left to show  $+3$ .



### Exercises

**Add.** Use counters or a number line if necessary.

- |                |                |                 |
|----------------|----------------|-----------------|
| 1. $3 + (-6)$  | 2. $-9 + 8$    | 3. $-4 + 7$     |
| 4. $6 + (-6)$  | 5. $-8 + (-2)$ | 6. $2 + (-5)$   |
| 7. $6 + (-12)$ | 8. $-6 + (-5)$ | 9. $4 + (-3)$   |
| 10. $-12 + 5$  | 11. $-4 + 10$  | 12. $-3 + (-5)$ |

**11-2 Homework Practice**

6-2.2, 6-1.1

**Adding Integers****Add. Use counters or a number line if necessary.**

1.  $+8 + (+4)$

2.  $-10 + (+7)$

3.  $-2 + (-10)$

4.  $+9 + (-1)$

5.  $-6 + (-5)$

6.  $+8 + (+9)$

7.  $+5 + (-3)$

8.  $-4 + (-9)$

9.  $-2 + (+14)$

10.  $-15 + (+13)$

11.  $+10 + (+4)$

12.  $+8 + (-12)$

13.  $+16 + (-5)$

14.  $+9 + (-3)$

15.  $-3 + (-8)$

16.  $-1 + (+1)$

**Add.**

17.  $2 + (-9) + 3 + 6$

18.  $3 + (-8) + 7 + (-1) + (-11)$

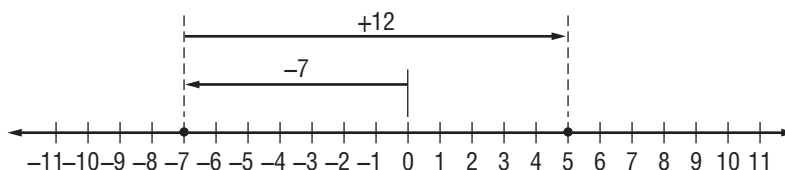
19.  $11 + 7 + (-3) + 5 + (-4)$

20.  $-2 + (-14) + 9 + 0 + 6$

21. **RAPPELLING** The Moaning Caverns in California are 410 feet deep. A rappeller descends by rope 165 feet into the main cavern. How much deeper can the rappeller go into the cavern?

22. **SEWING** Keisha discovered a mistake in her cross-stitch project after she had completed a row. To remove the mistake she had to pull out 72 stitches. She then sewed 39 stitches before having to change to a new thread color. If her starting point is zero, at what point is she in the row now?

23. Which expression is represented by the number line below?



**11-2 Problem-Solving Practice*****Adding Integers***

<p><b>1. GAME</b> To play a game on a game board, Drew puts his game piece on START. On his first turn, he moves his game piece ahead 7 spaces. On his second turn, Drew moves his game piece back 4 spaces. How many spaces away from START is his game piece now?</p>	<p><b>2. GAME</b> Frita's game piece is on square 24 of a game board. She draws a card that says, "Move back 4 spaces." Then she draws a card that says, "Move back 2 spaces." On which square is Frita's game piece now?</p>
<p><b>3. WEATHER</b> The temperature outside is <math>0^{\circ}\text{F}</math>. If the temperature drops <math>14^{\circ}</math> overnight, what was the overnight low temperature?</p>	<p><b>4. WEATHER</b> The temperature outside is <math>-16^{\circ}\text{F}</math>. Then the temperature rises 20 degrees. What is the current outdoor temperature?</p>
<p><b>5. ANIMALS</b> An ant crawls 14 centimeters down into an ant hole. It then crawls 6 centimeters up to the queen's nest. Write and solve an addition sentence that gives the location of the ant.</p>	<p><b>6. ANIMALS</b> Monarch butterflies travel an average of about 15 feet off the ground. One butterfly flies to a height of 22 feet. Tell how much higher it flies than average.</p>
<p><b>7. ANIMALS</b> Pacific salmon swimming up the Columbia River travel 2 feet under water. Suppose one salmon darts 3 feet up and out of the water. How far out of the water did the salmon jump?</p>	<p><b>8. ANIMALS</b> Plankton (microscopic animals) float on the top of a pond at night to feed. They drop to the bottom of the pond during the day. Express their daytime location as a negative number if the top of the pond is at sea level and the pond is 4 feet deep.</p>

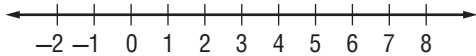
**11-3 Explore Through Reading**

6-2.2, 6-1.1

**Subtracting Integers****Get Ready for the Lesson**

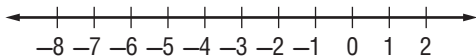
Complete the Mini Lab at the top of page 582 in your textbook.  
Write your answers below.

1. Model  $8 + (-2)$  using a number line.



2. Compare this model to the model for  $8 - 2$ . How is  $8 - 2$  related to  $8 + (-2)$ ?

3. Use a number line to model  $-3 + (-4)$ .



4. Compare this model to the model for  $-3 - 4$ . How is  $-3 - 4$  related to  $-3 + (-4)$ ?

**Read the Lesson**

5. What does the Mini Lab show?
6. What do the two pairs of equations near the bottom of page 582 show?
7. Look at Example 3, Method 1, on page 584. Why is it necessary to add 3 zero pairs in order to do the computation?

**Remember What You Learned**

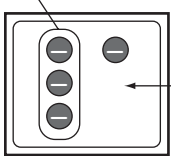
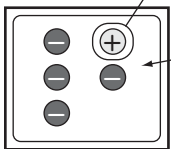
8. Work with a partner. Look at Check Your Progress toward the bottom of page 578. Change the three addition problems to subtraction problems. Solve the problems. Compare your answers with those of your partner.

**11-3****Study Guide**

6-2.2, 6-1.1

**Subtracting Integers**

To subtract an integer, add its opposite.

**Example 1** Find  $-4 - (-3)$ .**Method 1** Use counters.Place 4 negative counters on the mat to show  $-4$ . Remove 3 negative counters to show subtracting  $-3$ .So,  $-4 - (-3) = -1$ .**Example 2** Find  $-3 - 1$ .**Method 1** Use counters.Place 3 negative counters on the mat to show  $-3$ . To subtract  $+1$ , you must remove 1 positive counter. But there are no positive counters on the mat. You must add 1 zero pair to the mat. The value of the mat does not change. Then you can remove 1 positive counter.The difference of  $-3$  and  $1$  is  $-4$ .So,  $-3 - 1 = -4$ .**Method 2** Use the rule.

$$\begin{aligned} -4 - (-3) &= -4 + 3 && \text{To subtract } -3, \\ &= -1 && \text{add } 3. \\ &&& \text{Simplify.} \end{aligned}$$

**Method 2** Use the rule.

$$\begin{aligned} -3 - 1 &= -3 + (-1) && \text{To subtract } 1, \\ &= -4 && \text{add } -1. \\ &&& \text{Simplify.} \end{aligned}$$

**Exercises****Subtract. Use counters if necessary.**

1.  $+8 - 5$

2.  $-4 - 2$

3.  $7 - (-5)$

4.  $-3 - (-5)$

5.  $6 - (-10)$

6.  $-8 - (-4)$

7.  $-1 - 4$

8.  $2 - (-2)$

9.  $-5 - (-1)$

10.  $7 - 2$

11.  $-9 - (-9)$

12.  $6 - (-2)$

13.  $-8 - (-14)$

14.  $-2 - 9$

15.  $5 - 15$

**11-3 Homework Practice**

6-2.2, 6-1.1

**Subtracting Integers****Subtract. Use counters if necessary.**

1.  $12 - 9$

2.  $11 - 13$

3.  $-6 - 15$

4.  $8 - 4$

5.  $-8 - (-15)$

6.  $-8 - (-5)$

7.  $10 - (-12)$

8.  $-1 - 6$

9.  $5 - (-5)$

10.  $-7 - (-13)$

11.  $-17 - (-19)$

12.  $3 - (-13)$

13.  $-3 - 9$

14.  $14 - (-4)$

15.  $0 - (-8)$

16.  $-13 - (-12)$

17. The table at the right shows the results of two consecutive Biology tests for James, Mazen, Mia, and Shameeka. What is the test differential for each student?

Biology Test Results		
Student	Test 1	Test 2
James	84	96
Mazen	98	89
Mia	70	86
Shameeka	100	98

18. **ALGEBRA** Evaluate  $c - d$  if  $c = 4$  and  $d = 9$ .

19. The blue whale can dive as deep as 1,640 feet. A blue whale is at 600 feet below sea level and rises 370 feet to feed. It then dives 90 feet. Where is it?

20. **SWIMMING** Sara swims at the community center every day. One week she swam a total of 13.5 hours. Complete the table.

Day	Number of Hours
Monday	1.5
Tuesday	2.0
Wednesday	1.5
Thursday	1.5
Friday	2.0
Saturday	
Sunday	2.0

**11-3 Problem-Solving Practice**

6-2.2, 6-1.1

**Subtracting Integers****MONEY** For Exercises 1–4, use the transaction register.

A transaction register is used to record money deposits and withdrawals from a checking account. It shows how much money Mandy, a college student, had in her account as well as the 4 checks she has written so far.

Check No.	Date	Description of Transaction	Payment	Deposit	Balance
	9/04	spending money from parents		\$500	\$500
1	9/07	college bookstore — textbooks	\$291		
2	9/13	graphing calculator	\$91		
3	9/16	bus pass	\$150		
4	9/24	Charlie's Pizza	\$12		

<p><b>1.</b> Subtract each withdrawal to find the balance after each check was written. If Mandy spends more than \$500, record that amount as a negative number.</p>	<p><b>2.</b> Which check did Mandy write that made her account overdrawn?</p>
<p><b>3.</b> Mandy called home and asked for a loan. Her parents let her borrow \$500. What is her balance now?</p>	<p><b>4.</b> After her parents let her borrow the \$500 from Exercise 3, Mandy wants to spend \$300 on clothes and \$150 on decorations for her dorm room. Does she have enough money in the bank? Express her balance with an integer if she buys these items.</p>
<p><b>5. WEATHER</b> At 2 p.m., the temperature was <math>-9^{\circ}\text{F}</math>. If the temperature drops 20 degrees, what is the new temperature?</p>	<p><b>6. BASKETBALL</b> During a high school basketball game, the home team scored 51 points and the opponents scored 62 points. What is the point differential (the difference between the number of points scored by a team and its opponent) for the home team?</p>



**11-4****Explore Through Reading**

6-2.2, 6-1.1

***Multiplying Integers*****Get Ready for the Lesson**

Complete the Mini Lab at the top of page 587 in your textbook.  
Write your answers below.

1. Use counters to find  $4 \times (-3)$  and  $5 \times (-2)$ .
2. **MAKE A CONJECTURE** What is the sign of the product of a positive and negative integer?

**Read the Lesson**

3. How does the Mini Lab show that  $3 \times 2 = +6$ ?
4. How does the Mini Lab show that  $3 \times (-2) = -6$ ?
5. In Examples 1 and 2 on page 588, how do you know that the products should be negative?
6. In Examples 3 and 4 on page 588, how do you know that the products should be positive?

**Remember What You Learned**

7. Look at Example 5 on page 588. Imagine that all you see is the statement of the problem. From the problem, what words indicate that the pattern will start at 0 and progress in the negative direction? How could the problem be reworded to indicate a progression in the positive direction?

**11-4****Study Guide**

6-2.2, 6-1.1

**Multiplying Integers**

- The product of two integers with different signs is negative.
- The product of two integers with the same sign is positive.

**Example 1 Multiply.**

**1**  $2 \times (-1)$

 $2 \times (-1) = -2$  The integers have different signs. The product is negative.

**2**  $-4 \times 3$

 $-4 \times 3 = -12$  The integers have different signs. The product is negative.

**3**  $3 \times 5$

 $3 \times 5 = 15$  The integers have the same sign. The product is positive.

**4**  $-2 \times (-4)$

 $-2 \times (-4) = 8$  The integers have the same sign. The product is positive.**Exercises****Multiply.**

**1.**  $3 \times (-3)$

**2.**  $-5 \times (-2)$

**3.**  $-8 \times (-1)$

**4.**  $-2 \times 8$

**5.**  $4 \times -3$

**6.**  $-3 \times (-2)$

**7.**  $5 \times (-4)$

**8.**  $-10 \times (-4)$

**9.**  $-3 \times 6$

**10.**  $-3 \times (-10)$

**11.**  $6 \times (-4)$

**12.**  $-7 \times (-7)$

**11-4****Homework Practice**

6-2.2, 6-1.1

**Multiplying Integers****Multiply.**

1.  $-2 \times 15$

2.  $-4 \times (-11)$

3.  $-3 \times (-3)$

4.  $7(2)$

5.  $6(-8)$

6.  $13 \times 8$

7.  $15(-6)$

8.  $-12 \times 3$

9.  $-10(-4)$

10.  $-1(-7)$

11.  $8 \times 3$

12.  $-6 \times (-4)$

13.  $13 \times 7$

14.  $2 \times (-6)$

15.  $-9 \times 9$

16.  $-3(-14)$

17.  $9(-3 - 8)$

18.  $-7(4)(-5)$

19.  $-2(6 + (-7))$

20.  $7(-3 + 3)$

21.  $-2(8 + (-6))$

22.  $3(-5)(2)$

23.  $4(-2 + 9)$

24.  $-3(-4 - 4)$

25. **PATTERNS** Find the next two numbers in the pattern. Then describe the pattern.

$$8, -24, 72, -216, \dots$$

26. **ALGEBRA** Find the value of  $mn$  if  $m = -7$  and  $n = -12$ .

27. **CONSTRUCTION** The arm and torch of the Statue of Liberty were completed for the International Centennial Exhibition in Philadelphia in 1876. It took 20 men working 10 hours a day, 7 days a week, to complete it for the exhibition. What was the total number of hours worked in a week?

28. **EXERCISE** After finishing her workout, Felicia's heart rate decreased by 2 beats per minute for each of the next 5 minutes. Write an integer to represent the change in her heart rate at the end of 5 minutes.

**11-4 Problem-Solving Practice**

6-2.2, 6-1.1

***Multiplying Integers***

<p><b>1. BASKETBALL</b> A basketball player who makes a basket scores 2 points for her team. Tanya made 9 baskets in the game. Write a number sentence to show how many points she scored for her team.</p>	<p><b>2. HEALTH</b> Jim was recovering in the shade from a walk in the hot desert. His temperature dropped <math>2^{\circ}\text{F}</math> each hour for 2 hours. What was the total change in his temperature?</p>
<p><b>3. WEATHER</b> The outside temperature is <math>-3^{\circ}\text{F}</math> and falling at a rate of 2 degrees per hour. What will the temperature be in 5 hours?</p>	<p><b>4. POPULATION</b> A small town is losing residents at a rate of 24 residents per year. If this pattern continues for 5 years, what will be the change in relation to the original population?</p>
<p><b>5. SCIENCE</b> A pebble falls into a pond. From the surface, it descends at a rate of 2 feet per second. Where is the pebble in relation to the surface of the pond after 5 seconds?</p>	<p><b>6. CONSTRUCTION</b> A construction company is starting to excavate a hole for a new underground parking garage. If the company excavates 3 feet every hour for 4 hours, what will be the depth of the hole in relation to the surface?</p>
<p><b>7. WEATHER</b> The outside temperature is <math>-20^{\circ}\text{F}</math> and rising at a rate of 5 degrees per hour. How long will it be before the temperature reaches <math>0^{\circ}\text{F}</math>?</p>	<p><b>8. SCIENCE</b> For each kilometer above Earth's surface, the temperature decreases <math>7^{\circ}\text{C}</math>. If the temperature at Earth's surface is <math>-8^{\circ}</math>, what will be the temperature 7 kilometers above the surface?</p>

**11-5 Study Guide**

6-2.2, 6-1.1

**Problem-Solving Investigation: Work Backward**

When solving problems, one strategy that is helpful is to *work backward*. Sometimes you can use information in the problem to work backwards to find what you are looking for, or the answer to the problem.

You can use the *work backward* strategy, along with the following four-step problem solving plan to solve a problem.

- 1 Understand** — Read and get a general understanding of the problem.
- 2 Plan** — Make a plan to solve the problem and estimate the solution.
- 3 Solve** — Use your plan to solve the problem.
- 4 Check** — Check the reasonableness of your solution.

**Example 1** **TIME** Meagan is meeting her friends at the library at 6:30 P.M. Before her mom takes her to the library, they are going to stop by her grandma's house to drop something off. It takes 15 minutes to get from her house to her grandma's house and they will stay and visit for 30 minutes. If it takes 5 minutes to get from her grandma's house to the library, what time should Meagan and her mom leave their house?

**Understand** We know the time Meagan is meeting her friends at the library. We need to find what time Meagan and her mom should leave their house.

**Plan** To find the time they should leave, start with the 6:30 P.M. and first subtract 5 minutes for the time it takes to get from her grandma's house to the library.

**Solve** Time from grandma's to library: 6:30 P.M. — 5 minutes = 6:25 P.M.  
 Time visiting with grandma: 6:25 P.M. — 30 minutes = 5:55 P.M.  
 Time from home to grandma's: 5:55 P.M. — 15 minutes = 5:40 P.M.

Meagan and her mom should leave their house at 5:40 p.m.

**Check** Add up all the times, 15 min + 30 min + 5 min = 50 min. When you subtract 50 minutes from 6:30, the result is 5:40, so the answer is correct.

**Exercises**

**NUMBER SENSE** A number is divided by 3. Next, 7 is added to the quotient. Then, 10 is subtracted from the sum. If the result is 5, what is the number?

**11-5****Skills Practice**

6-2.2, 6-1.1

**Problem-Solving Investigation: Work Backward**

**Solve. Use the work backward strategy.**

- 1. MONEY** Leila bought 2 pairs of shoes that were the same price. Including the \$3 sales tax, she paid a total of \$57. What was the cost of each pair of shoes before the tax was added?
  
- 2. TIME** Hung has to be at school by 7:10 A.M. It takes 20 minutes for Hung to shower and get dressed and 15 minutes to eat breakfast. If Hung has a 25 minute bus ride to school, what is the latest time he should get up in the morning?
  
- 3. NUMBER SENSE** A number is multiplied by 4. Then 7 is added to the product. After subtracting 3, the result is 8. What is the number?
  
- 4. SCIENCE** A certain bacteria doubles its population every 12 hours. After 3 days, there were 1,600 bacteria. How many bacteria were there at the beginning of the first day?

**11-5 Homework Practice**

6-2.2, 6-1.1

**Problem-Solving Investigation: Work Backward****Mixed Problem Solving****Work backward to solve Exercises 1 and 2.**

- 1. NUMBER SENSE** A number is multiplied by 4. Next, 3 is added to the product, and then 11 is subtracted. If the result is 24, what is the number?
- 2.** Ichiko has guitar practice at 5:00 P.M. on Wednesday. It takes 20 minute for him to get to his lesson from school. He spends an hour in the science lab before leaving. If it takes 10 minutes to get ready for the lab, what time does his last class end?

**Use any strategy to solve Exercises 3–6. Some strategies are shown below.****Problem-Solving Strategies**

- Act it out.
- Make a table.
- Choose the method of computation.

- 3. GEOGRAPHY** North America has an area of 21,393,762 square kilometers. South America has an area of 17,522,371 square kilometers. What is the combined area of these two continents?

- 4. FLIGHT SCHOOL** The list shows how many times each of 20 students practiced with a piloting simulator at a flight training school one day.

9 11 12 9 6 12 10 8 13 14  
8 9 13 11 10 8 12 9 10 8

Make a frequency table to find how many more students practiced with the simulator 9–11 times than 12–14 times.

- 5. FOOD** The total cost for a take-out lunch was \$20. If four friends share the cost equally, how much will each friend pay?

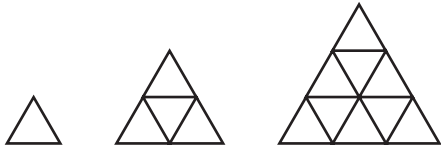
- 6. MONEY** Mai had \$210 in her checking account at the beginning of the month. She wrote checks for \$32 and \$9.59. At the end of the month, the bank credited her account with \$0.84 interest. How much money did Mai have in the account then?

**11-5 Problem-Solving Practice**

6-2.2, 6-1.1

**Problem-Solving Investigation: Work Backward**

- 1. PATTERNS** How many triangles are in the bottom row of the fifth figure of this pattern?



- 2. POPULATION** How many more people lived in Los Angeles than in Houston in 2004?

Five Largest U.S. Cities in 2004	
City	Population
New York, NY	8,104,079
Los Angeles, CA	3,845,541
Chicago, IL	2,862,244
Houston, TX	2,012,626
Philadelphia, PA	1,470,151

- 3. BASEBALL CARDS** Jamal has 45 baseball cards. He is collecting 5 more cards each month. Alicia has 30 baseball cards, and she is collecting 10 more each month. How many months will it be before Alicia has more cards than Jamal?

