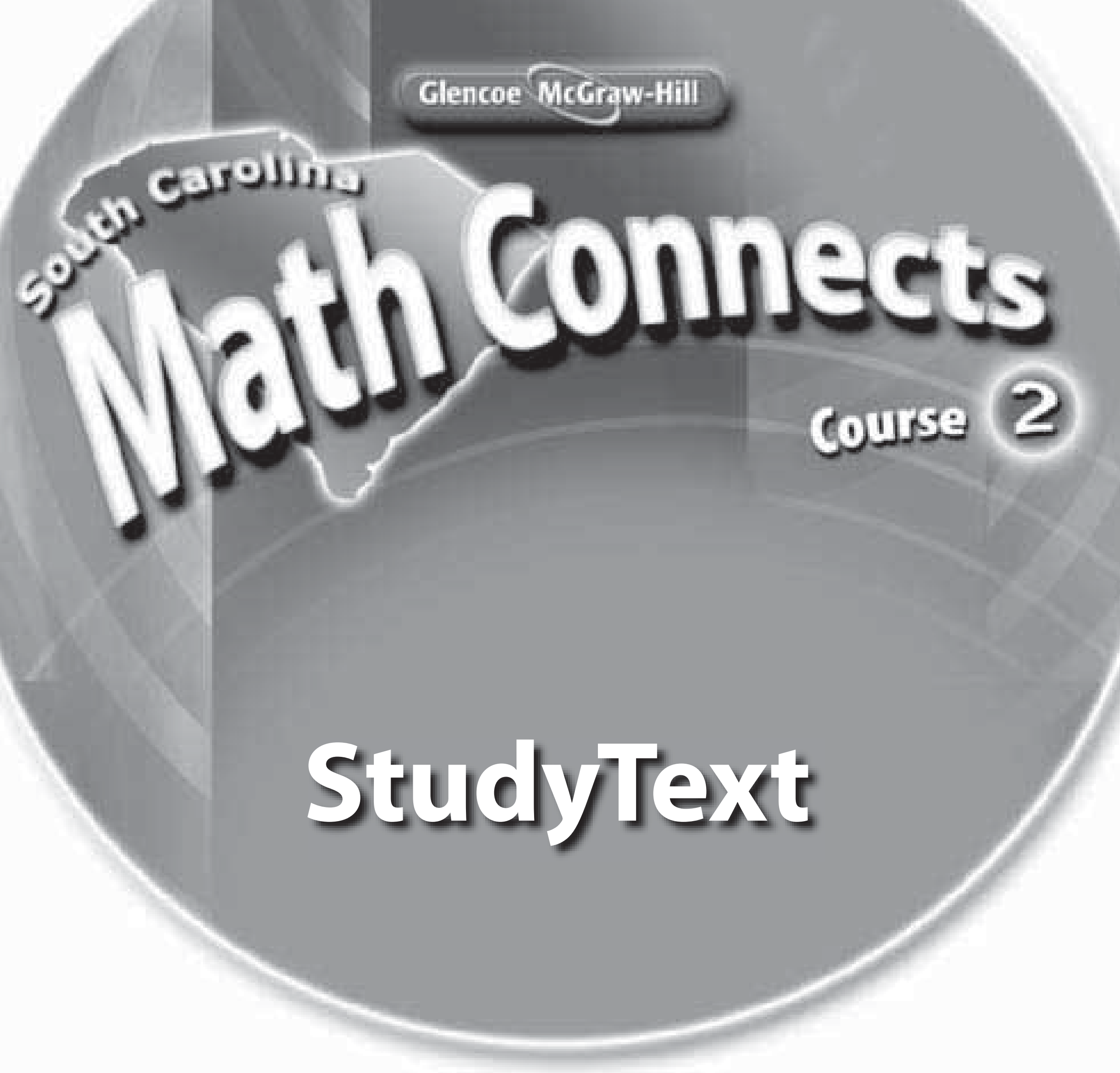

Glencoe McGraw-Hill

South Carolina Math Connects

Course 2

StudyText

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Glencoe/McGraw-Hill
8787 Orion Place
Columbus, OH 43240-4027

ISBN: 978-0-07-890681-7
MHID: 0-07-890681-4

South Carolina StudyText, Course 2

Printed in the United States of America.