- 4. FOOD** Is \$9 enough money to buy a loaf of bread for \$0.98, one pound of cheese for \$3.29, and one pound of lunch meat for \$4.29? Explain.

- 5. MEASUREMENT** If there are 8 fluid ounces in 1 cup, 2 cups in 1 pint, 2 pints in 1 quart, and 4 quarts in 1 gallon, how many fluid ounces are in 1 gallon?

- 6. GIFT GIVING** Alita, Alisa, and Alano are sharing the cost of their mother's birthday gift, which costs \$147. About how much money will each child need to contribute?



**11-6****Explore Through Reading**

6-2.2, 6-1.1

***Dividing Integers*****Get Ready for the Lesson**

Complete the Mini Lab at the top of page 594 in your textbook.  
Write your answers below.

1. Explain how you would model  $-9 \div 3$ .
  
2. What would you do differently to model  $8 \div 2$ ?

**Read the Lesson**

3. What is the definition of *division*?
  
4. Write in words what  $10 \div 5$  means.
  
5. Write in words what  $-10 \div 2$  means.
  
6. How do the rules for determining signs of quotients compare with the rules for determining the signs of products?
  
7. Look at Example 6 on page 595. Which words tell you that the answer will be a negative number?

**Remember What You Learned**

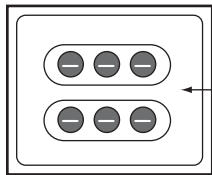
8. Work with a partner. Make two models that show integers divided into equal groups. Give the models to your partner and have your partner write the division expression for each model.

**11-6****Study Guide**

6-2.2, 6-1.1

**Dividing Integers**

- The quotient of two integers with different signs is negative.
- The quotient of two integers with the same sign is positive.

**Example 1** Use counters to find  $-6 \div 2$ .

There are 2 groups  
of 3 negative counters  
each.

So,  $-6 \div 2 = -3$ .**Examples** Divide.

**2**  $10 \div (-5)$

Since  $-5 \times (-2) = 10$ , it follows that  $10 \div (-5) = -2$ .

**3**  $-12 \div (-3)$

Since  $-3 \times 4 = -12$ , it follows that  $-12 \div (-3) = 4$ .**Exercises****Divide.**

1.  $4 \div (-2)$

2.  $-9 \div (-3)$

3.  $-8 \div 2$

4.  $-21 \div 7$

5.  $30 \div (-5)$

6.  $-24 \div 4$

7.  $-36 \div 6$

8.  $-45 \div (-5)$

9.  $-81 \div 9$

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

11.  $70 \div (-7)$

12.  $-64 \div (-8)$

13. **ALGEBRA** Find the value of  $a \div b$  if  $a = -18$  and  $b = 6$ .14. **ALGEBRA** For what value of  $p$  is  $p \div 5 = -7$  true?

**11-6 Homework Practice**

6-2.2, 6-1.1

**Dividing Integers****Divide.**

1.  $33 \div (-3)$

2.  $-84 \div (-6)$

3.  $-26 \div 13$

4.  $92 \div (-23)$

5.  $-96 \div 4$

6.  $36 \div (-6)$

7.  $76 \div 4$

8.  $-12 \div (-6)$

9.  $-30 \div (-5)$

10.  $-42 \div 7$

11.  $18 \div (-2)$

12.  $-27 \div 9$

13.  $69 \div 23$

14.  $52 \div 13$

15.  $-40 \div (-10)$

16.  $28 \div (-4)$

17.  $\frac{-8 - 7}{-5}$

18.  $\frac{5 - (-4) + (-9 + 6)}{6}$

19.  $\frac{(21 \div 3) \times 8}{-4}$

20.  $\frac{(-3 + (-2)) \times (-6 + 1)}{5}$

21. **MILKING** It takes 20 minutes for a cow to be milked by a milking machine. How many cows can be milked in 6 hours?

22. **ALGEBRA** What is the value of  $s \div t$  if  $s = -18$  and  $t = -6$ ?

23. **TESTING** Thi wants to find the average of her last four math tests. She scored 96 on her first test. Use the table to find her average score for the four tests.

Thi's Tests	
Test 1	0
Test 2	-13
Test 3	-5
Test 4	3

24. **GASOLINE** The price of a gallon of gasoline increased by 5 cents one week, decreased by 3 cents each of the next two weeks, and increased by 7 cents the fourth week. Find the average change in the price of gasoline for the 4 weeks.

**11-6****Problem-Solving Practice**

6-2.2, 6-1.1

***Dividing Integers***

<p><b>1. SKATING</b> Judges in some figure skating competitions must give a mandatory 5-point deduction for each jump missed during the technical part of the competition. Marisa has participated in 5 competitions this year and has been given a total of <math>-20</math> points for jumps missed. How many jumps did she miss?</p>	<p><b>2. SKATING</b> Miranda is an excellent spinner who averages <math>+3</math> points on her spins during competitions. Last year her total spin points equaled <math>+21</math>. About how many spins did she successfully complete?</p>
<p><b>3. WEATHER</b> The temperature dropped <math>32^{\circ}\text{F}</math> in 4 hours. Suppose the temperature dropped by an equal amount each hour. What integer describes the change?</p>	<p><b>4. SKATING</b> Dan's scores for speed this season are <math>-1, -3, 1, -1, -2, 0</math>. What is his average speed score for the season? (Hint: The average is the sum of the points divided by the number of scores.)</p>
<p><b>5. FOOTBALL</b> A football team was penalized 30 points in 3 plays. Suppose the team was penalized an equal number of yards on each play. Write an integer that gives the yards for each penalty.</p>	<p><b>6. BASKETBALL</b> A team scored a total of 27 points for three-point field goals in the season. How many 3-point field goals did they make?</p>
<p><b>7. TRACK</b> Anna and Sara both ran 5 laps of a race. When Anna finished, Sara was 15 meters behind Anna. Suppose Sara fell behind the same number of meters during each lap. Write an integer that describes how far Sara fell behind in each lap.</p>	<p><b>8. BAKING</b> Maria was penalized a total of 12 points in 6 baking contests for not starting on time. Suppose she was penalized an equal number of points at each competition. Write an integer that describes the penalty during each contest.</p>

**11-7****Explore Through Reading**

6-4.1, 6-1.7

***The Coordinate Plane*****Get Ready for the Lesson**

Complete the activity at the top of page 599 in your textbook.  
Write your answers below.

1. Describe the location of the barber shop in relation to the town hall.
2. What building is located 7 miles east and 5 miles north of the town hall?
3. Violeta is at the library. Describe how many blocks and in what direction she should travel to get to the supermarket.
4. Let north and east directions be represented by positive integers. Let west and south directions be represented by negative integers. Describe the location of the high school as an ordered pair using integers.
5. Describe the location of the bank as an ordered pair using integers.

**Read the Lesson**

6. Describe how to locate the point  $(-5, -3)$  on a coordinate grid.
7. In which quadrant is the point  $(-5, -3)$ ?

**Remember What You Learned**

8. Work with a partner. Draw a coordinate system that can be used to locate objects in your classroom. Have one person say the ordered pair of a location and the other say what object is located at that point.

# 11-7

## Study Guide



6-4.1, 6-1.7

### The Coordinate Plane

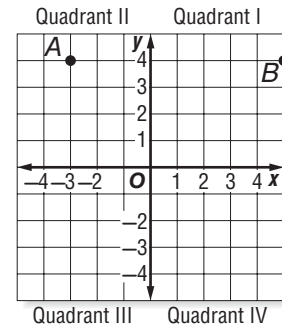
The  $x$ -axis and  $y$ -axis separate the coordinate system into four regions called **quadrants**.

**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.

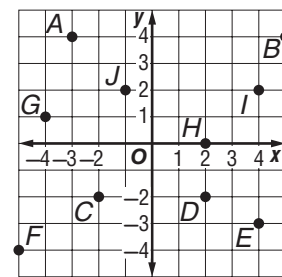
Since the  $y$ -coordinate is  $4$ , move  $4$  units up.

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

See grid at the top of the page.

### Exercises

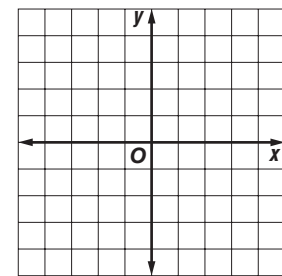
Use the coordinate plane at the right. Write the ordered pair that names each point.



- |        |        |
|--------|--------|
| 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. $I(2, -3)$ |

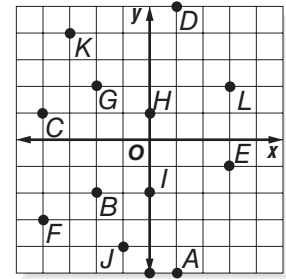


# 11-7 Homework Practice



## The Coordinate Plane

Use the coordinate plane at the right for Exercises 1–6. Identify the point for each ordered pair.

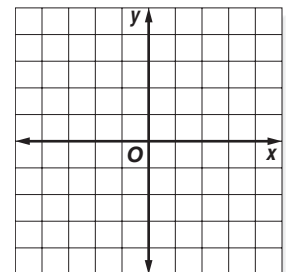


- |               |               |
|---------------|---------------|
| 1. $(-3, 4)$  | 2. $(-4, -3)$ |
| 3. $(-2, -2)$ | 4. $(3, -1)$  |
| 5. $(0, 1)$   | 6. $(-1, -4)$ |

For Exercises 7–12, use the coordinate plane above. Write the ordered pair that names each point. Then identify the quadrant where each point is located.

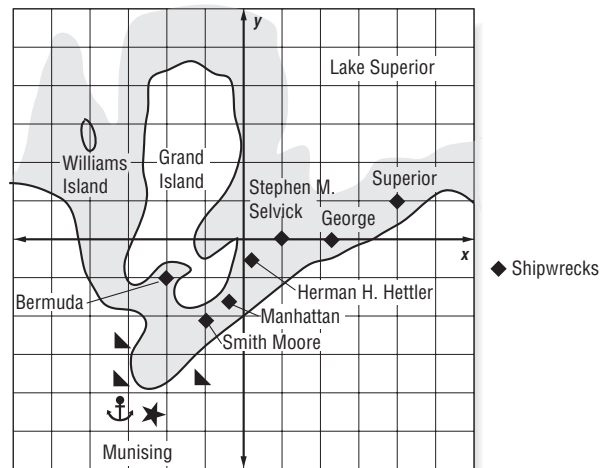
- |              |              |
|--------------|--------------|
| 7. <i>C</i>  | 8. <i>L</i>  |
| 9. <i>D</i>  | 10. <i>A</i> |
| 11. <i>G</i> | 12. <i>I</i> |

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



- |                 |                |
|-----------------|----------------|
| 13. $L(-2, 0)$  | 14. $M(5, 2)$  |
| 15. $N(-4, -3)$ | 16. $P(1, -1)$ |
| 17. $Q(0, -4)$  | 18. $R(3, -3)$ |

Use the map of the Alger Underwater Preserve in Lake Superior to answer the following questions.



- In which quadrant is the Stephen M. Selvick located?
- What is the ordered pair that represents the location of the Bermuda? the Superior?
- Which quadrant contains Williams Island?
- Which shipwreck is closest to the origin?



# Mini-Project



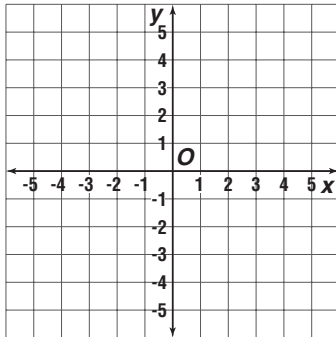
6-4.1, 6-1.7

(Use with Lesson 11-7)

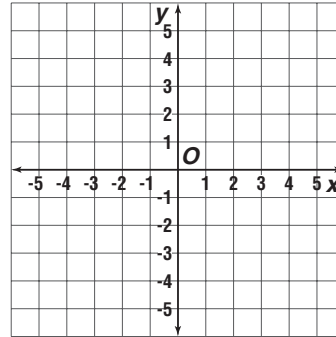
## The Coordinate System

- Graph and label each point.
- Connect the points in order, including the last and the first points.
- Name the figure.

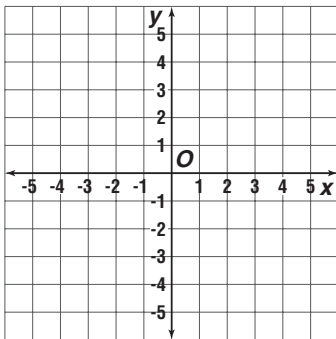
- $A(-3, 3)$ ,  $B(1, 3)$ ,  $C(1, -1)$ ,  
 $D(-3, -1)$



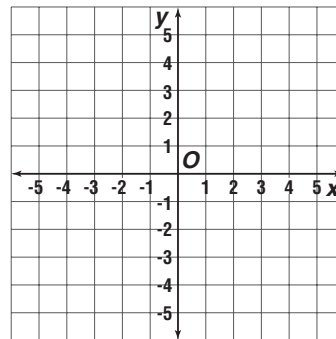
- $J(-5, 2)$ ,  $K(3, 2)$ ,  $L(3, -3)$ ,  
 $M(-5, -3)$



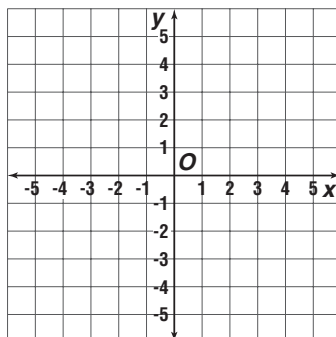
- $P(-3, 3)$ ,  $Q(2, 3)$ ,  $R(5, -2)$ ,  
 $S(-5, -2)$



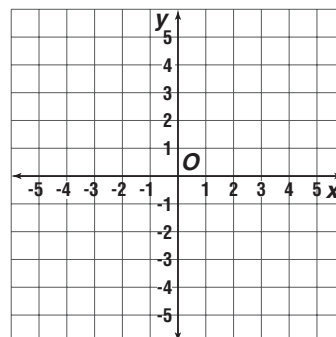
- $E(-3, 4)$ ,  $F(4, 2)$ ,  $G(4, -2)$ ,  
 $H(-3, 0)$



- $S(-4, 5)$ ,  $T(0, 5)$ ,  $U(0, -2)$ ,  
 $V(-4, -2)$



- $P(-2, 4)$ ,  $Q(1, 4)$ ,  $R(3, 1)$ ,  $S(3, -1)$ ,  
 $T(1, -4)$ ,  $U(-2, -4)$ ,  $V(-4, -1)$ ,  
 $W(-4, 1)$





**11-8****Explore Through Reading**6-4.5, 6-4.6,  
6-4.1, 6-4.2,  
6-1.7**Translations****Get Ready for the Lesson**

Read the problem at the top of page 604. Write your answers below.

1. On Jose's second turn, he spins a 4. Describe where his piece will be after moving.
  
2. Did the size or shape of the came piece change after moving?

**Read the Lesson**

3. Example 1 shows the translation of a square. What is used to indicate the new vertices?
  
4. In Example 2, a triangle is translated. What shape is the resulting figure?
  
5. In Example 3, what would be the ordered pair of  $A'$  if the original figure was translated 5 units right and 4 units down?
  
6. A point at ordered pair  $(2, 4)$  is translated 3 units right and 2 units up and then translated again 2 units left and 3 units up. What is the ordered pair of the final point? How would you write this as one translation?

**Remember What You Learned**

7. If a figure with vertices  $X(2, 3)$ ,  $Y(-1, 5)$ , and  $Z(3, -6)$  is translated 3 units left and 4 units up, find the vertices of the translated figure.

# 11-8 Study Guide



6-4.5, 6-4.6,  
6-4.1, 6-4.2,  
6-1.7

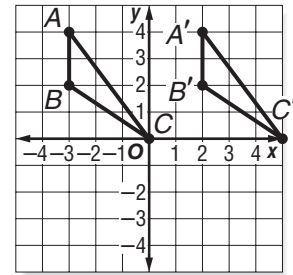
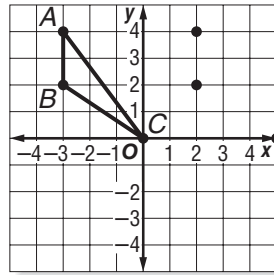
## Translations

- A transformation is a movement of a geometric figure.
- The resulting figure is called the image.
- A translation is the sliding of a figure without turning it.
- A translation does not change the size or shape of a figure.

### Example 1 Translate triangle ABC 5 units to the right.

**Step 1** Move each vertex of the triangle 5 units right. Label the new vertices  $A'$ ,  $B'$ ,  $C'$ .

**Step 2** Connect the new vertices to draw the triangle. The coordinates of the vertices of the new triangle are  $A'(2, 4)$ ,  $B'(2, 2)$ , and  $C'(5, 0)$ .



**Example 2** A placemat on a table has vertices at  $(0, 0)$ ,  $(3, 0)$ ,  $(3, 4)$ , and  $(0, 4)$ . Find the vertices of the placemat after a translation of 4 units right and 2 units up.

Vertex	$(x + 4, y + 2)$	New vertex
$(0, 0)$	$(0 + 4, 0 + 2)$	$(4, 2)$
$(3, 0)$	$(3 + 4, 0 + 2)$	$(7, 2)$
$(3, 4)$	$(3 + 4, 4 + 2)$	$(7, 6)$
$(0, 4)$	$(0 + 4, 4 + 2)$	$(4, 6)$

### Exercises

Find the coordinates of the image of  $(2, 4)$ ,  $(1, 5)$ ,  $(1, -3)$ , and  $(3, -4)$  under each transformation.

- 2 units right
- 4 units down
- 3 units left and 4 units down
- 45 units right and 3 units up

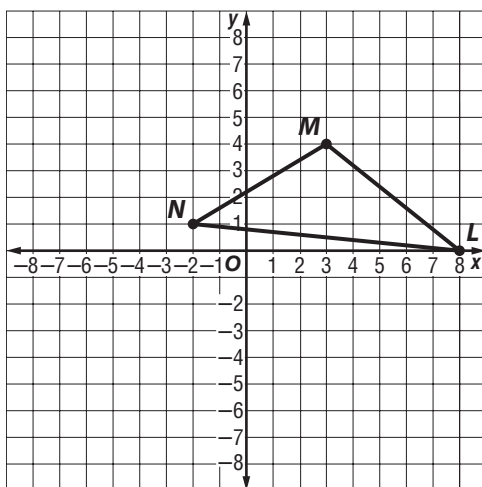
# 11-8 Homework Practice



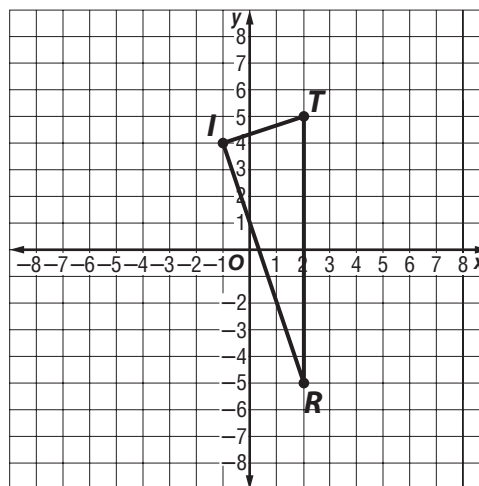
6-4.5, 6-4.6,  
6-4.1, 6-4.2,  
6-1.7

## Translations

1. Translate  $LMN$  5 units down. Graph triangle  $L'M'N'$ .



2. Translate  $TRI$  2 units left and 3 units up. Graph  $T'R'I'$ .



A table has vertices of  $(0, 3)$ ,  $(6, 2)$ ,  $(0, 8)$ , and  $(-2, 5)$  on a floor. Find the vertices of the table after each translation.

- |                                  |                                    |
|----------------------------------|------------------------------------|
| 3. 4 units right                 | 4. 2 units left                    |
| 5. 6 units up                    | 6. 9 units down                    |
| 7. 1 unit left and 5 units up    | 8. 7 units right and 8 units up    |
| 9. 4 units left and 6 units down | 10. 9 units right and 3 units down |
| 11. 1 unit left and 9 units up   | 12. 5 units right and 7 units down |
13. One of the vertices of a square is  $(3, 5)$ . What is the ordered pair of the image after a translation of 3 units up, 5 units left and then 4 units down? What translation will give the same result?

**11-8 Problem-Solving Practice**6-4.5, 6-4.6,  
6-4.1, 6-4.2,  
6-1.7**Translations**

<p><b>1. PICNIC TABLE</b> After moving a picnic table at a shelter, the coordinates of its corners are <math>(3, 4)</math>, <math>(-2, 4)</math>, <math>(3, 2)</math> and <math>(-2, 2)</math>. If the picnic table was moved 3 units left and 4 units up, what were the original coordinates of the picnic table?</p>	<p><b>2. CAMPING</b> The Larsons' tent corners have the coordinates <math>(0, 5)</math>, <math>(5, 5)</math>, <math>(5, 0)</math>, <math>(0, 0)</math>. They want to move it 5 units right and 2 units up. What are the new coordinates of the tent corners?</p>
<p><b>3. FLOWER BEDS</b> Jeanne's flower bed has the following coordinates for its corners: <math>(-1, 2)</math>, <math>(-1, -2)</math>, <math>(2, -2)</math>, <math>(2, 2)</math>. She wants to move it 3 units left and 2 units up. What are the coordinates of the corners of the new flower bed?</p>	<p><b>4. baseball</b> The corners of home plate are now at <math>(0, 0)</math>, <math>(1, 0)</math>, <math>(1, 1)</math>, and <math>(0, 1)</math>. It was moved 2 units right and 3 units down from its previous position. What are the original coordinates of home plate?</p>
<p><b>5. LOGOS</b> A company is designing a logo that uses a triangle. The triangle's corners has coordinates <math>(3, 4)</math>, <math>(-2, -2)</math> and <math>(5, -1)</math>. They decide to move the triangle left 2 units and up 4 units. What are the new coordinates of the corners of the translated triangle?</p>	<p><b>6. T-SHIRTS</b> The final position of a T-shirt design has corners at <math>(2, 3)</math>, <math>(-5, 1)</math> and <math>(4, 0)</math>. This is a translation of 4 units left and 3 units down from the original position. What were the coordinates of the original corners?</p>

**11-9****Explore Through Reading****6-4.4, 6-4.5,  
6-4.1, 6-4.3,  
6-4.6****Reflections****Get Ready for the Lesson**

Read the problem at the top of page 610. Write your answers below.

1. What do you notice about each wing of the butterfly?
2. If the butterfly were to fold its wings together, would the markings on the butterfly's wings line up? Explain.

**Read the Lesson**

3. Example 1 shows the reflection of a figure over the  $x$ -axis. Which coordinate changes when reflecting over the  $x$ -axis? Explain.
4. In Example 2, a figure is reflected over the  $y$ -axis. Which coordinate changes when reflecting over the  $y$ -axis? Explain.
5. Describe a way to help you remember which coordinate changes?
6. What is the line of reflection?

**Remember What You Learned**

7. If a figure with vertices  $X(2, 3)$ ,  $Y(-1, 5)$ , and  $Z(3, -6)$  is reflected over the  $x$ -axis, find the vertices of the translated figure.

## 11-9

## Study Guide

## Reflections

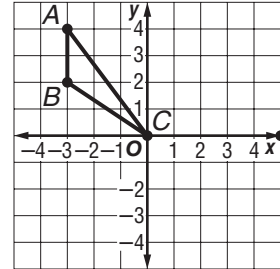
6-4.4, 6-4.5,  
6-4.1, 6-4.3,  
6-4.6

- A reflection is the mirror image that is created when a figure is flipped over a line.
- A reflection is a type of geometric transformation.
- When reflecting over the  $x$ -axis, the  $y$ -coordinate changes to its opposite.
- When reflecting over the  $y$ -axis, the  $x$ -coordinate changes to its opposite.

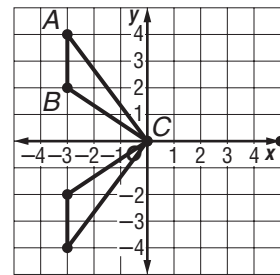
**Example 1** Reflect triangle  $ABC$  over the  $x$ -axis.

**Step 1** Graph triangle  $ABC$  on a coordinate plane. Then count the number of units between each vertex and the  $x$ -axis.

- $A$  is 4 units from the axis.  
 $B$  is 2 units from the axis.  
 $C$  is 0 units from the axis.



**Step 2** Make a point for each vertex the same distance away from the  $x$ -axis on the opposite side of the  $x$ -axis and connect the new points to form the image of the triangle. The new points are  $A'(-3, -4)$ ,  $B'(-3, -2)$ , and  $C'(0, 0)$ .

**Exercises**

Find the coordinates of the image of  $(2, 4)$ ,  $(1, 5)$ ,  $(1, -3)$  and  $(3, -4)$  under each transformation.

1. a reflection over the  $x$ -axis
2. a reflection over the  $y$ -axis

Find the coordinates of the image of  $(-1, 1)$ ,  $(3, -2)$  and  $(0, 5)$  under each transformation.

3. a reflection over the  $x$ -axis
4. a reflection over the  $y$ -axis

# 11-9

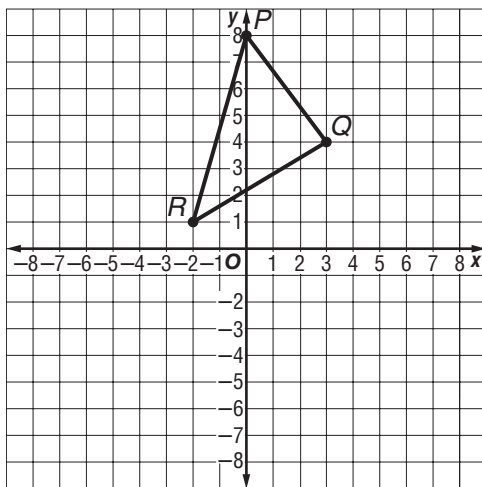
# Homework Practice



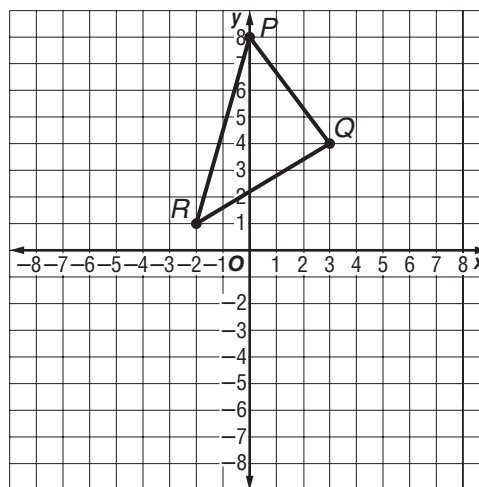
6-4.4, 6-4.5,  
6-4.1, 6-4.3,  
6-4.6

## Reflections

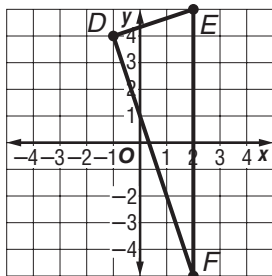
1. Reflect  $PQR$  over the  $x$ -axis. Graph  $P'Q'R'$ .



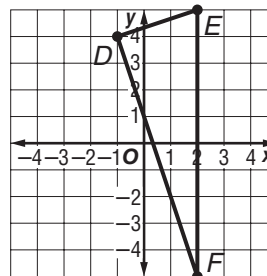
2. Reflect  $PQR$  over the  $y$ -axis. Graph  $P'Q'R'$ .



3. Reflect  $DEF$  over the  $x$ -axis. Graph  $D'E'F'$ .



4. Reflect  $DEF$  over the  $y$ -axis. Graph  $D'E'F'$ .



A table has vertices of  $(0, 3)$ ,  $(6, 2)$ ,  $(0, 8)$ , and  $(-2, 5)$  on a floor. Find the vertices of the table after each transformation.

5. a reflection over the  $x$ -axis                      6. a reflection over the  $y$ -axis

A piece of artwork has vertices of  $(2, 5)$ ,  $(-1, 6)$  and  $(0, -7)$  on a wall. Find the vertices of the table after each transformation.

7. a reflection over the  $x$ -axis                      8. a reflection over the  $y$ -axis

# 11-9

## Problem-Solving Practice



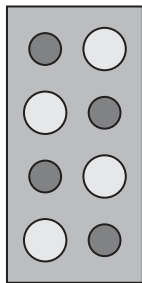
6-4.4, 6-4.5,  
6-4.1, 6-4.3,  
6-4.6

### Reflections

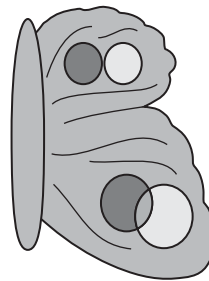
**1. FURNITURE** After moving a couch, the coordinates of its corners are  $(2, 5)$ ,  $(5, 5)$ ,  $(5, -3)$  and  $(2, -3)$ . If the couch was reflected over the  $x$ -axis, what were the original coordinates of the couch?

**2. CHALK** Chrissy is drawing a chalk design on the sidewalk. The corners have coordinates  $(3, 5)$ ,  $(-1, 2)$ , and  $(0, -5)$ . She wants to reflect it over the  $y$ -axis. What are the new coordinates on the artwork corners?

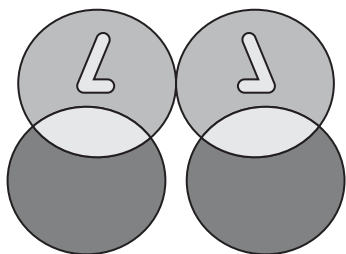
**3. ARTWORK** Ling's artwork uses reflections. The right half of her artwork is shown. Copy the design and draw the entire artwork after it has been reflected over a vertical line.



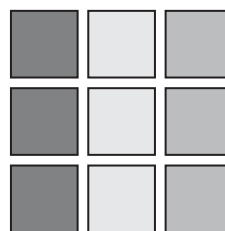
**4. BUTTERFLIES** Half of a butterfly is shown. The other half can be drawn by reflecting it over a vertical line. Copy the butterfly and draw the entire butterfly after it has been reflected over a vertical line.



**5. BOWLING SHIRTS** The design for the school's bowling team shirts is shown. Describe the transformation that was used to create the design.



**6. TILING** A floor tile design is shown below. Describe the transformation that was used to create the design.





**11-10****Explore Through Reading**6-4.3, 6-4.5,  
6-4.1, 6-4.2,  
6-4.4, 6-4.6**Rotations****MINI Lab**

Read the MINI Lab at the top of page 615. Write your answers below.

1. Describe the transformation that occurred from triangle  $ABC$  to triangle  $A'B'C'$ .
2. What are the coordinates of triangle  $A'B'C'$  ?

**Read the Lesson**

3. What is another name for a rotation?
4. What are the possible values for the degree of rotation?
5. Example 1 shows a rotation of  $90^\circ$  clockwise. Describe how a  $90^\circ$  clockwise turn affects the coordinates of the original points.
6. What does it mean for a figure to have rotational symmetry?

**Remember What You Learned**

7. If a figure with vertices  $X(2, 3)$ ,  $Y(-1, 5)$ , and  $Z(3, -6)$  is rotated  $90^\circ$  clockwise about the origin, find the vertices of the translated figure.

# 11-10 Study Guide

## Rotations



6-4.3, 6-4.5,  
6-4.1, 6-4.2,  
6-4.4, 6-4.6

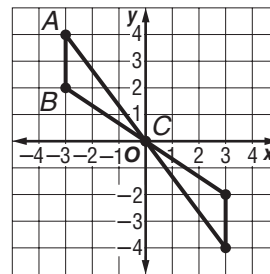
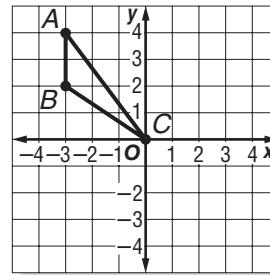
- A rotation occurs when a figure is rotated around a point.
- Another name for a rotation is a turn.
- In a rotation clockwise of  $90^\circ$  about the origin, the point  $(x, y)$  becomes  $(y, -x)$ .
- In a rotation clockwise of  $180^\circ$  about the origin, the point  $(x, y)$  becomes  $(-x, -y)$ .
- In a rotation clockwise of  $270^\circ$  about the origin, the point  $(x, y)$  becomes  $(-y, x)$ .

**Example 1** Rotate triangle  $ABC$  clockwise  $180^\circ$  about the origin.

**Step 1** Graph triangle  $ABC$  on a coordinate plane.

**Step 2** Sketch segment  $AO$  connecting point  $A$  to the origin. Sketch another segment  $A'O$  so that the angle between point  $A, O,$  and  $A'$  measures  $180^\circ$  and the segment is congruent to  $AO$ .

**Step 3** Repeat for point  $B$  (point  $C$  won't move since it is at the origin). Then connect the vertices to form triangle  $A'B'C'$ .



### Exercises

Find the coordinates of the image of  $(2, 4), (1, 5), (1, -3)$  and  $(3, -4)$  under each transformation.

1. a rotation of  $90^\circ$  about the origin
2. a rotation of  $270^\circ$  about the origin

Determine whether each figure has rotational symmetry. Write *yes* or *no*. If *yes*, name the angle(s) of rotation.

3. **X**

4. **Q**

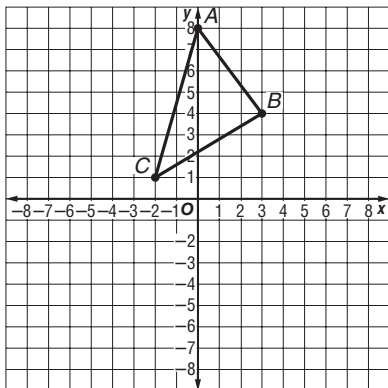
# 11-10 Homework Practice



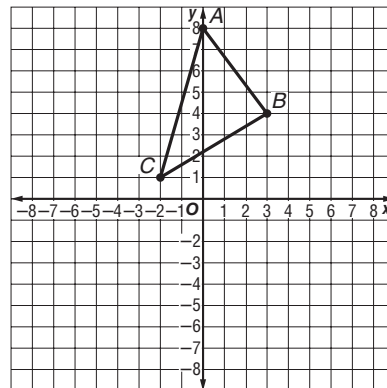
6-4.3, 6-4.5,  
6-4.1, 6-4.2,  
6-4.4, 6-4.6

## Rotations

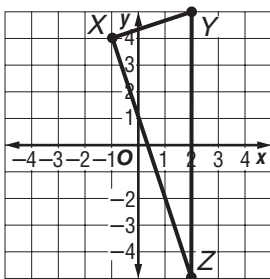
1. Rotate  $ABC$   $90^\circ$  about the origin.  
Graph  $A'B'C'$ .



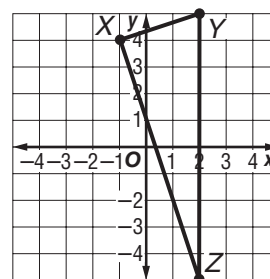
2. Rotate  $ABC$   $180^\circ$  about the origin.  
Graph  $A'B'C'$ .



3. Rotate  $XYZ$   $270^\circ$  about the origin.  
Graph  $X'Y'Z'$ .



4. Rotate  $XYZ$   $180^\circ$  about the origin.  
Graph  $X'Y'Z'$ .



Determine whether each figure has rotational symmetry. Write *yes* or *no*. If yes, name the angle(s) of rotation.

5. **N**

6. **H**

7.

8.

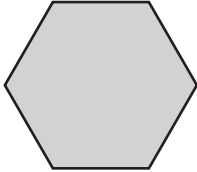
# 11-10 Problem-Solving Practice



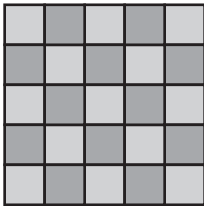
6-4.3, 6-4.5,  
6-4.1, 6-4.2,  
6-4.4, 6-4.6

## Rotations

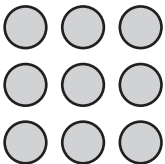
1. **JEWELRY** Does the jewel shown have rotational symmetry? If yes, what is the angle of rotation?



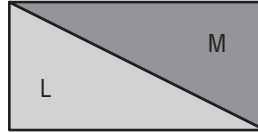
3. **QUILTS** Does the quilt shown have rotational symmetry? If yes, what is the angle of rotation?



5. **ART** Does the artwork shown have rotational symmetry? If yes, what is the angle of rotation?



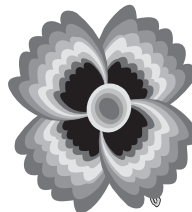
2. **LOGOS** Does the logo shown have rotational symmetry? If yes, what is the angle of rotation?



4. **BUTTERFLIES** Does the butterfly shown have rotational symmetry? If yes, what is the angle of rotation?



6. **FLOWERS** Does the flower shown have rotational symmetry? If yes, what is the angle of rotation?

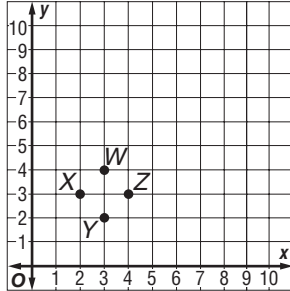




# Chapter 11 Test

## Mastering the SC Standards

- 1** Leon wants to find the location of an ordered pair. Which point represents the location of the ordered pair (3, 2)?



- (A) Point W  
 (B) Point X  
 (C) Point Y  
 (D) Point Z

6-4.1

- 2** What number completes the sentence below?

$$17 + \underline{\quad} = 0$$

- (A) 71  
 (B) 17  
 (C) 0  
 (D) -17

6-2.2

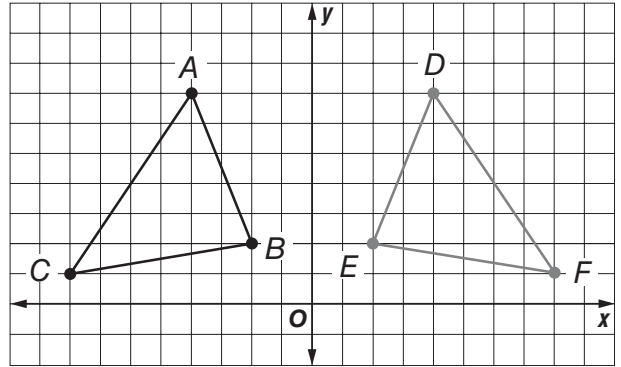
- 3** Which symbol makes this sentence true?

$$-4 \square -7$$

- (A) >  
 (B) <  
 (C) =  
 (D) ≥

6-2.3

- 4** Triangle ABC was transformed to form triangle DEF below.



Which transformation is shown above?

- (A) rotation  
 (B) translation  
 (C) tessellation  
 (D) reflection

6-4.5

- 5** What is the solution to  $-7 \times 8$ ?

- (A) 56  
 (B) -56  
 (C) 63  
 (D) -63

6-2.2

- 6** Which integer is closest to zero?

- (A) 3  
 (B) -2  
 (C) 5  
 (D) -4

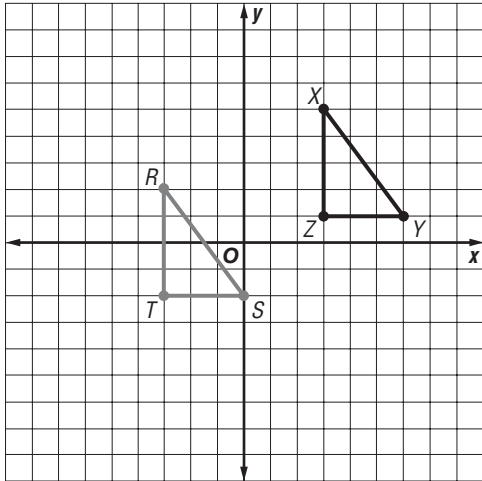
6-2.3



# Chapter 11 Test (continued)

## Mastering the SC Standards

- 7** In the graph below,  $\triangle XYZ$  is a translation of  $\triangle RST$ . Which of the following describes the translation?



- Ⓐ 6 units down and 3 units to the left  
 Ⓑ 3 units up and 6 units to the right  
 Ⓒ 6 units to the left and 1 unit down  
 Ⓓ 3 units up and 1 unit to the right

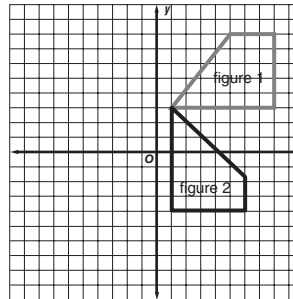
**6-4.6**

- 8** What is the solution to  $-17 - 9$ ?

- Ⓐ 7  
 Ⓑ 8  
 Ⓒ -8  
 Ⓓ -26

**6-2.2**

- 9** In the graph below, figure 1 was transformed to form figure 2.



Which transformation is shown above?

- Ⓐ rotation  
 Ⓑ translation  
 Ⓒ tessellation  
 Ⓓ reflection

**6-4.5**

- 10** Alexandra solves the problem below.

$$-96 \div -12$$

What does she get for an answer?

- Ⓐ -9  
 Ⓑ -8  
 Ⓒ 8  
 Ⓓ 9

**6-2.2**

**12****Anticipation Guide****Algebra: Properties and Equations****STEP 1** *Before you begin Chapter 12*

- Read each statement.
- Decide whether you Agree (A) or Disagree (D) with the statement.
- Write A or D in the first column OR if you are not sure whether you agree or disagree, write NS (Not Sure).