1 2 3 4 5 6 7 8 9 10 045 16 15 14 13 12 11 10 09 08

Using Your South Carolina StudyText

South Carolina Math Connects StudyText, Course 2 is a practice workbook designed to help you master the South Carolina Academic Standards for Grade 7 Mathematics. It is divided into three sections.

Prerequisite Skills Check

This is an assessment of the South Carolina Mathematics Standards from Grade 6. 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 2*. 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 7 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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Mastering the PASS

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Additional Resource
Math Triumphs, Grade 7 [Book 3]: Chapter 7 (Whole Numbers and Integers), Chapter 8 (Integer Operations), Chapter 9 (Variables and Expressions) and Chapter 10 (Equations).

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Additional Resource
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10 Geometry: Polygons (continued)

Page	Lesson	Academic Math Standard(s) Focus	Use with *Glencoe South Carolina Math Connects,* Course 2 (pages)
	10-9 Translations		553–557
317	Explore Through Reading	**7-4.1**	
318	Study Guide	**7-4.1**	
319	Homework Practice	**7-4.1**	
320	Problem-Solving Practice	**7-4.1**	
	10-10 Reflections		558–562
321	Explore Through Reading	**7-4.1**	
322	Study Guide	**7-4.1**	
323	Homework Practice	**7-4.1**	
324	Problem-Solving Practice	**7-4.1**	
325	**Chapter 10 Test**		

Additional Resource
Math Triumphs, Grade 7 [Book 2]: Chapter 5 (Two-Dimensional Figures)

11 Measurement: Two- and Three-Dimensional Figures

Page	Lesson	Academic Math Standard(s) Focus	Use with *Glencoe South Carolina Math Connects,* Course 2 (pages)
327	**Chapter 11 Anticipation Guide**		
328	**Chapter 11 Family Activity**		
	11-2 Area of Triangles and Trapezoids		578–582
329	Explore Through Reading	7-4.1, 7-5.3	
330	Study Guide	7-4.1, 7-5.3	
331	Homework Practice	7-4.1, 7-5.3	
332	Problem-Solving Practice	7-4.1, 7-5.3	
	11A Areas of Similar and Congruent Polygons		LA 4
333	Study Guide	7-4.6	
334	Skills Practice	7-4.6	
335	Homework Practice	7-4.6	
336	Problem-Solving Practice	7-6.2	
	11-7 Three-Dimensional Figures		603–606
337	Explore Through Reading	7-4.4, 7-5.2	
338	Study Guide	7-4.4, 7-5.2	
339	Homework Practice	7-4.4, 7-5.2	
340	Problem-Solving Practice	7-4.4, 7-5.2	
	11-8 Drawing Three-Dimensional Figures		608–612
341	Explore Through Reading	7-4.4, 7-4.3	
342	Study Guide	7-4.4, 7-4.3	
343	Homework Practice	7-4.4, 7-4.3	
344	Problem-Solving Practice	7-4.4, 7-4.3	
	11A Cross sections of Solids		745
345	Study Guide	7-4.3	
346	Skills Practice	7-4.3	
347	Homework Practice	7-4.3	
348	Problem-Solving Practice	7-4.3	
	11-9 Volume of Prisms		613–618
349	Explore Through Reading	7-4.4, 7-5.2	
350	Study Guide	7-4.4, 7-5.2	
351	Homework Practice	7-4.4, 7-5.2	
352	Problem-Solving Practice	7-4.4, 7-5.2	
	11-10 Volume of Cylinders		619–623
353	Explore Through Reading	7-4.4, 7-5.2	
354	Study Guide	7-4.4, 7-5.2	
355	Homework Practice	7-4.4, 7-5.2	
356	Problem-Solving Practice	7-4.4, 7-5.2	
357	**Chapter 11 Test**		

Additional Resource

Math Triumphs, Grade 7 [Book 2]: Chapter 4 (Measurement), Chapter 5 (Two-Dimensional Figures), and Chapter 6 (Three-Dimensional Figures)