<b>STEP 1</b> A, D, or NS	<b>Statement</b>	<b>STEP 2</b> A or D
	1. By using the Distributive Property, the 3 would be multiplied with both the $x$ and the 2 in the expression $3(x + 2)$ .	
	2. 3 and $3x$ are like terms because they both contain the number 3.	
	3. $7 + x + 1$ can be simplified to $8 + x$ by using the Commutative Property.	
	4. $(y + 8) + 15 = y + (8 + 15)$ shows how the Associative Property can be used.	
	5. To solve the equation $4 + b = -32$ , add 4 to both sides.	
	6. "Five less than a number" can be written as $5 + n$ .	
	7. Inequalities can be solved using the same form of inverse operations as equations.	
	8. Multiplication and division are inverse operations.	
	9. If you add the same number to both sides of an equation, the equation will remain equal.	
	10. To solve the equation $7x = 42$ , multiply both sides by 7.	

**STEP 2** *After you complete Chapter 12*

- Review each statement and complete the last column by entering an A (Agree) or a D (Disagree).
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a separate sheet of paper to explain why you disagree. Use examples, if possible.

**12****Family Activity****State Test Practice**

**Fold the page along the dashed line. Work each problem on another piece of paper. Then unfold the page to check your work.**

1. Find the solution to the equation written below:

$$x - 7 = -11$$

- A**  $x = 18$   
**B**  $x = -18$   
**C**  $x = -4$   
**D**  $x = 4$

2. Simplify the following algebraic expression:

$$(5 + x) = 3$$

- A**  $x + 8$   
**B**  $15x$   
**C**  $15 + 3x$   
**D**  $8x$

**Fold here.**

**Solution**

1. *Hint: Do the opposite operation to the one shown in the equation.*

Because the opposite operation of subtraction is addition, add 7 to both sides of the equal sign. Since  $-7 + 7 = 0$ , only  $x$  is left on the left side. Now, add 7 to  $-11$ . Since they have opposite signs, subtract and get 4, but since  $-11$  has the greater absolute value, the answer becomes  $-4$ .

$$-4 - 7 = -11$$

The answer is **C**.

**Solution**

2. *Hint: Put together numbers and letters which look alike.*

Using properties helps to make this problem easier. See the steps below:

$$\begin{aligned} (5 + x) + 3 &= (x + 5) + 3 && \text{Commutative Property} \\ &= x + (5 + 3) && \text{Associative Property} \\ &= x + 8 && \text{Add.} \end{aligned}$$

$$(5 + x) + 3 = x + 8$$

The answer is **A**.



**12-1****Explore Through Reading**6-3.4, 6-1.4,  
6-1.6, 6-1.7***The Distributive Property*****Get Ready for the Lesson**

Read the introduction at the top of page 632 in your textbook.  
Write your answers below.

1. What does the expression  $3(20 + 15)$  represent?
2. Evaluate the expression in Exercise 1.
3. Evaluate the expression  $3 \cdot 20 + 3 \cdot 15$ . What do you notice?

**Read the Lesson**

4. What mathematical operation is always involved when using the Distributive Property?
5. Write the following expression in your own words:  $4(x + 7)$ .
6. Rewrite the above expression using the Distributive Property.

**Remember What You Learned**

7. Describe a real-world situation where you might use a version of the Distributive Property.

**12-1****Study Guide**
**6-3.4, 6-1.4,**  
**6-1.6, 6-1.7**
**The Distributive Property**

- To multiply a sum by a number, multiply each addend by the number outside the parentheses.
- $a(b + c) = ab + bc$
- $(b + c)a = ba + ca$

**Example 1** Find  $6 \times 38$  mentally using the Distributive Property.

$$\begin{aligned}
 6 \times 38 &= 6(30 + 8) && \text{Write 38 as } 30 + 8. \\
 &= 6(30) + 6(8) && \text{Distributive Property} \\
 &= 180 + 48 && \text{Multiply mentally.} \\
 &= 228 && \text{Add.}
 \end{aligned}$$

So,  $6 \times 38 = 228$

**Example 2** Use the Distributive Property to rewrite  $4(x + 3)$ .

$$\begin{aligned}
 4(x + 3) &= 4(x) + 4(3) && \text{Distributive Property} \\
 &= 4x + 12 && \text{Multiply.}
 \end{aligned}$$

So,  $4(x + 3)$  can be rewritten as  $4x + 12$ .

**Exercises**

Solve each problem mentally using the Distributive Property.

1.  $4 \times 82$

2.  $9 \times 26$

3.  $12 \times 44$

4.  $8 \times 5.7$

Use the Distributive Property to rewrite each algebraic expression.

5.  $5(y + 4)$

6.  $(7 + r)3$

7.  $12(x + 5)$

8.  $(b + 2)9$

9.  $4(4 + a)$

10.  $9(7 + v)$

**12-1****Homework Practice**6-3.4, 6-1.4,  
6-1.6, 6-1.7***The Distributive Property*****Solve each problem mentally using the Distributive Property.**

1.  $8 \times 34$

2.  $5 \times 47$

3.  $12 \times 51$

4.  $8 \times 53$

5.  $6 \times 4.4$

6.  $7 \times 2.9$

**Use the Distributive Property to rewrite each algebraic expression.**

7.  $6(n + 4)$

8.  $(2 + r)15$

9.  $8(s + 5)$

10.  $(b + 8)3$

11.  $5(6 + b)$

12.  $9(3 + v)$

13.  $(r - 7)7$

14.  $12(4 - v)$

15.  $11(3 - s)$

**For Exercises 16–18, use the table that shows the prices of tickets and various food items at the movie theater.**

Item	Price
Ticket	\$8.50
Popcorn	\$5.25
Soda	\$4.00
Candy	\$3.75
Nachos	\$6.50

16. Four friends each bought a ticket and a bag of popcorn. How much total money did they spend?

17. How much money will the movie theater make if a birthday party of 12 kids each buys a box of candy and a soda but doesn't go see a movie?

18. How much more money will a person spend who buys three orders of nachos than a person who buys three bags of popcorn?

**12-1****Problem-Solving Practice**
**6-3.4, 6-1.4,**  
**6-1.6, 6-1.7**
***The Distributive Property***

- 1. SEATING** The Valley High School Auditorium is able to seat 8 elementary school groups of 65 students. Use the Distributive Property to determine how many students they can seat.

- 2. SHOPPING** Five friends each buy a shirt that costs  $x$  dollars and a pair of shoes that cost \$24.00. Write an expression to show how much total money they spent. Then rewrite the expression using the Distributive Property.

**For Exercises 3 and 4, use the table that shows the number of seats available on various types of aircrafts.**

Aircraft	Number of Seats
737	150
757	183
767	250
MD-88	142
777	268

- 3. SEATS** How many total seats will the airline gain by purchasing three more of both the 737 aircrafts and MD-88 aircrafts?

- 4. PASSENGERS** How many more people can sit on four 777 aircrafts than on four 767 aircrafts?

- 5. CARS** A rental company buys 7 more compact cars for \$8,500 each and 7 more midsize cars for \$12,500 each. How much total money will they spend?

- 6. BAKING** A baking company charges \$1.75 per slice for baking and \$0.35 per slice for decorating. How much would a decorated cake cost containing 150 slices?

**12-2****Explore Through Reading****6-3.3, 6-3.4,  
6-1.4*****Simplifying Algebraic Expressions*****Get Ready for the Lesson**

Complete the activity at the top of page 636 in your textbook.  
Write your answers below.

1. Evaluate the expression  $(40 + 30) + 50$ .
2. Evaluate the expression  $40 + (30 + 50)$ .
3. Evaluate the expression  $40 + (50 + 30)$ .
4. What do you notice about your answers in Exercises 1–3?
5. What can you conclude about the order in which you add any three numbers?

**Read the Lesson**

6. How are the Commutative and Associative properties different?
7. Which property is being modeled in the following problem:  
 $7 + (3 + 4) = (7 + 3) + 4$ ?
8. Which of the following are like terms:  $3x$ ,  $4$ ,  $xy$ ,  $7b$ ,  $x$ ,  $2y$ ,  $9x$ ?
9. Simplify the following expression:  $5y + 4 + 2y + 8$ .

**Remember What You Learned**

10. Using the Commutative and Associative properties as well as combining like terms, simplify the expression  $7 + (3 + 4x) + 12 + 6x$ . Show all your steps and justify your reasoning.

**12-2****Study Guide**6-3.3, 6-3.4,  
6-1.4**Simplifying Algebraic Expressions**

- **Commutative Property:** The order which numbers are added or multiplied does not change the sum or the product.
- $a + b = b + a$  or  $a \cdot b = b \cdot a$ .
- **Associative Property:** The way in which numbers are grouped does not change the sum or the product.
- $(a + b) + c = a + (b + c)$  or  $(a \cdot b) \cdot c = a \cdot (b \cdot c)$
- **Like terms** contain the same variables. Ex:  $2y$ ,  $y$ , and  $7y$  are all like terms, but  $4x$  is not.

**Example 1** Simplify the expression  $16 + (v + 4)$ .

$$\begin{aligned} 16 + (v + 4) &= 16 + (4 + v) && \text{Commutative Property} \\ &= (16 + 4) + v && \text{Associative Property} \\ &= 20 + v && \text{Add.} \end{aligned}$$

So,  $16 + (v + 4)$  in simplified form is  $20 + v$ .

**Example 2** Simplify the expression  $3x + (6 + 2x)$ .

$$\begin{aligned} 3x + (6 + 2x) &= 3x + (2x + 6) && \text{Commutative Property} \\ &= (3x + 2x) + 6 && \text{Associative Property} \\ &= 5x + 6 && \text{Combine like terms.} \end{aligned}$$

So,  $3x + (6 + 2x)$  in simplified form is  $5x + 6$ .

**Exercises**

**Simplify each expression. Justify each step.**

1.  $5 + x + 3$

2.  $6 + (x + 4)$

3.  $(b + 10) + 15$

4.  $8x + 5 + 2x$

5.  $(12 + 2u) + 3$

6.  $11p + 8 + 7p$

7.  $9x + (4 + 3x)$

8.  $(8 + 12x) + (2 + 7x)$

9.  $5y + 4 + 7y$

**12-2****Homework Practice****6-3.3, 6-3.4,  
6-1.4*****Simplifying Algebraic Expressions*****Simplify each expression. Justify each step.**

1.  $(7 + x) + 7x$

2.  $5 \cdot (4 \cdot x)$

3.  $15 + (x + 9)$

4.  $(6x + 21) + 14$

5.  $3x + 2 + 11x$

6.  $(x + 13) + 8$

7.  $(12 + 2x) + 4$

8.  $8 \cdot (x \cdot 4)$

9.  $3(5x)$

10.  $3x + (7x + 10)$

11.  $5x + (2 + x)$

12.  $4 \cdot x \cdot 10$

13.  $(x \cdot 12) \cdot 3$

14.  $14x + 9 + 6x$

15.  $5x + (24 + 14x)$

**ALGEBRA For Exercises 16 through 21, translate each verbal expression into an algebraic expression. Then, simplify the expression.**

16. The sum of three and a number is added to twenty-four.

17. The product of six and a number is multiplied by nine.

18. The sum of 10 times a number and fifteen is added to eleven times the same number.

19. Two sets of the sum of a number and eight are added to five times the same number.

20. Three sets of a sum of a number and four are added to the sum of seven times the same number and thirteen.

21. Five friends went to a baseball game. Three of the friends each bought a ticket for  $x$  dollars and a soda for \$6.00. The other two friends each bought only tickets. Write and simplify an expression that represents the amount of money spent.

**12-2****Problem-Solving Practice**6-3.3, 6-3.4,  
6-1.4**Simplifying Algebraic Expressions**

**1. AMUSEMENT PARKS** Four friends went to a local amusement park. Three of the friends bought ride tickets for  $x$  dollars, plus a game pass for \$10. The other friend bought just a ride ticket. Write and simplify an expression showing the amount of total money spent.

**2. ALGEBRA** Translate and simplify the expression: the sum of fifteen and a number plus twelve. Justify your steps.

**3. AGE** Julianna is  $x$  years old. Her sister is 2 years older than her. Her mother is 3 times as old as her sister. Her Uncle Rich is 5 years older than her mother. Write and simplify an expression representing Rich's age.

**4. REASONING** In the expression  $30 + 40 + 70$ , Jillian added 30 and 40 and then 70, while Samuel added 30 and 70 and then 40. Who is correct? Explain your reasoning.

**ICE CREAM** For Exercises 5 through 8, use the following information provided in the table.

Toppings	Cost
Ice Cream (Scoop)	$x$ dollars
Sprinkles	\$0.25
Hot Fudge	\$0.75
Whipped Cream	\$0.50
Nuts	\$0.35

**5.** Ten kids each order a scoop of ice cream. Five of the kids add sprinkles, 3 add nuts, and 2 add nothing extra. Write and simplify an expression that represents the total cost.

**6.** Write and simplify an expression that represents the total cost of ordering nuts on a scoop of ice cream and then adding hot fudge.

**7.** Three friends went for ice cream. Two ordered a scoop with whipped cream, and the other one ordered a scoop with everything. Write and simplify an expression that represents the total cost.

**8.** Two people order ice cream. The first one orders two scoops plus sprinkles, and the second one orders three scoops. Write and simplify an expression showing the total cost.



**12-3****Explore Through Reading**

6-3.3, 6-3.5

**Solving Addition Equations****Get Ready for the Lesson**

Read the introduction at the top of page 644 in your textbook.

Write your answers below.

1. Write an expression to represent the gain of 4 yards.
2. Write an addition equation you could use to find the yards needed before gaining 4 yards.
3. You could solve the addition equation by counting back on the number line. What operation does counting back suggest?

**Read the Lesson**

For Exercises 4–7, look at Example 2 at the top of page 645.

4. What is the inverse operation and why is it used?
5. How is the Subtraction Property of Equality used in the solution?
6. What is the additive identity (Identity Property of Addition) and how is it used in the solution?
7. What does the checkmark at the end of the example indicate?

**Remember What You Learned**

8. In your own words, describe what *inverse* means. Discuss your idea with a partner. How does the concept of inverse operations compare to your understanding of inverse?

# 12-3

## Study Guide



6-3.3, 6-3.5

### Solving Addition Equations

**Subtraction Property of Equality** If you subtract the same number from each side of an equation, the two sides remain equal.

$$\begin{array}{r} 5 = 5 \\ -3 = -3 \\ \hline 2 = 2 \end{array}$$

**Example 1** Solve  $x + 2 = 7$  using models.

$x + 2 = 7$

$x + 2 - 2 = 7 - 2$

$x = 5$

The solution is 5.  $5 + 2 = 7$  ✓  
5 substituted in the original equation is correct.

**Example 2** Solve  $b + 3 = 2$ .

$$\begin{array}{r} b + 3 = 2 \quad \text{Write the equation.} \\ -3 = -3 \quad \text{Subtract 3 from each side to undo the addition of 3 on the left.} \\ \hline b + 0 = -1 \quad \text{Simplify.} \\ b = -1 \end{array}$$

The solution is  $-1$ .

**Check**  $b + 3 = 2$  Write the original equation.  
 $-1 + 3 \stackrel{?}{=} 2$  Replace  $b$  with  $-1$ .  
 $2 = 2$  ✓ This sentence is true.

### Exercises

Solve each equation. Use models if necessary. Check your solution.

- |                |                 |                 |
|----------------|-----------------|-----------------|
| 1. $a + 1 = 7$ | 2. $3 + b = 8$  | 3. $c + 7 = 4$  |
| 4. $9 = x + 4$ | 5. $g + 8 = -2$ | 6. $d + 6 = -5$ |

**12-3****Homework Practice**

6-3.3, 6-3.5

**Solving Addition Equations****Solve each equation. Use models if necessary. Check your solution.**

1.  $9 + d = -5$

2.  $b + 2 = 6$

3.  $x + (-4) = 1$

4.  $-2 + j = -9$

5.  $m + (-4) = 9$

6.  $1 = f + (-7)$

7.  $6 + c = 3$

8.  $8 + y = -9$

9.  $3 + h = -6$

10.  $p + (-6) = -4$

11.  $\frac{1}{4} + a = \frac{3}{4}$

12.  $-\frac{3}{8} + g = \frac{2}{8}$

13. **ALGEBRA** What is the value of  $n$  if  $7 + n = 5$ ?

**THOROUGHBREDS** The table shows the earnings of some of the leading horses at Northlands Park. Use the table to answer Exercises 14 and 15.

14. Sparhawk has earned \$8,329 more than Silver Sky. Write and solve an equation to find Silver Sky's earnings.

Horse Earnings at Northlands Park	
Horse	Earnings
Sparhawk	\$52,800
Griffin's Web	\$43,757
Kaylee's Magic	\$121,113
Eternal Secrecy	\$57,532
Silver Sky	
Huntley's Creek	

15. Write and solve an equation to find Huntley's Creek's earnings if the total earnings for all the horses is \$354,386.



# Mini-Project

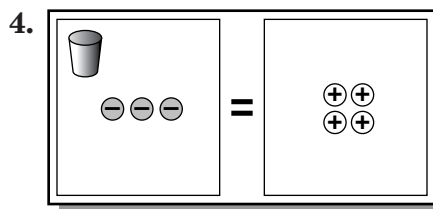
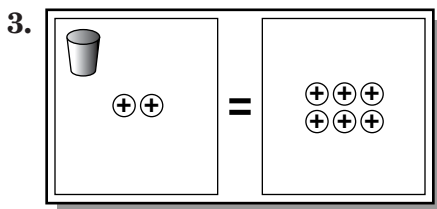
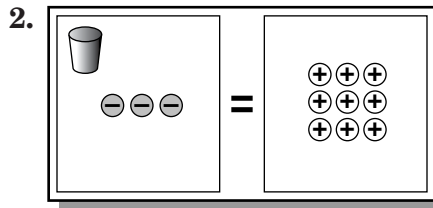
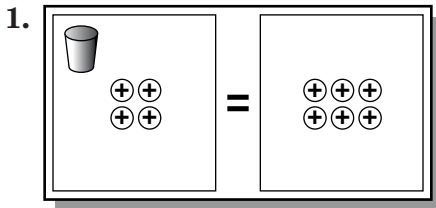


6-3.3, 6-3.5

(Use with Lesson 12-3)

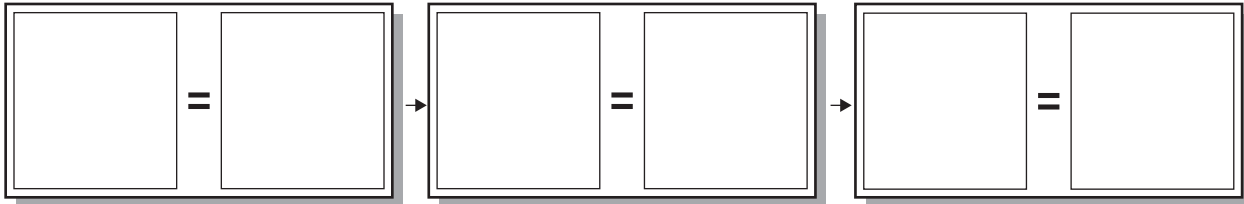
## Solving Addition Equations

Write the equation that is represented by each model.

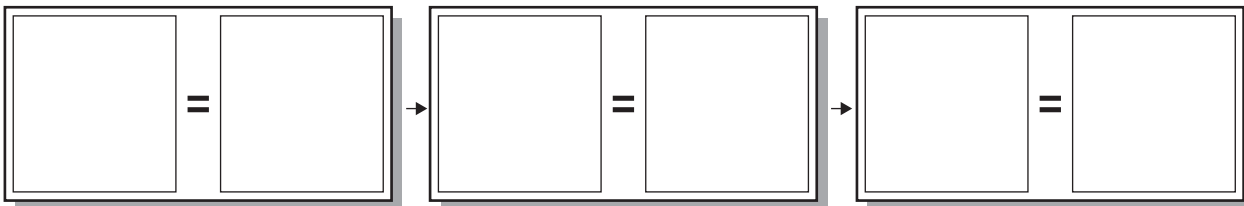


Solve each equation using cups and counters. Sketch the arrangement in the boxes.

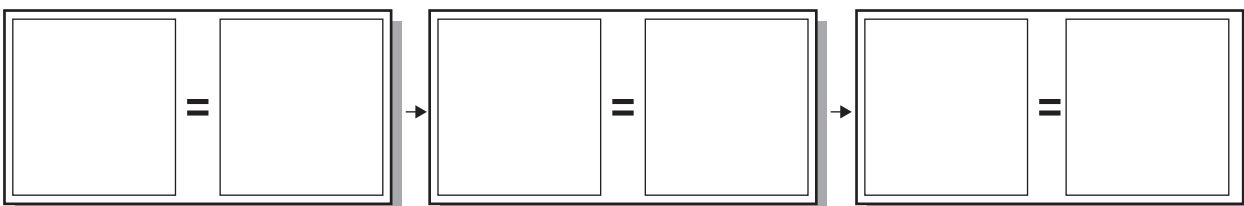
5.  $x + 2 = 6$



6.  $x + (-2) = -7$



7.  $x + 1 = -3$



8. Solve  $x + 4 = -3$  without using models.  $x =$  \_\_\_\_\_

**12-4****Explore Through Reading**6-3.3, 6-3.5,  
6-1.6**Solving Subtraction Equations****Get Ready for the Lesson**

Read the introduction at the top of page 651 in your textbook.

Write your answers below.

1. Let  $s$  represent Charmaine's Score. Write an equation for *36 points less than Charmaine's Score is equal to 109*.
2. Find Charmaine's height by counting forward. What operation does counting forward suggest?

**Read the Lesson**

3. In modeling a subtraction equation, how and why are zero pairs used?

**For Exercises 4 and 5, look at Example 2 on page 652.**

4. What is the inverse operation and why is it used?
5. How is the Addition Property of Equality used in the solution?
6. In the equation  $y - 4 = -10$ , how could you get the variable alone on one side of the equation?

**Remember What You Learned**

7. Work with a partner. Pretend your partner missed this lesson on subtraction equations. Make up a subtraction equation and solve it for your partner on a piece of paper. Show each step and explain how an inverse operation, the Addition Property of Equality, and the Additive Identity are used.

# 12-4

## Study Guide



6-3.3, 6-3.5,  
6-1.6

### Solving Subtraction Equations

**Addition Property of Equality** If you add the same number to each side of an equation, the two sides remain equal.

$$\begin{array}{r} 5 = 5 \\ +3 = +3 \\ \hline 8 = 8 \end{array}$$

**Example 1** Solve  $x - 2 = 1$  using models.

$x - 2 = 1$

$x - 2 + 2 = 1 + 2$

$x = 3$

Model the equation.

Add 2 positive counters to each side of the mat.

Remove the zero pairs.

The solution is 3.

**Example 2** Solve  $b - 3 = -5$ .

$$\begin{array}{r} b - 3 = -5 \quad \text{Write the equation.} \\ +3 = +3 \quad \text{Add 3 to each side to undo the subtraction of 3 on the left.} \\ \hline b + 0 = -2 \quad \text{Simplify.} \\ b = -2 \end{array}$$

**Check**

$$\begin{array}{r} b - 3 = -5 \quad \text{Write the original equation.} \\ -2 - 3 \stackrel{?}{=} -5 \quad \text{Replace } b \text{ with } -2. \\ -5 = -5 \quad \checkmark \quad \text{This sentence is true.} \end{array}$$

### Exercises

Solve each equation. Use models if necessary. Check your solution.

- |                  |                  |                  |
|------------------|------------------|------------------|
| 1. $a - 2 = 3$   | 2. $b - 1 = 7$   | 3. $c - 4 = 4$   |
| 4. $-2 = x - 4$  | 5. $z - 6 = -3$  | 6. $g - 3 = -4$  |
| 7. $-9 + w = 1$  | 8. $v - 8 = 5$   | 9. $-7 = y - 5$  |
| 10. $u - 3 = -4$ | 11. $-2 = t - 9$ | 12. $f - 6 = -3$ |

**12-4****Homework Practice****6-3.3, 6-3.5,  
6-1.6****Solving Subtraction Equations**

Solve each equation. Use models if necessary. Check your solution.

1.  $t - 7 = -19$

2.  $x - 2 = -5$

3.  $g - 6 = -2$

4.  $-6 = c - 5$

5.  $h - 5 = 4$

6.  $8 - j = 5$

7.  $y - (-7) = 7$

8.  $9 = a - 9$

9.  $p - (-3) = 5$

10.  $d - 5 = -9$

11.  $m - \frac{3}{8} = \frac{11}{18}$

12.  $b - \frac{3}{15} = -1$

**13. PARASAILING** A parasailer is attached by a cable to a boat and towed so that the parachute she is wearing catches air and raises her into the air. When the boat slows down to turn back towards the beach the parasailer's chute catches less air and dips 25 meters. She must descend another 45 meters to return to the boat. Write and solve a subtraction equation to find her original height above the boat before the turn.

**14. ALGEBRA** What is the value of  $k$  if  $-6 = 9 - k$ ?

**15.** The Petrified Forest National Park in Arizona recently expanded their boundaries by 93,533 acres. The original acreage was 125,000. Write and solve a subtraction equation to find the new acreage of the park.

**16.** A mako shark caught by a rod and reel in Massachusetts Bay weighed 1,324 pounds. This was 103 pounds more than the International Game Fish Association (IGFA) record. What is the IGFA record for a mako shark?

**12-4****Problem-Solving Practice**6-3.3, 6-3.5,  
6-1.6**Solving Subtraction Equations**

<p><b>1. BIRDS</b> A house cat, Sophie, scared away 5 birds when she arrived on the porch. If 3 birds remain, write and solve an equation to find how many birds were on the porch before Sophie arrived.</p>	<p><b>2. APPLES</b> David brought apples to school one day. After giving one to each of his 5 closest friends, David had 6 apples left. Write and solve an equation to find how many apples David brought to school.</p>
<p><b>3. BASKETBALL</b> The basketball team is practicing after school. Four students have to leave early. If 12 basketball players remain, write and solve an equation to find how many students are on the basketball team.</p>	<p><b>4. MARBLES</b> Virginia's mother gave her marbles for her birthday. Virginia lost 13 of them. If she has 24 marbles left, write and solve an equation to find how many her mother gave her.</p>
<p><b>5. MONEY</b> Claudio went for a walk. While he was walking, \$1.35 fell out of his pocket. When he returned home, he counted his money and had \$2.55 left. Write and solve an equation to find how much money was in Claudio's pocket when he started his walk.</p>	<p><b>6. HANG GLIDING</b> Aida was hang gliding. After losing 35 feet in altitude, she was gliding at 125 feet. Write and solve an equation to find her height when she started hang gliding.</p>
<p><b>7. SHARKS</b> The average great hammerhead shark is 11.5 feet long. The average great hammerhead shark is 13.5 feet shorter than the average whale shark. Write and solve an equation to find the length of the average whale shark.</p>	<p><b>8. JOKES</b> At a party, Tex told 17 fewer knock-knock jokes than he did riddles. If he told 23 knock-knock jokes, write and solve an equation to find how many riddles Tex told at the party.</p>



**12-5****Explore Through Reading****6-3.3, 6-3.5,  
6-1.6****Solving Multiplication Equations****Get Ready for the Lesson**

Read the introduction at the top of page 657 in your textbook.

Write your answers below.

1. Let  $x$  represent the number of ringtones. Explain how the equation  $2x = 10$  represents the situation.

**Read the Lesson**

2. In the equation  $2x = 10$ , what is the coefficient?
3. In the equation  $2x = 10$ , what is the operation? How do you know?
4. In Example 1 on page 657, why are both sides of the equation divided by 2?
5. In Example 3 on page 658, why is the equation  $3 = 5t$ ?
6. Describe what is happening in each step.

$$-3x = 27$$

$$\frac{-3x}{-3} = \frac{27}{-3}$$

$$1x = -9$$

$$x = -9$$

**Remember What You Learned**

7. Work with a partner. Explain how you use division to solve a multiplication problem. Describe an example from real life where you would use division in this way.

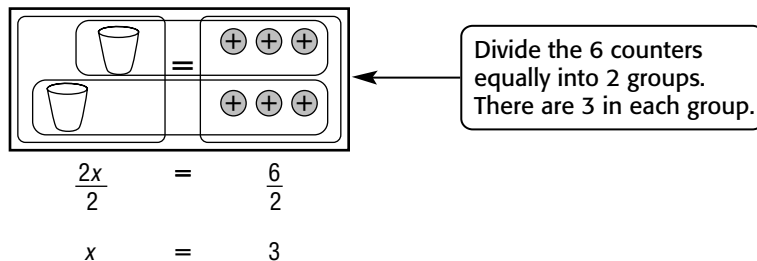
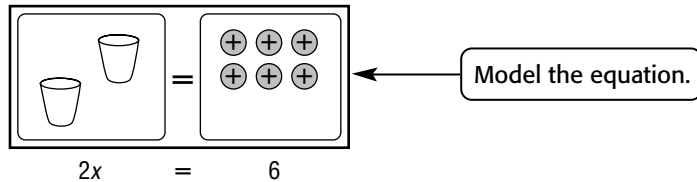
## 12-5

## Study Guide

6-3.3, 6-3.5,  
6-1.6

## Solving Multiplication Equations

In a multiplication equation, the number by which a variable is multiplied is called the **coefficient**. In the multiplication equation,  $2x = 8$ , the coefficient is 2.

**Example 1** Solve  $2x = 6$  using models.

**Check**  $2x = 6$  Write the original equation.  
 $2(3) \stackrel{?}{=} 6$  Replace  $x$  with 3.  
 $6 = 6$  This sentence is true. ✓

The solution is 3.

**Example 2** Solve  $-4b = 12$ .

$-4b = 12$  Write the equation.  
 $\frac{-4b}{-4} = \frac{12}{-4}$  Divide each side by  $-4$  to get a single positive variable by itself.  
 $1b = -3$  Simplify.  
 $b = -3$

**Check**  $-4b = 12$  Write the original equation.  
 $-4(-3) \stackrel{?}{=} 12$  Replace  $b$  with  $-3$ .  
 $12 = 12$  This sentence is true. ✓

The solution is  $-3$ .

**Exercises**

Solve each equation. Use models if necessary. Check your solution.

- |                |                |                |
|----------------|----------------|----------------|
| 1. $5a = 25$   | 2. $7c = 49$   | 3. $24 = 6d$   |
| 4. $2x = -8$   | 5. $18 = -9y$  | 6. $-8g = -16$ |
| 7. $18 = -3z$  | 8. $-4w = -36$ | 9. $56 = 7v$   |
| 10. $24 = -8f$ | 11. $3u = -27$ | 12. $-42 = 6t$ |

**12-5 Homework Practice****6-3.3, 6-3.5,  
6-1.6****Solving Multiplication Equations**

Solve each equation. Use models if necessary.

1.  $7a = 63$

2.  $-14k = 0$

3.  $-13w = 39$

4.  $55 = -11x$

5.  $3v = -42$

6.  $96 = 12f$

7.  $-14u = -70$

8.  $-3c = 3$

9.  $15s = -120$

10.  $35q = -5$

11.  $-6 = -2y$

12.  $-13t = -117$

13.  $72 = -6r$

14.  $0.8b = -1.12$

15.  $-2.3g = 7.13$

16.  $40 = -1.6m$

14. **TIME** The Russian ice breaker *Yamal* can move forward through 2.3-meter thick ice at a speed of 5.5 kilometers per hour. Write and solve a multiplication equation to find the number of hours it will take to travel 82.5 kilometers through the ice.

**FUNDRAISING** A school is raising money by selling calendars for \$20 each. Mrs. Hawkins promised a party to whichever of her English classes sold the most calendars over the course of four weeks. Use the table to answer Exercises 15–17.

Mrs. Hawkins' Fundraising Challenge	
Class	Number of Calendars Sold
1st Period	60
2nd Period	123
3rd Period	89
4th Period	126

15. Write and solve an equation to show the average number of calendars her 3rd period class sold per week during the four-week challenge.
16. How many calendars did the 1st and 2nd period classes sell on average per week? Write and solve a multiplication equation.
17. What was the average number of calendars sold in a week by all of her classes?

**12-5****Problem-Solving Practice**6-3.3, 6-3.5,  
6-1.6**Solving Multiplication Equations**

<p><b>1. BAND SOLO</b> Kai's solo in the next school band performance is 4 times as long as Dena's solo. Kai's solo is 12 minutes long. Write and solve an equation to find the length of Dena's solo.</p>	<p><b>2. CATS</b> Steve's tabby cat eats 5 times as often as his black cat. The tabby cat ate 10 times yesterday. Write and solve an equation to find how many times the black cat ate.</p>
<p><b>3. FOOTBALL</b> In last night's football game, the home team earned 3 times as many points as the visiting team. They won the game with 21 points. Write and solve an equation to find how many points the visiting team had.</p>	<p><b>4. MONEY</b> Paz has 3 times as much money in her wallet as in her pocket. There is \$18 in her wallet. Write and solve an equation to find how much money is in her pocket.</p>
<p><b>5. MORNINGS</b> It takes Jun 3 times as long as it takes Kendra to get ready in the morning. It takes Jun 45 minutes to get ready. Write and solve an equation to find how long it takes Kendra.</p>	<p><b>6. FISH</b> In his home aquarium, Enli has 12 times as many guppies as he has goldfish. Enli just counted 72 guppies. Write and solve an equation to find how many goldfish he has.</p>
<p><b>7. MUSIC</b> Ray's favorite song is 2 times as long as Meli's favorite song. Write and solve an equation to find the length of Meli's favorite song if Ray's lasts 6 minutes.</p>	<p><b>8. TRAILS</b> The forest trail to Round Lake is 3 times as long as the rocky trail to Round Lake. The forest trail is 15 miles long. Write and solve an equation to find the length of the rocky trail.</p>



# Chapter 12 Test

## Mastering the SC Standards

**1** Marino wants to solve for  $d$  in the equation  $d - 13 = 56$ . Which step is the best first step for Marino to solve for  $d$ ?

- (A) Divide both sides by 13.
- (B) Subtract 13 from both sides.
- (C) Multiply both sides by 13.
- (D) Add 13 to both sides.

**6-3.5**

**2** Which expression is equal to  $6(7 - 4)$ ?

- (A)  $6 \times 7 - 6 \times 4$
- (B)  $6 \times 7 \times 4$
- (C)  $6 \times 7 - 4$
- (D)  $6 + 7 \times 4$

**6-3.4**

**3** Lien solved the equation  $8c = 72$  and got the answer 9. Which equation shows how Lien solved for  $c$ ?

- (A)  $c = 72 \times 8$
- (B)  $c = 72 + 8$
- (C)  $c = 72 \div 8$
- (D)  $c = 72 - 8$

**6-3.5**

**4** Renting an auditorium costs \$250, plus an extra \$40 per hour ( $h$ ). Which equation can be used to find the total cost ( $T$ ) of renting the auditorium?

- (A)  $T = 250 \times 40h$
- (B)  $T = 250 + 40h$
- (C)  $T = (250 \times 40)h$
- (D)  $T = 250 + \frac{40}{h}$

**6-3.3**

**5** Masako correctly simplifies the expression  $9 + 6x - 4 + 8x$ . What does he get for an answer?

- (A)  $19x$
- (B)  $13 + 2x$
- (C)  $5 - 14x$
- (D)  $5 + 14x$

**6-3.3**

**6** To evaluate the expression  $6(3 + 4)$ , Shauna adds 3 and 4 to get 7. Then she multiplies 6 by 7 to get 42. What other method could Shauna use to get the same result?

- (A) Multiply 3 by 4, and then add 6 and 12.
- (B) Multiply 6 by 3 and 6 by 4, and then add 18 and 24.
- (C) Multiply 6 by 3 and 3 by 4, and then add 18 and 12.
- (D) Multiply 6 by 4 and 3 by 4, and then add 24 and 12.

**6-3.4**



# Chapter 12 Test (continued)

## Mastering the SC Standards

- 7** Last year, Christina and her dad counted loggerhead turtle nests on a beach on Hilton Head Island. This year, they went back to the same beach and found 6 more nests than last year. They counted a total of 14 nests this year. To find out how many nests they found last year, or  $n$ , Christina wrote the equation  $n + 6 = 14$ . What should be Christina's first step to solve the equation?

- (A) Subtract 6 from both sides of the equation.
- (B) Add 6 to both sides of the equation.
- (C) Multiply both sides of the equation by 6.
- (D) Divide both sides of the equation by 6.

**6-3.5**

- 8** Amit solves a math problem and finds the answer to be the expression  $4y + 9 - 6y - 3$ . Which expression shows this answer written in simplest form?

- (A)  $10y + 6$
- (B)  $6 - 2y$
- (C)  $12 - 2y$
- (D)  $3y$

**6-3.3**

- 9** Matt has some marbles in his collection. His friend gives him 38 more marbles. Matt now has 63 marbles. Which equation can be used to find the original number of marbles,  $m$ , in Matt's collection?

- (A)  $m = 38 + 63$
- (B)  $m = \frac{63}{38}$
- (C)  $m = 38 - 63$
- (D)  $m = 63 - 38$

**6-3.3**

- 10** What is the value of  $t$  in the equation  $6t = 54$ ?

- (A)  $t = 7$
- (B)  $t = 8$
- (C)  $t = 9$
- (D)  $t = 12$

**6-3.5**

- 11** Which expression is equal to  $6 \times 37$ ?

- (A)  $(6 \times 30) + (7 \times 30)$
- (B)  $(6 \times 30) + (6 \times 7)$
- (C)  $(7 \times 30) + (7 \times 6)$
- (D)  $(4 \times 7) + (30 \times 7)$

**6-3.4**



# Tips for Taking the PASS

In sixth grade, you will take a test called the Palmetto Assessment of State Standards, or PASS.

The following pages will help you get ready to take the PASS.

- Most of the questions you will answer on the PASS are *multiple-choice* questions. A multiple-choice question can be the easiest kind of problem to answer because you know that one of the answer choices is the right answer. You will answer the *multiple-choice* questions in your test booklet.
- Two other kinds of questions on the PASS are *short-response* and *extended-response* questions. There are no choices given to select from for these types of questions. You must figure out the answer on your own and then record your answer in the space provided in your test book. Often you are asked to show your work or give a reason for your answer.
- It is important to check over your work. These pages teach you how to check over your work so that you do your best when you take the PASS.





## Tips for Taking the PASS (continued)

### How do I answer multiple-choice questions?

Read the question and choose the best answer.

Avery sells homemade scarves at a craft fair. Large scarves sell for \$15 each, medium scarves sell for \$12 each, and small scarves sell for \$7 each. If Avery sells  $l$  large scarves and  $s$  small scarves at the craft fair, which expression represents the total amount Avery earns at the craft fair?

- (A)  $12l + 7s$
- (B)  $15s + 7l$
- (C)  $15l + 7s$
- (D)  $15l + 12s$

- Read the question carefully and determine what information is needed to solve the question.
- If there are any words in the question that you are unsure of, use context clues to help you solve the question.
- Do any work in your test booklet beside or below the question.
- Work slowly and carefully. Check your work.
- Solve the problem and look for your answer in the choices.
- Use a pencil to record your answer in your test booklet.







## Tips for Taking the PASS (continued)

### How do I fill in the bubble?

Did you find your answer among the choices given?

If not, go back and work the problem again.

- If your answer is one of the choices, use a pencil to fill in the answer bubble with the letter of your choice.
- Make sure you fill in the bubble completely. The chart below shows you how to do this best.
- Make your marks dark.



Correct	
<input type="radio"/>	A $2x$
<input type="radio"/>	B $2x + 1$
<input type="radio"/>	C $4x$
<input checked="" type="radio"/>	$4x - 1$

Incorrect	
<input type="radio"/>	A $2x$
<input type="radio"/>	B $2x + 1$
<input type="radio"/>	C $4x$
<input type="radio"/>	<del><math>4x - 1</math></del>

Incorrect	
<input type="radio"/>	A $2x$
<input type="radio"/>	B $2x + 1$
<input type="radio"/>	C $4x$
<input checked="" type="radio"/>	$4x - 1$

Incorrect	
<input type="radio"/>	A $2x$
<input type="radio"/>	B $2x + 1$
<input type="radio"/>	C $4x$
<input checked="" type="radio"/>	<del><math>4x - 1</math></del>

- If you make a mistake be sure to erase your first mark completely before marking the correct choice.

The next two pages will show you how to answer short-response and extended-response questions.



## Tips for Taking the PASS (continued)

### How do I answer short-response and extended-response questions?

Some of the questions on your test will be *short-response* or *extended-response* items. These questions will ask you to solve a problem and write your own answer in the space provided. You may also need to show your work by writing down each step in the problem, drawing a picture, completing a chart, or explaining in words how you found the answer.

The only difference between a short- and an extended-response question is that an extended-response question has more than one part to it.

Follow these steps to help you answer these types of questions:

- Read the problem carefully.
- Make sure you understand what the question is asking.
- Decide which facts you need to solve the problem.
- Decide which operation you would use.
- Work the problem in the space provided in your test booklet.
- Check that the answer makes sense.
- When a problem asks you to show your work, you may do so by writing down each step in the problem, drawing a picture, completing a chart, or describing in words how you solved the problem.
- Record your answer in the space provided.

*Question 1 on the next page is a short-response question.*

*Question 2 on the next page is an extended-response question.*





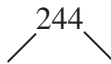
## Tips for Taking the PASS (continued)

Read each question and write in your answers completely on the lines provided.

- 1** To evaluate the expression  $26 - 7 \times 4$ , Jon subtracted 7 from 26 to get 19, and then multiplied 19 by 4 to get 76. What should Jon have done differently?