12 Geometry and Measurement

Page	Lesson	Academic Math Standard(s) Focus	Use with *Glencoe South Carolina Math Connects,* Course 2 (pages)
359	**Chapter 12 Anticipation Guide**		
360	**Chapter 12 Family Activity**		
	12-1 Estimating Square Roots		636–639
361	Explore Through Reading	**7-2.10**	
362	Study Guide	**7-2.10**	
363	Homework Practice	**7-2.10**	
364	Problem-Solving Practice	**7-2.10**	
	12-3 Problem-Solving Investigation: Make a Model		646–647
365	Study Guide	**7-5.2**	
366	Skills Practice	**7-5.2**	
367	Homework Practice	**7-5.2**	
368	Problem-Solving Practice	**7-5.2**	
	12-4 Surface Area of Rectangular Prisms		649–653
369	Explore Through Reading	**7-5.2**	
370	Study Guide	**7-5.2**	
371	Homework Practice	**7-5.2**	
372	Problem-Solving Practice	**7-5.2**	
	12-5 Surface Area of Cylinders		656–659
373	Explore Through Reading	**7-5.2**	
374	Study Guide	**7-5.2**	
375	Homework Practice	**7-5.2**	
376	Problem-Solving Practice	**7-5.2**	
377	**Chapter 12 Test**		

Additional Resource

Math Triumphs, Grade 7 [Book 2]: Chapter 5 (Two-Dimensional Figures), and Chapter 6 (Three-Dimensional Figures)

South Carolina Academic Standards

Grade 7 Mathematics

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

7 is the grade level. → **7-1.7** ← 7 is the indicator number.
↑
7-1 is the standard number.

Mathematical Processes	
Standard 7-1:	The student will understand and utilize the mathematical processes of problem solving, reasoning and proof, communication, connections, and representation.
7-1.1	Generate and solve complex abstract problems that involve modeling physical, social, or mathematical phenomena.
7-1.2	Evaluate conjectures and pose follow-up questions to prove or disprove conjectures.
7-1.3	Use inductive and deductive reasoning to formulate mathematical arguments.
7-1.4	Understand equivalent symbolic expressions as distinct symbolic forms that represent the same relationship.
7-1.5	Generalize mathematical statements based on inductive and deductive reasoning.
7-1.6	Use correct and clearly written or spoken words, variables, and notation to communicate about significant mathematical tasks.
7-1.7	Generalize connections among a variety of representational forms and real-world situations.
7-1.8	Use standard and nonstandard representations to convey and support mathematical relationships.
Number and Operations	
Standard 7-2:	The student will demonstrate through the mathematical processes an understanding of the representation of rational numbers, percentages, and square roots of perfect squares; the application of ratios, rates, and proportions to solve problems; accurate, efficient, and generalizable methods for operations with integers; the multiplication and division of fractions and decimals; and the inverse relationship between squaring and finding the square roots of perfect squares.
7-2.1	Understand fractional percentages and percentages greater than one hundred.
7-2.2	Represent the location of rational numbers and square roots of perfect squares on a number line.
7-2.3	Compare rational numbers, percentages, and square roots of perfect squares by using the symbols $\leq$, $\geq$, $<$, $>$, and $=$.
7-2.4	Understand the meaning of absolute value.
7-2.5	Apply ratios, rates, and proportions to discounts, taxes, tips, interest, unit costs, and similar shapes.

South Carolina Academic Standards

Grade 7 Mathematics (continued)