\_\_\_\_\_

- 2** Find the prime factorization of 244 by completing the factor tree below.



Write the prime factorization as an expression.

\_\_\_\_\_



# Tips for Taking the PASS (continued)

## How can I check my work?

### *Ask yourself these questions:*

- Did I use the right information from the problem?
- Did I answer the question that was asked?
- When solving the problem, did I copy the correct numbers from the problem?
- Did I do the math correctly?
- Does my answer make sense?
- Did I fill in the bubbles correctly for multiple-choice?
- Did I write my answer on the line provided and show all of my work when required for short-response and extended-response questions?

## Test-Taking Hints

- Go to bed early the night before the test. You will think more clearly after a good night's rest.
- Eat breakfast in the morning. An empty stomach will distract you while taking your test.
- Relax. Most people get nervous when taking a test. It is natural. Just do your best.
- Answer questions you are sure about first. If you do not know the answer to a question, skip it and go back to that question later.
- Think positively. Some problems may seem hard to you, but you may be able to figure out what to do if you read each question carefully.
- Become familiar with a variety of formulas and when they should be used.

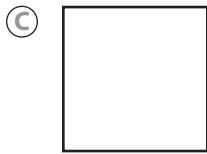
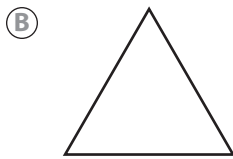
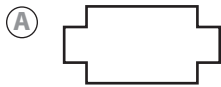


# Tips for Taking the PASS (continued)

## Practice Questions

Read the question and choose the best answer.  
Be sure to mark your answer.

- 1** Which shape below has the highest order of rotational symmetry?



- 2** Jamie listed the height of each family member in inches.

What is the median of height of Jamie's family?

\_\_\_\_\_

What is the mean height of Jamie's family?

\_\_\_\_\_

How did Justin's height affect the mean and median heights of Jamie's family?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Name	Height
Dad	71
Mom	65
Jonah	67
Jamie	62
Justin	25

Turn the page to check your answers.



# Tips for Taking the PASS (continued)

## Practice Questions

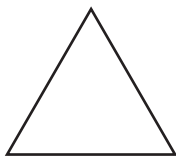
Read the question and choose the best answer.  
Be sure to mark your answer.

- 1 Which shape below has the highest order of rotational symmetry?

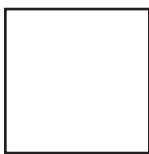
(A)



(B)



(C)



The correct answer is C.  
You need to fill in bubble C in your test booklet.

(D)



- 2 Jamie listed the height of each family member in inches.

What is the median of height of Jamie's family?

65

What is the mean height of Jamie's family?

58

How did Justin's height affect the mean and median heights of Jamie's family?

Justin's height changed the mean more than it  
changed the median. Without Justin's height, the  
mean would be 66.25 and the median would be 66.

Name	Height
Dad	71
Mom	65
Jonah	67
Jamie	62
Justin	25

Do your work in the white space.

$$\frac{(71 + 65 + 67 + 62 + 25)}{5} = 58$$



# Diagnostic Test

- 1** Ben saw 10 birds while he was bird watching. Four of them were Carolina Wrens. What percentage of the birds were Carolina Wrens?

(A) 10%  
 (B) 14%  
 (C) 40%  
 (D) 60%

6-2.1

- 2** A group of hikers in the Blue Ridge Mountains hiked 12 miles in 3 hours. What was their unit rate?

(A) 3 miles per hour  
 (B) 4 miles per hour  
 (C) 9 miles per hour  
 (D) 15 miles per hour

6-5.6

- 3** The table below shows the relationship between  $x$  and  $y$ . When  $x$  is equal to 3, what is the value of  $y$ ?

$x$	$y$
0	0
1	3
2	6
3	?

(A) 3  
 (B) 6  
 (C) 9  
 (D) 12

6-3.1

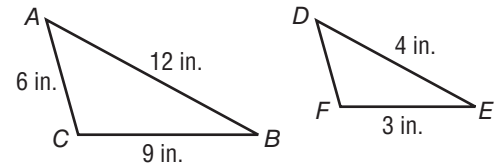
- 4** Which symbol makes the sentence true?

$$\frac{3}{5} \square \frac{6}{8}$$

(A)  $<$   
 (B)  $>$   
 (C)  $=$   
 (D)  $\geq$

6-2.3

- 5** Triangle  $ABC$  is similar to triangle  $DEF$ . What is the length of side  $DF$ ?



(A) 2 inches  
 (B) 3 inches  
 (C) 4 inches  
 (D) 6 inches

6-4.7





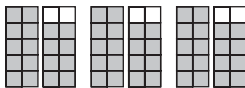
# Diagnostic Test (continued)

- 6** Dennis works two jobs. His first job pays \$15 per hour, and his second job pays \$11 per hour. If Dennis works  $a$  hours at his first job and  $b$  hours at his second job, which expression represents the total number of dollars Dennis makes altogether?

- (A)  $11a + 15b$   
 (B)  $15a + 11b$   
 (C)  $11a \times 15b$   
 (D)  $15a \times 11b$

**6-3.3**

- 7** Which multiplication is shown by the model below?



- (A)  $0.8 \times 3$   
 (B)  $1.5 \times 2$   
 (C)  $1.8 \times 3$   
 (D)  $2.8 \times 3$

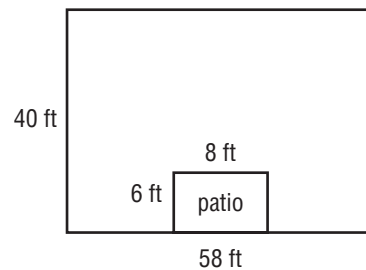
**6-2.5**

- 8** Kuri needs to add  $\frac{4}{6}$  and  $\frac{5}{8}$ . She finds the lowest common denominator for both fractions and rewrites the fractions using the new denominator. Which expression below shows how Kuri rewrote the two fractions?

- (A)  $\frac{16}{24} + \frac{15}{24}$   
 (B)  $\frac{32}{48} + \frac{30}{48}$   
 (C)  $\frac{16}{24} + \frac{5}{8}$   
 (D)  $\frac{4}{16} + \frac{10}{16}$

**6-2.4**

- 9** Below is a diagram of Masako's backyard.



Masako plans to plant grass seed in his entire backyard except for the patio. Which expression below shows one way he can find the area of the backyard that needs to be planted with grass?

- (A)  $(40 \times 58) \times (8 \times 6)$   
 (B)  $(40 \times 8) - (58 \times 6)$   
 (C)  $(40 \times 58) + (8 \times 6)$   
 (D)  $(40 \times 58) - (8 \times 6)$

**6-5.5**







# Diagnostic Test (continued)

- 10** Peter measured 4 circles and recorded his results in this table.

Circle Measurements in Centimeters				
Diameter	5.0	8.0	11.0	15.0
Circumference	15.7	25.1	34.4	47.1

If Peter divides the numbers in the second row by the numbers above them, what will he find?

- (A) the unit rate of each circle
- (B) the area of each circle
- (C) an estimate for  $\pi$
- (D) the perimeter of each circle

**6-5.1**

- 11** According to the scale of a map on a camping website, 1 inch equals 18 miles. How many miles are represented by 6 inches on a map?

- (A) 3 miles
- (B) 24 miles
- (C) 90 miles
- (D) 108 miles

**6-5.7**

- 12** How can  $3 \times 3 \times 3 \times 3$  be represented using an exponent?

- (A)  $3^4$
- (B)  $3^2$
- (C)  $3^3$
- (D)  $4^3$

**6-2.9**

- 13** Ramon wants to find the average of his test scores below.

76%, 88%, 82%, 91%, 83%

What measure should he use?

- (A) mode
- (B) median
- (C) range
- (D) mean

**6-6.3**

- 14** Mr. Cameron drove his boat on the Savannah River at a speed of 15 miles per hour. At this rate, how long will it take him to go 30 miles?

- (A) 2 hours
- (B) 2.5 hours
- (C) 3 hours
- (D) 3.5 hours

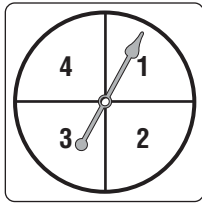
**6-2.6**





# Diagnostic Test (continued)

- 15** Kenesha needs to predict the probability of the spinner below NOT landing on a 3. She got  $\frac{1}{4}$  as her answer. Her friend Tanya tells her she made a mistake. Which equation shows what Kenesha could have done to find the correct answer?



- (A)  $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$   
 (B)  $\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$   
 (C)  $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} = \frac{3}{2}$   
 (D)  $\frac{3}{4} + \frac{2}{4} = \frac{5}{2}$

**6-6.5**

- 16** Carlos created a stem-and-leaf plot to show the number of points he scored in each basketball game he played this season.

Points Scored	
Stem	Leaves
0	5 8 9
1	0 0 1 2 2 2 3 4 5 8
2	0 0

Key 1|3 = 13

Which data set did Carlos use to create his stem-and-leaf plot?

- (A) 10, 18, 9, 12, 20, 14, 12, 5, 20, 13, 10, 11, 10, 15, 12, 8, 16  
 (B) 5, 18, 9, 10, 12, 20, 14, 12, 20, 13, 10, 12, 15, 8, 10  
 (C) 20, 8, 9, 13, 12, 10, 11, 18, 14, 10, 5, 20, 15, 12  
 (D) 10, 11, 18, 20, 8, 9, 12, 13, 14, 20, 15, 5, 12, 10, 12

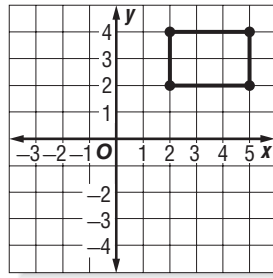
**6-6.2**





# Diagnostic Test (continued)

- 17** Cory listed the coordinates of three of the vertices in a rectangle: (2, 2), (2, 4), (5, 2). He made the graph below to help figure out the coordinates of the fourth vertex.



Which coordinate pair below represents the fourth vertex?

- (A) (5, 3)  
 (B) (5, 4)  
 (C) (4, 5)  
 (D) (5, 5)

**6-4.2**

- 18** What is the solution to the following expression?

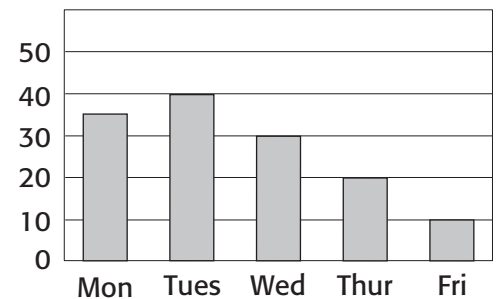
$$2^3 + (9 - 3) \times 3 = \underline{\hspace{2cm}}$$

- (A) 26  
 (B) 32  
 (C) 42  
 (D) 400

**6-3.2**

- 19** Roberto conducted a survey to find out how many people who live on his street recycle containers. The bar graph below shows the number of people who recycled each day for 5 days.

**People Who Recycle**



Which statement is true based on the graph?

- (A) More people recycled at the end of the week than at the beginning of the week.  
 (B) More people recycled at the beginning of the week than at the end of the week.  
 (C) The same number of people recycled every day.  
 (D) More people recycled on Wednesday than any other day.

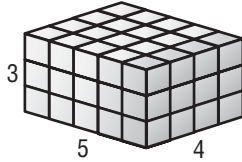
**6-6.1**





# Diagnostic Test (continued)

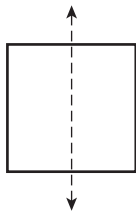
- 20** Which expression represents a strategy John could use to find the surface area of the figure below?



- (A)  $2(3 \times 4) + 2(4 \times 5) + 2(5 \times 3)$   
 (B)  $(3 \times 4) + (4 \times 5) + (5 \times 3)$   
 (C)  $2(3 + 4) \times 2(4 + 5) \times 2(5 + 3)$   
 (D)  $3 \times 4 \times 5$

**6-5.3**

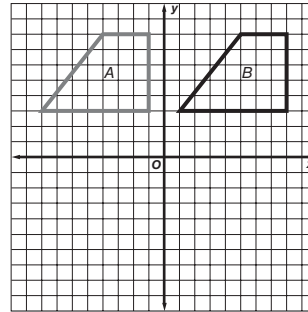
- 21** One line of symmetry is shown on the square below. How many total lines of symmetry does this square have?



- (A) 1  
 (B) 2  
 (C) 4  
 (D) 6

**6-4.4**

For problems 22 and 23, use the graph below.



- 22** What type of transformation is represented by the figures?

- (A) rotation  
 (B) translation  
 (C) reflection  
 (D) dilation

**6-4.5**

- 23** Which of the following describes the change in coordinates from figure A to figure B?

- (A) 2 units left and 1 unit up  
 (B) 2 units left  
 (C) 9 units right  
 (D) 9 units left

**6-4.6**





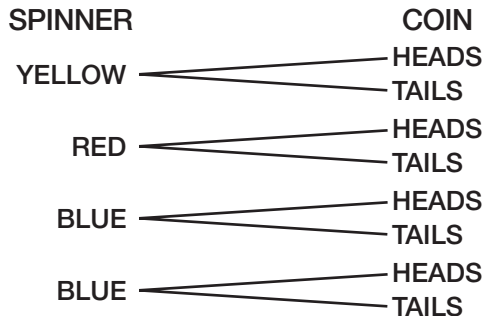
# Diagnostic Test (continued)

**24** Which expression is equal to  $5(3 + 1)$ ?

- (A)  $5 \times 3 + 1$
- (B)  $5 \times 3 \times 1$
- (C)  $5 \times 3 + 5 \times 1$
- (D)  $5 + 1 \times 3$

**6-3.4**

**25** Rosa drew the following tree diagram for a spinner with four equal sections and a coin.



What is the probability of spinning yellow and flipping tails?

- (A)  $\frac{1}{8}$
- (B)  $\frac{1}{4}$
- (C)  $\frac{1}{2}$
- (D)  $\frac{3}{4}$

**6-6.4**

**26** What is the prime factorization of 60?

- (A)  $3 \times 4 \times 5$
- (B)  $2^2 \times 3 \times 5$
- (C)  $2 \times 3^2 \times 5$
- (D)  $5^2 \times 3 \times 2$

**6-2.8**

**27** A circle has a diameter of  $\frac{21}{2}$ . If  $\frac{22}{7}$  is used for the value of pi in the circumference formula, then what is the circumference of this circle?

- (A) 11
- (B) 13.6
- (C) 22
- (D) 33

**6-5.2**

**28** Which expression is equal to  $(6 \times 5) \times 8$ ?

- (A)  $6 \times (5 \times 8)$
- (B)  $(6 \times 5) + 8$
- (C)  $(6 + 5) \times 8$
- (D)  $6 + 5 + 8$

**6-3.4**

**29** Laura needs to calculate the value of  $10^4$ . Which expression shows one way that Laura can find the correct answer?

- (A)  $10 \times 10 \times 10$
- (B)  $10 + 10 + 10 + 10$
- (C)  $10 \times 4$
- (D)  $10 \times 10 \times 10 \times 10$

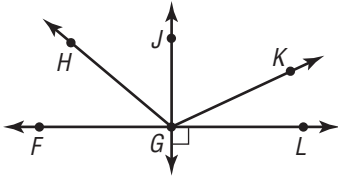
**6-2.7**





# Diagnostic Test (continued)

Use the figure below to answer questions 30 and 31.



**30** Which two angles are complementary?

- (A)  $\angle FGH$  and  $\angle HGL$
- (B)  $\angle FGJ$  and  $\angle JGL$
- (C)  $\angle FGH$  and  $\angle HGJ$
- (D)  $\angle FGK$  and  $\angle KGL$

6-4.9

**31** Which two angles are supplementary?

- (A)  $\angle LGH$  and  $\angle FGH$
- (B)  $\angle LGK$  and  $\angle KGJ$
- (C)  $\angle KGH$  and  $\angle HGF$
- (D)  $\angle FGK$  and  $\angle JGK$

6-4.9

**32** What number completes the sentence?

$$14 + \underline{\quad} = 0$$

- (A) 41
- (B) 14
- (C) 0
- (D) -14

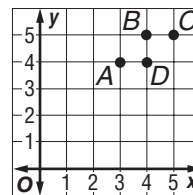
6-2.2

**33** Kevin solved the equation  $9t = 63$  and got the answer 7. Which equation shows how Kevin solved for  $t$ ?

- (A)  $t = 63 \times 9$
- (B)  $t = 63 \div 9$
- (C)  $t = 63 + 9$
- (D)  $t = 63 - 9$

6-3.5

**34** Which point represents the location of the ordered pair (4, 5)?



- (A) Point A
- (B) Point B
- (C) Point C
- (D) Point D

6-4.1





# Diagnostic Test (continued)

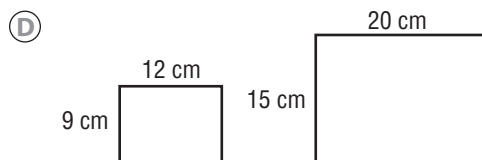
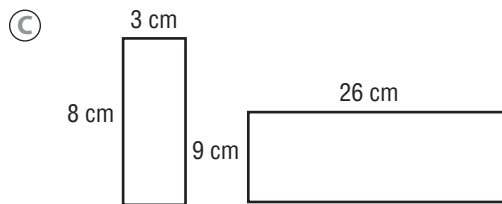
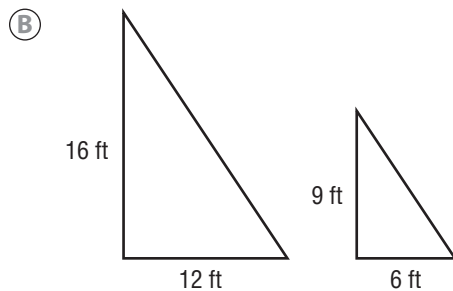
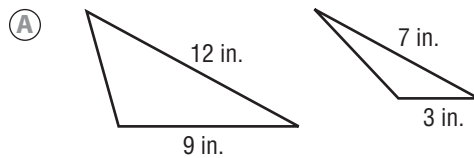
- 35** What number completes the sentence?

$$7 \times \underline{\hspace{1cm}} = -84$$

- (A) -12  
 (B) 12  
 (C) -13  
 (D) 13

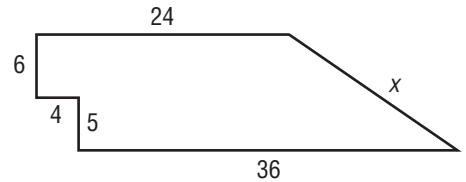
**6-2.2**

- 36** Which of the following pairs of shapes are similar figures?



**6-4.8**

- 37** The polygon below has a perimeter of 85 units.



What expression can be used to find the length of  $x$ ?

- (A)  $85 + 70$   
 (B)  $85 \div 6$   
 (C)  $85 - 36$   
 (D)  $85 - 75$

**6-5.5**

- 38** The table shows how many of each type of animal Polly's Pet shop has sold.

Animal	Number Sold
Dog	9
Cat	8
Bird	5
Hamster	6
Snake	2

What is the probability that the next animal the pet shop sells is a hamster?

- (A) 6%  
 (B) 20%  
 (C) 50%  
 (D) 60%

**6-6.4**





# Diagnostic Test (continued)

- 39** Amit and Chen investigated line symmetry and rotational symmetry in a few shapes. They made the chart below of their findings.

Shape	Sides	Lines of symmetry	Order of rotational symmetry
Equilateral triangle	3	3	3
Square	4	4	4
Regular hexagon	6	6	6

What can the boys conclude from their findings about the relationship between line symmetry and rotational symmetry in these three shapes?

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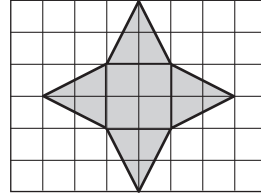
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**6-4.3**

- 40** What is the area of the shape below? Show your work and explain your strategy for solving. Each box is equal to 1 square centimeter.




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**6-5.4**







# Practice by Standard

## Number and Operations

- 1** Ten of the 50 states in the U.S. have less land area than South Carolina. What is the percent of U.S. states that have less land area than South Carolina?

(A) 10%  
 (B) 20%  
 (C) 25%  
 (D) 40%

6-2.1

- 2** What is the prime factorization of 48?

(A)  $2^3 \times 6$   
 (B)  $2^4 \times 3$   
 (C)  $2^3 \times 3^2$   
 (D)  $4^2 \times 3$

6-2.8

- 3** Which expression below shows a way to solve  $\frac{3}{5} - \frac{1}{4}$ ?

(A)  $\frac{3-1}{5-4}$   
 (B)  $\frac{9}{15} - \frac{3}{15}$   
 (C)  $\frac{3}{5} - \frac{2}{5}$   
 (D)  $\frac{12}{20} - \frac{5}{20}$

6-2.4

- 4** What symbol makes the sentence below true?

$$0.7 \square 8\%$$

(A)  $<$   
 (B)  $>$   
 (C)  $=$   
 (D)  $\leq$

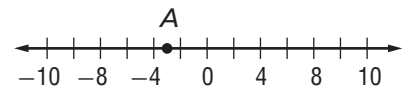
6-2.3

- 5** Which expression below shows how to use multiplication to solve  $\frac{4}{7} \div \frac{2}{3}$ ?

(A)  $\frac{7}{4} \times \frac{3}{2}$   
 (B)  $\frac{7}{4} \times \frac{2}{3}$   
 (C)  $\frac{4}{7} \times \frac{3}{2}$   
 (D)  $\frac{4}{7} \times \frac{2}{3}$

6-2.5

- 6** What integer does letter A on the number line below represent?



(A) -3  
 (B) -1  
 (C) 3  
 (D) 5

6-2.2



# Practice by Standard

## Number and Operations (continued)

**7** Which expression shows how to solve  $10^5$ ?

- (A)  $10 + 10 + 10 + 10 + 10$
- (B)  $10 \times 10 \times 10 \times 10 \times 10$
- (C)  $10 \times 5$
- (D)  $5^{10}$

**6-2.7**

**8** How can  $2 \times 2 \times 2 \times 2 \times 2 \times 2$  be represented using an exponent?

- (A)  $2^2$
- (B)  $2^4$
- (C)  $2^5$
- (D)  $2^6$

**6-2.9**

**9** Jerome drives 120 miles from Columbia to Charleston. He drives an average of 40 miles per hour for the entire trip. Assuming Jerome doesn't stop, how long does it take him to drive to Charleston?

- (A) 2 hours
- (B) 2.5 hours
- (C) 3 hours
- (D) 3.5 hours

**6-2.6**

**10** What number is 60% of 40?

- (A) 24
- (B) 36
- (C) 48
- (D) 64

**6-2.1**

**11** Which expression below shows one way to solve  $\frac{5}{6} + \frac{2}{3}$ ?

- (A)  $\frac{5}{6} + \frac{2}{6}$
- (B)  $\frac{5}{6} + \frac{4}{6}$
- (C)  $\frac{5+2}{6+3}$
- (D)  $\frac{5+2}{6}$

**6-2.4**

**12** What is the prime factorization of 100?

- (A)  $10^2$
- (B)  $2^5 \times 5$
- (C)  $2^3 \times 5^2$
- (D)  $2^2 \times 5^2$

**6-2.8**

**13** A meteorologist stated that the temperature of  $13^\circ\text{F}$  felt like  $-26^\circ\text{F}$  with the wind chill factor. What is the difference between the actual temperature and how cold it felt?

- (A)  $-29$  degrees
- (B)  $-13$  degrees
- (C) 13 degrees
- (D) 39 degrees

**6-2.2**



# Practice by Standard

## Algebra

- 1** The table below shows the prices of conch shells at a store in Myrtle Beach.

Conch Shells	Price
1	\$1.50
2	\$3.00
3	\$4.50
4	?

How much does it cost to buy 4 conch shells?

- Ⓐ \$3.00  
 Ⓑ \$5.50  
 Ⓒ \$6.00  
 Ⓓ \$6.50

**6-3.1**

- 2** Carrie solved the equation  $5x = 30$  and got the answer 6. Which expression shows how Carrie solved for  $x$ ?

- Ⓐ  $x = 30 + 5$   
 Ⓑ  $x = 30 - 5$   
 Ⓒ  $x = 30 \times 5$   
 Ⓓ  $x = 30 \div 5$

**6-3.5**

- 3** Which expression is equal to  $4 \times 27$ ?

- Ⓐ  $(4 \times 20) + (4 \times 7)$   
 Ⓑ  $(4 \times 20) + (7 \times 20)$   
 Ⓒ  $(7 \times 20) + (7 \times 4)$   
 Ⓓ  $(4 \times 7) + (20 \times 7)$

**6-3.4**

- 4** What is the solution to the equation below?

$$3 + (5^2 - 9) \times 2 = \underline{\hspace{2cm}}$$

- Ⓐ 10  
 Ⓑ 35  
 Ⓒ 38  
 Ⓓ 110

**6-3.2**

- 5** Jose wants to solve for  $c$  in the equation  $7c + 15 = 43$ . Which step below is the best first step?

- Ⓐ Divide both sides by 7.  
 Ⓑ Add 15 to both sides.  
 Ⓒ Multiply both sides by 7.  
 Ⓓ Subtract 15 from both sides.

**6-3.5**

- 6** Lisa sells homemade baskets. Large baskets sell for \$12 each and small baskets sell for \$7 each. If Lisa sells  $l$  large baskets and  $s$  small baskets, which expression represents the total amount that Lisa earns from selling baskets?

- Ⓐ  $12s + 7l$   
 Ⓑ  $12s \times 7l$   
 Ⓒ  $12l \times 7s$   
 Ⓓ  $12l + 7s$

**6-3.3**



# Practice by Standard

## Algebra (continued)

**7** Which expression is equal to  $3(4 \times 5)$ ?

- (A)  $4 \times (3 + 5)$
- (B)  $(3 \times 4) + (3 \times 5)$
- (C)  $(4 \times 3) + (4 \times 5)$
- (D)  $4 \times (3 \times 5)$

**6-3.4**

**8** The table below shows the relationship between  $x$  and  $y$ .

$x$	$y$
5	4
10	8
15	12
20	?

When  $x$  is equal to 20, what is the value of  $y$ ?

- (A) 16
- (B) 18
- (C) 19
- (D) 25

**6-3.1**

**9** What is the solution to the equation below?

$$2 \times (90 - 3^2 \div 9) = \underline{\hspace{2cm}}$$

- (A) 18
- (B) 19
- (C) 178
- (D) 179

**6-3.2**

**10** A park ranger near the Catawba River counts  $d$  white-tailed deer and  $r$  raccoons during one day. Between the deer and raccoons, the ranger counts 30 animals. Which equation below shows this situation?

- (A)  $d + r = 30$
- (B)  $d \times r = 30$
- (C)  $d \div r = 30$
- (D)  $d - r = 30$

**6-3.3**

**11** What is the first part of the equation to solve the expression  $5 - 12 \times 2 + 3^2$ ?

- (A)  $5 - 12$
- (B)  $12 \times 2$
- (C)  $2 + 3$
- (D)  $3^2$

**6-3.2**

**12** What is the value of  $d$  in the equation  $4d = 16$ ?

- (A)  $d = 4$
- (B)  $d = 12$
- (C)  $d = 16$
- (D)  $d = 64$

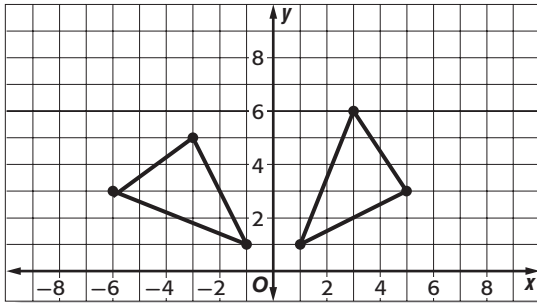
**6-3.5**



# Practice by Standard

## Geometry

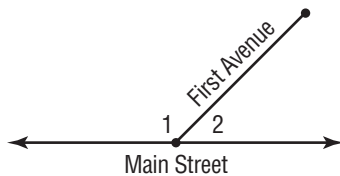
- 1** What type of transformation is represented by the triangles?



- (A) rotation
- (B) translation
- (C) reflection
- (D) dilation

6-4.5

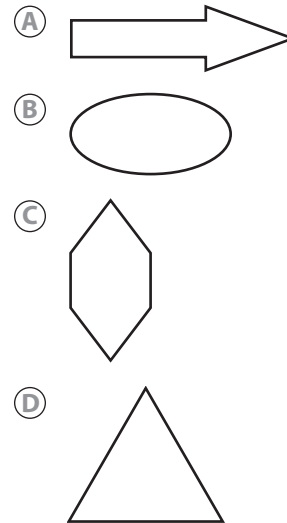
- 2** Which term best describes the two angles formed by the intersection of Main Street and First Avenue?



- (A) complementary angles
- (B) supplementary angles
- (C) vertical angles
- (D) corresponding angles

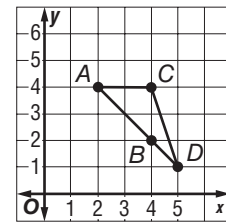
6-4.9

- 3** Which shape below has line symmetry but no rotational symmetry?



6-4.3

- 4** Which point represents the location of the ordered pair (4, 2)?



- (A) Point A
- (B) Point B
- (C) Point C
- (D) Point D

6-4.1



# Practice by Standard

## Geometry (continued)

**5** Which shape below does not have rotational symmetry?

- (A)
- (B)
- (C)
- (D)

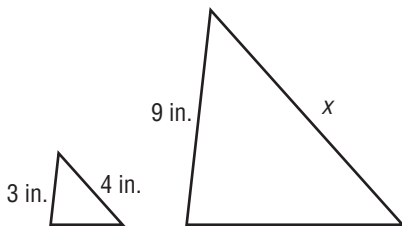
6-4.4

**6** Carlos drew a rectangle with a length of 10 centimeters and a width of 12 centimeters. Which choice below shows the length and width of a rectangle similar to the one Carlos drew?

- (A)  $l = 20$  cm;  $w = 22$  cm
- (B)  $l = 5$  cm;  $w = 6$  cm
- (C)  $l = 14$  cm;  $w = 18$  cm
- (D)  $l = 3$  cm;  $w = 4$  cm

6-4.8

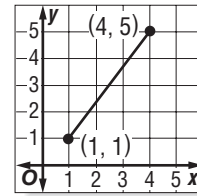
**7** The triangles below are similar. What is the length of side  $x$ ?



- (A) 10 in.
- (B) 12 in.
- (C) 14 in.
- (D) 16 in.

6-4.7

**8** Charlotte connected the coordinates below.

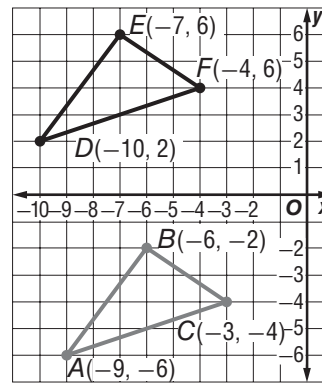


Charlotte wants to create a right triangle by connecting these two coordinates to a third coordinate. Which of the following coordinates could she use?

- (A) (1, 5)
- (B) (2, 1)
- (C) (3, 4)
- (D) (5, 1)

6-4.2

**9**  $\triangle DEF$  is a translation of  $\triangle ABC$ .



Which of the following describes the translation?

- (A) 1 unit left and 8 units down
- (B) 8 units left and 1 unit up
- (C) 8 units up and 1 unit left
- (D) 1 unit right and 8 units up

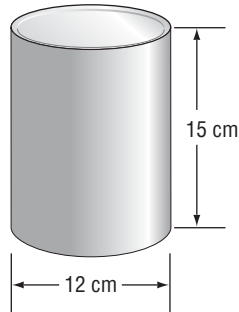
6-4.6



# Practice by Standard

## Measurement

- 1** Maria wants to find the surface area of the cylinder below.

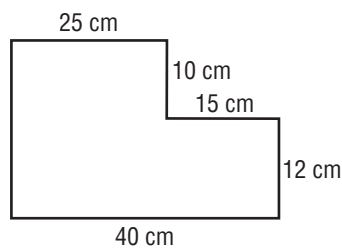


Which 2-dimensional shapes should Maria find the area of to find the total surface area of the cylinder?

- (A) 2 rectangles, 1 circle
- (B) 1 rectangle, 1 circle
- (C) 2 rectangles, 2 circles
- (D) 1 rectangle, 2 circles

**6-5.3**

- 2** What is the area of the shape below?



- (A)  $430 \text{ cm}^2$
- (B)  $680 \text{ cm}^2$
- (C)  $730 \text{ cm}^2$
- (D)  $880 \text{ cm}^2$

**6-5.5**

- 3** Which equation could be used to find the area of a circle with a diameter of 12 centimeters, using 3.14 for  $\pi$ ?

- (A)  $3.14 \times 12$
- (B)  $3.14 \times 12^2$
- (C)  $3.14 \times 6$
- (D)  $3.14 \times 6^2$

**6-5.2**

- 4** Alicia kayaks 12 miles on the Edisto River. It takes her 4 hours to kayak that distance. Solve the proportion below to find her unit rate.

$$\frac{12 \text{ miles}}{4 \text{ hours}} = \frac{x \text{ miles}}{1 \text{ hour}}$$

- (A) 3 miles per hour
- (B) 4 miles per hour
- (C) 8 miles per hour
- (D) 9 miles per hour

**6-5.6**

- 5** The radius of a circle is 2 centimeters. Which choice below shows the diameter and circumference of this circle, using 3.14 for  $\pi$ ?

- (A)  $d = 1 \text{ cm}; c = 3.14 \text{ cm}$
- (B)  $d = 3.14 \text{ cm}; c = 6.28 \text{ cm}$
- (C)  $d = 4 \text{ cm}; c = 12.56 \text{ cm}$
- (D)  $d = 6.28 \text{ cm}; c = 12.56 \text{ cm}$

**6-5.1**



# Practice by Standard

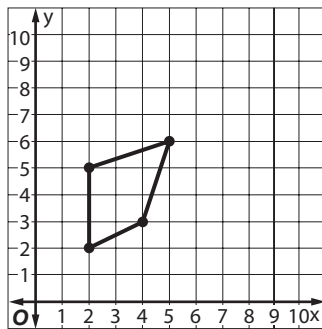
## Measurement (continued)

- 6** Ann and Lisa mark the locations of their homes on a map of Greenville. They measure the distance between their homes on the map as 5 inches. The scale of the map is 1 inch equals  $\frac{1}{2}$  mile. How far apart are Ann's and Lisa's homes?

- (A) 1.25 miles
- (B) 2.5 miles
- (C) 3.75 miles
- (D) 5 miles

**6-5.7**

- 7** Which choice is the best estimate for the area of the shape below?



- (A) 4 square units
- (B) 5 square units
- (C) 7 square units
- (D) 9 square units

**6-5.4**

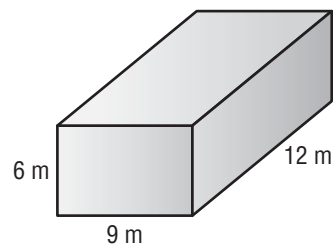
- 8** The trip from Rock Hill to Beaufort is about 200 miles. Jackie made this trip in about 4 hours. Solve the proportion below to find her unit rate.

$$\frac{200 \text{ mile}}{4 \text{ hours}} = \frac{x \text{ miles}}{1 \text{ hour}}$$

- (A) 25 miles per hour
- (B) 40 miles per hour
- (C) 50 miles per hour
- (D) 60 miles per hour

**6-5.6**

- 9** Which expression shows how to find the surface area of the rectangular prism below?



- (A)  $6 \times 9 + 6 \times 12 + 9 \times 12$
- (B)  $2 \times (6 \times 9 \times 12)$
- (C)  $(6 + 9) \times (6 + 12) \times (9 + 12)$
- (D)  $2 \times (6 \times 9 + 6 \times 12 + 9 \times 12)$

**6-5.3**





# Practice by Standard

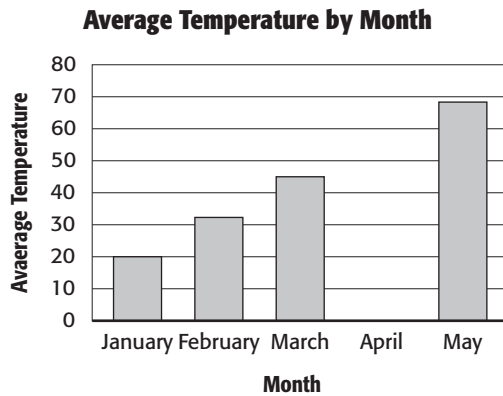
## Data Analysis and Probability

- 1** Lisa puts a stack of 30 postcards into a bag. Out of these postcards, 10 are from Charleston, 15 are from Myrtle Beach, and 5 are from Hilton Head. If Lisa randomly chooses 1 postcard from the bag, what is the probability that she will not choose a postcard from Hilton Head?

- (A)  $\frac{1}{6}$   
 (B)  $\frac{1}{2}$   
 (C)  $\frac{2}{3}$   
 (D)  $\frac{5}{6}$

6-6.5

- 2** The following bar graph shows the average temperature for January, February, March, and May. What is the most likely average temperature for the month of April?



- (A) 32  
 (B) 44  
 (C) 56  
 (D) 68

6-6.1

- 3** The table below lists the students running for class president and vice president.

President	Vice President
Jorden	Lauren
Maria	Jack
Chen	

Which tree diagram shows all the possible combinations of president and vice president?

- (A)  $\begin{array}{l} \text{Jordan} \\ \text{Maria} \end{array} \begin{array}{l} \diagup \text{Lauren} \\ \diagdown \text{Jack} \end{array}$
- (B)  $\begin{array}{l} \text{Jordan} \\ \text{Chen} \end{array} \begin{array}{l} \diagup \text{Lauren} \\ \diagdown \text{Maria} \\ \diagdown \text{Jack} \end{array}$
- (C)  $\begin{array}{l} \text{Jordan} \\ \text{Chen} \end{array} \begin{array}{l} \diagup \text{Lauren} \\ \diagdown \text{Jack} \end{array}$
- (D)  $\begin{array}{l} \text{Jordan} \\ \text{Maria} \\ \text{Chen} \end{array} \begin{array}{l} \diagup \text{Lauren} \\ \diagdown \text{Jack} \\ \diagdown \text{Chen} \end{array}$

6-6.4



# Practice by Standard

## Data Analysis and Probability (continued)

- 4** Which measure is best to find the central tendency of the data set below?

1, 1, 4, 5, 8, 9, 12, 13, 63

- (A) mode  
(B) median  
(C) range  
(D) mean

**6-6.3**

- 5** Shawn recorded the following math test scores from his first semester of college.

85, 83, 95, 93, 80, 79, 88

Which of the following stem-and-leaf plots correctly displays this data?

(A)

Stem	Leaves
8	0 3 5 8 9
9	3 5

(B)

Stem	Leaves
7	79
8	80 83 85 88
9	93 95

(C)

Stem	Leaves
7	9
8	8 5 3 0
9	3 5

(D)

Stem	Leaves
7	9
8	0 3 5 8
9	3 5

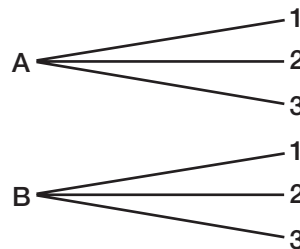
**6-6.2**

- 6** The probability that Don can draw a jack from the cards that remain in the deck is  $\frac{2}{23}$ . What is the probability that Don will not draw a jack out of the cards that remain in the deck?

- (A) 0  
(B)  $\frac{1}{23}$   
(C)  $\frac{1}{11}$   
(D)  $\frac{21}{23}$

**6-6.5**

- 7** Rachel made the following tree diagram for spinning two spinners.



What is the probability of spinning B and an odd number?

- (A)  $\frac{1}{3}$   
(B)  $\frac{1}{6}$   
(C)  $\frac{2}{3}$   
(D)  $\frac{4}{9}$

**6-6.4**



# Practice Test

- 1** A weather forecast has determined that the probability of rain for the following day is 48%. What is the probability that it will not rain the following day?

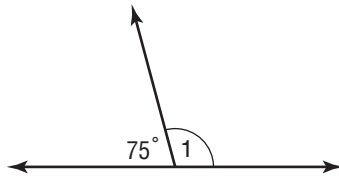
- (A) 23%  
 (B) 26%  
 (C) 48%  
 (D) 52%

- 2** Which number sentence is related to the following sentence?

$$\frac{1}{2} \div \frac{1}{6} = 3$$

- (A)  $3 \div \frac{1}{2} = \frac{1}{6}$   
 (B)  $\frac{1}{2} \times 6 = 3$   
 (C)  $\frac{1}{6} \times \frac{1}{2} = 3$   
 (D)  $3 \div \frac{1}{6} = \frac{1}{2}$

- 3** The angles below are supplementary. What is the measure of angle 1?



- (A) 15°  
 (B) 75°  
 (C) 105°  
 (D) 115°

- 4** To evaluate the expression  $21 - 6 \times 3$ , Sabrina subtracted 6 from 21 to get 15, and then multiplied 15 by 3 to get 45. What should Sabrina have done differently?

- (A) subtracted  $(6 \times 3)$  from 21  
 (B) subtracted 6 from  $(21 \times 3)$   
 (C) subtracted 3 from  $(21 \times 6)$   
 (D) subtracted  $(21 \times 3)$  from 6

- 5** The table below shows the relationship between  $x$  and  $y$ .

$x$	$y$
1	3
2	6
3	9
4	?

When  $x$  is equal to 4, what is the value of  $y$ ?

- (A) 10  
 (B) 12  
 (C) 13  
 (D) 15



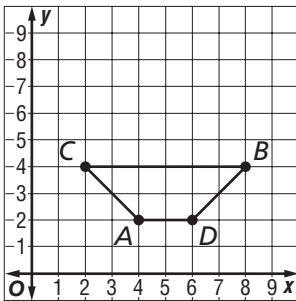


# Practice Test (continued)

- 6** The population of South Carolina can be approximated by the expression  $4 \times 10^6$ . Which expression below shows how to calculate this number?

- (A)  $4 \times (10 + 10 + 10 + 10 + 10 + 10)$   
 (B)  $4 \times 10 + 4 \times 10 + 4 \times 10 + 4 \times 10 + 4 \times 10 + 4 \times 10$   
 (C)  $4 \times 6 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$   
 (D)  $4 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$

- 7** Which point is located at (4, 2)?



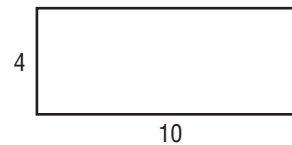
- (A) A  
 (B) B  
 (C) C  
 (D) D

- 8** Di ran a 10-kilometer race along the Cooper River in Charleston in 1.25 hours. Using the proportion below, what was her unit rate?

$$\frac{10 \text{ kilometers}}{1.25 \text{ hours}} = \frac{x \text{ kilometers}}{1 \text{ hour}}$$

- (A) 6 kilometers per hour  
 (B) 8 kilometers per hour  
 (C) 11.25 kilometers per hour  
 (D) 12.5 kilometers per hour

- 9** Brian drew a rectangle that was 4 units by 10 units.



Which shape below is similar to Brian's rectangle?

- (A)   
 (B)   
 (C)   
 (D)





# Practice Test (continued)

- 10** Which symbol makes the number sentence true?

$$0.034 \square 34\%$$

- (A) <  
 (B) >  
 (C) =  
 (D) +

- 11** Kiarra works for 5 hours and makes \$32. Which equation can she use to find  $h$ , how much money she makes per hour?

- (A)  $h + \$32 = 5$   
 (B)  $\$32 \div 5 = h$   
 (C)  $\$32 - 5 = h$   
 (D)  $h + 5 = \$32$

- 12** A circular pool has a diameter of 14 feet. Which equation can be used to find its circumference,  $C$ , in feet?

- (A)  $C = 14 \times \pi$   
 (B)  $C = 7 \times \pi$   
 (C)  $C = 7^2 \times \pi$   
 (D)  $C = 2 \times 14 \times \pi$

- 13** Hai rides his bike for 2 hours and travels 16 miles. Using the proportion below, what is Hai's average speed?

$$\frac{16 \text{ miles}}{2 \text{ hours}} = \frac{? \text{ miles}}{1 \text{ hour}}$$

- (A) 8 miles per hour  
 (B) 14 miles per hour  
 (C) 18 miles per hour  
 (D) 32 miles per hour

- 14** Milk is the state beverage of South Carolina. The table below shows the output of a pump at a milk processing plant.

At the end of	Gallons pumped
6 minutes	60
7 minutes	70
8 minutes	80

At what rate does the pump operate?

- (A) 6 gallons/minute  
 (B) 7 gallons/minute  
 (C) 8 gallons/minute  
 (D) 10 gallons/minute





# Practice Test (continued)

- 15** On Saturday morning the temperature was  $3^{\circ}\text{F}$  below zero. By 2:00 P.M. the temperature rose  $16^{\circ}$ . What was the temperature at 2:00 P.M.?

Ⓐ  $13^{\circ}\text{F}$   
 Ⓑ  $16^{\circ}\text{F}$   
 Ⓒ  $18^{\circ}\text{F}$   
 Ⓓ  $19^{\circ}\text{F}$

- 16** Rachel wants to find the value of  $y$  in the equation  $3y = 15$ . Which step will correctly solve the equation?

Ⓐ Add 3 to both sides.  
 Ⓑ Subtract 3 from both sides.  
 Ⓒ Multiply both sides by 3.  
 Ⓓ Divide both sides by 3.

- 17** Maria drove her car for 208 miles and used 8 gallons of gasoline. Using the proportion below, what is the unit rate of the number of miles per gallon for Maria's car?

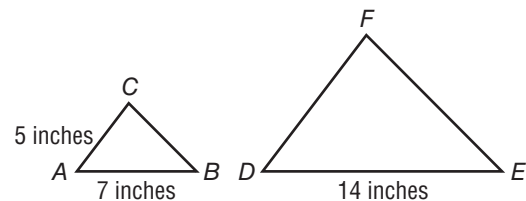
$$\frac{208 \text{ miles}}{8 \text{ gallons}} = \frac{x \text{ miles}}{1 \text{ gallon}}$$

Ⓐ 21 miles per gallon  
 Ⓑ 24 miles per gallon  
 Ⓒ 26 miles per gallon  
 Ⓓ 28 miles per gallon

- 18** What is the area of a circle with a radius of 3 centimeters? Use 3.14 for  $\pi$ .

Ⓐ  $14.13 \text{ cm}^2$   
 Ⓑ  $18.84 \text{ cm}^2$   
 Ⓒ  $28.26 \text{ cm}^2$   
 Ⓓ  $37.68 \text{ cm}^2$

- 19**  $\triangle ABC$  is similar to  $\triangle DEF$ . What is the length of  $\overline{DF}$ ?



Ⓐ 2 inches  
 Ⓑ 10 inches  
 Ⓒ 20 inches  
 Ⓓ 21 inches

- 20** Which expression is equivalent to  $6x - 12$ ?

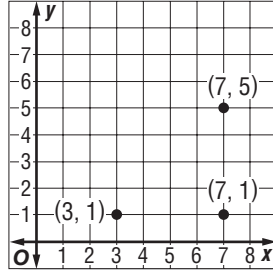
Ⓐ  $6(x - 2)$   
 Ⓑ  $x(6 - 12)$   
 Ⓒ  $6(x - 12)$   
 Ⓓ  $x(6 - 2)$





# Practice Test (continued)

- 21** John is drawing a square on the coordinate grid. He marks 3 vertices at  $(3, 1)$ ,  $(7, 1)$ , and  $(7, 5)$ .



What are the coordinates of the missing vertex?

- (A)  $(3, 4)$
- (B)  $(1, 5)$
- (C)  $(3, 5)$
- (D)  $(4, 4)$

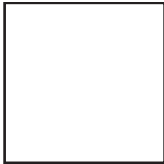

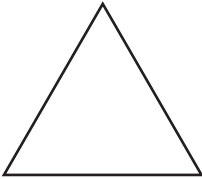

- 22** For every 3 steps that Nathan takes, his little brother, Patrick, has to take 8 steps in order to walk the same distance. If Nathan takes 45 steps, how many steps must Patrick take in order to walk the same distance?

- (A) 100
- (B) 120
- (C) 140
- (D) 160

- 23** Lisa buys 5 snow globes as souvenirs for her friends. Three of the snow globes are from Myrtle Beach and 2 are from Charleston. If Lisa randomly gives one of the snow globes to a friend, what is the probability that it will not be from Myrtle Beach?

- (A)  $\frac{1}{3}$
- (B)  $\frac{2}{5}$
- (C)  $\frac{3}{5}$
- (D)  $\frac{2}{3}$

- 24** Which shape below has the highest order of rotational symmetry?

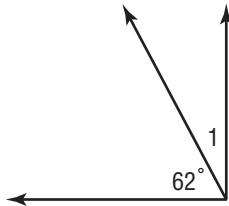
- (A) 
- (B) 
- (C) 
- (D) 





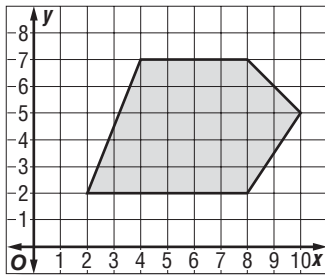
# Practice Test (continued)

- 25** What is the measure of  $\angle 1$  in the following figure?



- (A)  $18^\circ$   
 (B)  $28^\circ$   
 (C)  $38^\circ$   
 (D)  $118^\circ$

- 26** Which choice is the best estimate for the area of the shape below?



- (A) 20 square units  
 (B) 30 square units  
 (C) 35 square units  
 (D) 40 square units

- 27** Last week, Sarah scored 14 points in her basketball game. Yesterday, she scored  $n$  fewer points during her game. Which expression shows how many points she scored in yesterday's game?

- (A)  $14 \div n$   
 (B)  $n + 14$   
 (C)  $14 - n$   
 (D)  $n \times 14$

- 28** What is the value of  $x$  in the equation below?

$$x - 6 = 18$$

- (A) 3  
 (B) 12  
 (C) 20  
 (D) 24

- 29** What is the prime factorization of 81?

- (A)  $9^2$   
 (B)  $3^4$   
 (C)  $3^2 \times 2^2$   
 (D)  $3^3 \times 2$







# Practice Test (continued)

**30** What is 30% of 70?

- (A) 17
- (B) 21
- (C) 27
- (D) 35

**31** Fruit smoothies at a juice shop can be made with 1 choice of juice and 1 choice of frozen fruit. Use the two lists below to find the total number of possible smoothie choices.

Juice	Fruit
apple	banana
peach	blueberry
mango	strawberry
	pineapple

- (A) 7 choices
- (B) 12 choices
- (C) 14 choices
- (D) 21 choices

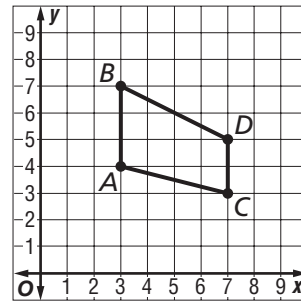
**32** Which of the following expressions has the same value as  $3 \times (4 + 9)$ ?

- (A)  $(3 \times 4) + 9$
- (B)  $(3 \times 4) + (9 \times 4)$
- (C)  $(3 \times 4) \times (3 \times 9)$
- (D)  $(3 \times 4) + (3 \times 9)$

**33** Which expression shows how to find the surface area of a cube with sides that are 4 units long?

- (A)  $6 \times 4 \times 4$
- (B)  $6 \times (4 + 4)$
- (C)  $4 \times 4 \times 4$
- (D)  $6 \times 6 \times 4$

**34** Which point is located at (3, 7)?



- (A) A
- (B) B
- (C) C
- (D) D

**35** Which expression below is equal to 32?

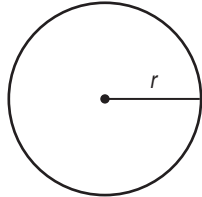
- (A)  $2^3$
- (B)  $2^4$
- (C)  $2^5$
- (D)  $2^6$





# Practice Test (continued)

- 36** The circle below has a circumference of  $26\pi$  and a radius of  $r$ . Which equation could be used to solve for  $r$ ?



Circumference =  $26\pi$

- Ⓐ  $\pi \times r = 26\pi$   
 Ⓑ  $\pi \times r^2 = 26\pi$   
 Ⓒ  $\pi \times 2r = 26$   
 Ⓓ  $\pi \times 2r = 26\pi$

- 37** A researcher has done a count of eastern bluebirds every year for the past 5 years. The results are shown in the table below.

Year	Count
1	6
2	9
3	11
4	14
5	18

Which choice is the best prediction for how many eastern bluebirds the researcher will count this year?

- Ⓐ 21  
 Ⓑ 25  
 Ⓒ 27  
 Ⓓ 31

- 38** Calvin rode his bicycle for 15 miles on Saturday. If he rode for 2 hours, which expression could he use to find his rate in miles per hour?

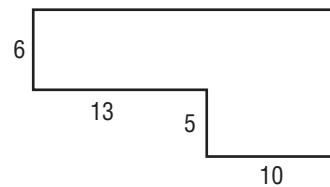
- Ⓐ  $15 \div 2$   
 Ⓑ  $2 \div 15$   
 Ⓒ  $2 \times \frac{1}{15}$   
 Ⓓ  $15 \times 2$

- 39** Which value of  $m$  makes the following equation true?

$$m + 48 = 32$$

- Ⓐ  $-80$   
 Ⓑ  $-16$   
 Ⓒ 16  
 Ⓓ 80

- 40** What is the perimeter of the figure below?



- Ⓐ 34  
 Ⓑ 48  
 Ⓒ 54  
 Ⓓ 68





# Practice Test (continued)

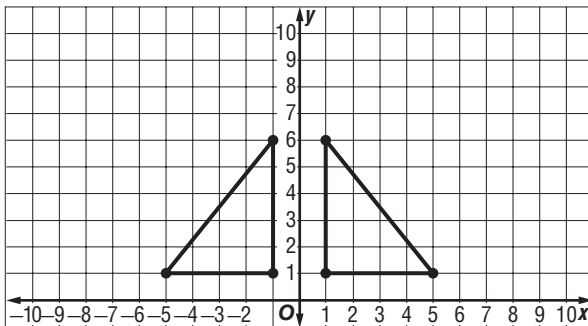
- 41** Becky's part-time job is to deliver pizzas. On average she receives a 15% tip for each delivery she makes. If Becky delivers a pizza and the bill is \$40.00, how much can she expect to receive for a tip?

(A) \$1.50  
 (B) \$4.50  
 (C) \$6.00  
 (D) \$8.00

- 42** What should be the first step when solving the expression  $6 + 4 \times (3 - 1) \div 2$ ?

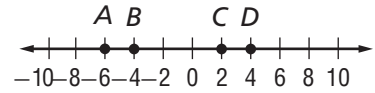
(A)  $6 + 4$   
 (B)  $4 \times 3$   
 (C)  $3 - 1$   
 (D)  $1 \div 2$

- 43** Which type of transformation is represented by the triangles below?



(A) rotation  
 (B) translation  
 (C) reflection  
 (D) dilation

- 44** Which letter represents 4 on the number line below?



(A) A  
 (B) B  
 (C) C  
 (D) D

- 45** A scale drawing uses a scale of 1 inch equals 3 feet. How many inches would represent 42 feet in this drawing?

(A) 3.5  
 (B) 14  
 (C) 15  
 (D) 126

- 46** A circle has a diameter of 20 meters. Using 3.14 for  $\pi$ , what is the area of the circle?

(A)  $31.4 \text{ m}^2$   
 (B)  $62.4 \text{ m}^2$   
 (C)  $314 \text{ m}^2$   
 (D)  $1,256 \text{ m}^2$





# Practice Test (continued)

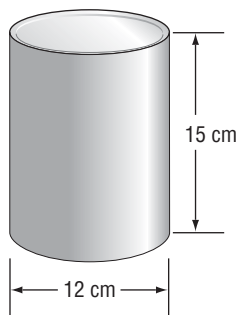
- 47** Which measure is best to find the most common number in a data set?

(A) mode  
 (B) median  
 (C) range  
 (D) mean

- 48** Which expression is equivalent to  $3.821 \div 0.02$ ?

(A)  $3,821 \div 2$   
 (B)  $3,821 \div 20$   
 (C)  $3,821 \div 200$   
 (D)  $3,821 \div 2,000$

- 49** Which expression shows how to find the surface area of the cylinder below?



(A)  $6 \times (\pi \times 15^2)$   
 (B)  $12 \times 15\pi + (\pi \times 6 \times 2)$   
 (C)  $15 \times 12\pi + 2(\pi \times 6^2)$   
 (D)  $15 \times (\pi \times 12^2)$

- 50** Which of the following stem-and-leaf plots correctly displays the data below showing the ages of customers in a store?

13, 25, 23, 38, 20, 20, 25, 47, 51,  
 16, 53, 41, 37, 20, 21, 47, 10, 30

- (A) **Age of Customers**

Stem	Leaf
1	0 3 6
2	0 1 3 5 5
3	0 7 8
4	1 7
5	1 3

- (B) **Age of Customers**

Stem	Leaf
1	0 3 6
2	0 0 1 3 5
3	0 7 8
4	1 7
5	1 3

- (C) **Age of Customers**

Stem	Leaf
1	0 3 6
2	0 1 3 5
3	0 7 8
4	1 7
5	1 3

- (D) **Age of Customers**

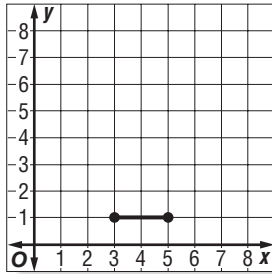
Stem	Leaf
1	0 3 6
2	0 0 0 1 3 5 5
3	0 7 8
4	1 7 7
5	1 3





# Practice Test (continued)

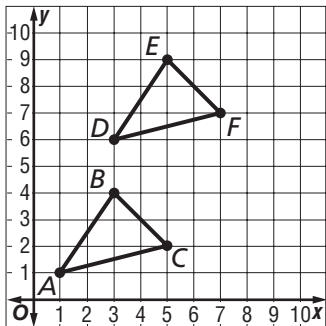
- 51** Jacob started drawing a right triangle by connecting the points (3, 1) and (5, 1).



Which coordinate pair below can Jacob use to complete his shape?

- (A) (4, 2)
- (B) (3, 3)
- (C) (6, 4)
- (D) (1, 5)

- 52**  $\triangle DEF$  is a translation of  $\triangle ABC$ .



Which of the following describes the translation?

- (A) 2 units right and 5 units down
- (B) 5 units right and 2 units up
- (C) 2 units right and 5 units up
- (D) 5 units down and 2 units left

- 53** Kevin made the chart below to show the number of minutes he played in each basketball game and how many points he scored.

Minutes	Points
18	8
22	15
25	18
28	22
32	24

Which choice is the most reasonable prediction for how many points Kevin would score if he plays 35 minutes in his next game?

- (A) 20
- (B) 26
- (C) 32
- (D) 35

- 54** Maria has five test scores for the nine-week term. What is the range of her test scores?

32, 70, 98, 88, 62

- (A) 62
- (B) 66
- (C) 88
- (D) 98

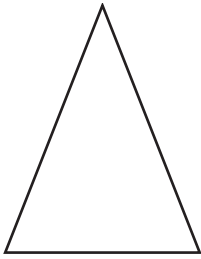




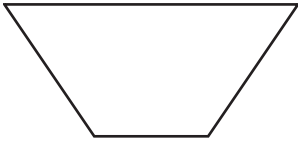
# Practice Test (continued)

**55** Which shape has rotational symmetry?

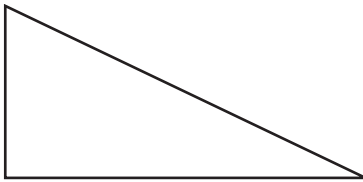
(A)



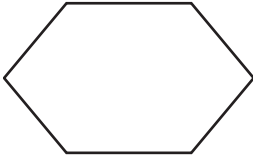
(B)



(C)



(D)



**56** The Parkdale High School wrestling team is made up of six wrestlers. The six wrestlers' weights are as follows: 134 pounds, 175 pounds, 136 pounds, 155 pounds, 159 pounds, and 175 pounds. What is the median weight, in pounds, of the six wrestlers?

- (A) 136
- (B) 155
- (C) 157
- (D) 175

**57** Terry needs to choose an outfit to wear. He can choose a red, blue, or green shirt and black or brown pants. Which organized list shows all the possible outfits Terry could wear?

(A)

red, black  
red, brown  
blue, black  
blue, brown  
green, black  
green, brown

(B)

red, black  
blue, brown  
green, black

(C)

red, black  
blue, black  
green, black  
red, brown  
blue, brown

(D)

red, brown  
red, brown  
blue, brown  
blue, black  
green, black  
green, black





## Practice Test (continued)

- 58** Ben has 8 blue marbles and 6 red marbles in a bag. If Ben randomly chooses one marble from the bag, what is the probability that the marble will not be blue?

- (A)  $\frac{1}{4}$   
 (B)  $\frac{3}{7}$   
 (C)  $\frac{4}{7}$   
 (D)  $\frac{3}{4}$

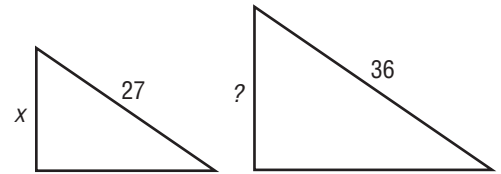
- 59** The frequency table below shows the scores that students received on the last 10-point math quiz.

Score	Frequency
4	2
5	1
6	2
7	3
8	4
9	2
10	3

How many students scored 10 points on the quiz?

- (A) 1  
 (B) 2  
 (C) 3  
 (D) 4

- 60** These two right triangles are similar. The length of the hypotenuse of the first triangle is 27, while the length of the hypotenuse of the second triangle is 36. The height of the first triangle is  $x$ . Write an expression to show the height of the second triangle.



\_\_\_\_\_





# Practice Test (continued)

- 61** Find the prime factorization of 288 by completing the factor tree below.  
Then write the prime factorization of 288 as an expression on the line below.



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