7-2.6	Translate between standard form and exponential form.
7-2.7	Translate between standard form and scientific notation.
7-2.8	Generate strategies to add, subtract, multiply, and divide integers.
7-2.9	Apply an algorithm to multiply and divide fractions and decimals.
7-2.10	Understand the inverse relationship between squaring and finding the square roots of perfect squares.
Algebra	
Standard 7-3:	The student will demonstrate through the mathematical processes an understanding of proportional relationships.
7-3.1	Analyze geometric patterns and pattern relationships.
7-3.2	Analyze tables and graphs to describe the rate of change between and among quantities.
7-3.3	Understand slope as a constant rate of change.
7-3.4	Use inverse operations to solve two-step equations and two-step inequalities.
7-3.5	Represent on a number line the solution of a two-step inequality.
7-3.6	Represent proportional relationships with graphs, tables, and equations.
7-3.7	Classify relationships as either directly proportional, inversely proportional, or nonproportional.
Geometry	
Standard 7-4:	The student will demonstrate through the mathematical processes an understanding of proportional reasoning, tessellations, the use of geometric properties to make deductive arguments, the results of the intersection of geometric shapes in a plane, and the relationships among angles formed when a transversal intersects two parallel lines.
7-4.1	Analyze geometric properties and the relationships among the properties of triangles, congruence, similarity, and transformations to make deductive arguments.
7-4.2	Explain the results of the intersection of two or more geometric shapes in a plane.
7-4.3	Illustrate the cross section of a solid.
7-4.4	Translate between two- and three-dimensional representations of compound figures.
7-4.5	Analyze the congruent and supplementary relationships—specifically, alternate interior, alternate exterior, corresponding, and adjacent—of the angles formed by parallel lines and a transversal.
7-4.6	Compare the areas of similar shapes and the areas of congruent shapes.
7-4.7	Explain the proportional relationship among attributes of similar shapes.
7-4.8	Apply proportional reasoning to find missing attributes of similar shapes.
7-4.9	Create tessellations with transformations.
7-4.10	Explain the relationship of the angle measurements among shapes that tessellate.

South Carolina Academic Standards

Grade 7 Mathematics (continued)

Measurement	
Standard 7-5:	The student will demonstrate through the mathematical processes an understanding of how to use ratio and proportion to solve problems involving scale factors and rates and how to use one-step unit analysis to convert between and within the U.S. Customary System and the metric system.
7-5.1	Use ratio and proportion to solve problems involving scale factors and rates.
7-5.2	Apply strategies and formulas to determine the surface area and volume of the three-dimensional shapes prism, pyramid, and cylinder.
7-5.3	Generate strategies to determine the perimeters and areas of trapezoids.
7-5.4	Recall equivalencies associated with length, mass and weight, and liquid volume: 1 square yard = 9 square feet, 1 cubic meter = 1 million cubic centimeters, 1 kilometer = $\frac{5}{8}$ mile, 1 inch = 2.54 centimeters; 2.2 kilograms = 1 pound; and 1.06 quarts = 1 liter.
7-5.5	Use one-step unit analysis to convert between and within the U.S. Customary System and the metric system.
Data Analysis and Probability	
Standard 7-6:	The student will demonstrate through the mathematical processes an understanding of the relationships between two populations or samples.
7-6.1	Predict the characteristics of two populations based on the analysis of sample data.
7-6.2	Organize data in box plots or circle graphs as appropriate.
7-6.3	Apply procedures to calculate the interquartile range.
7-6.4	Interpret the interquartile range for data.
7-6.5	Apply procedures to calculate the probability of mutually exclusive simple or compound events.
7-6.6	Interpret the probability of mutually exclusive simple or compound events.
7-6.7	Differentiate between experimental and theoretical probability of the same event.
7-6.8	Use the fundamental counting principle to determine the number of possible outcomes for a multistage event.

Name Date

Prerequisite Skills Check

1 Ben saw 10 birds while he was bird watching. Four of them were Carolina Wrens. What percentage of the birds were Carolina Wrens?

Ⓐ 10%
Ⓑ 14%
Ⓒ 40%
Ⓓ 60%

---

2 A group of hikers in the Blue Ridge Mountains hiked 12 miles in 3 hours. What was their unit rate?

Ⓐ 3 miles per hour
Ⓑ 4 miles per hour
Ⓒ 9 miles per hour
Ⓓ 15 miles per hour

---

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	?

Ⓐ 3
Ⓑ 6
Ⓒ 9
Ⓓ 12

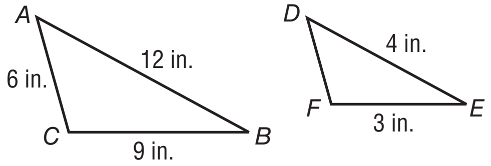
4 Which symbol makes the sentence true?

$$\frac{3}{5} \ \square \ \frac{6}{8}$$

Ⓐ <
Ⓑ >
Ⓒ =
Ⓓ ≥

---

5 Triangle *ABC* is similar to triangle *DEF*. What is the length of side *DF*?



Ⓐ 2 inches
Ⓑ 3 inches
Ⓒ 4 inches
Ⓓ 6 inches

Go on

Name Date

Prerequisite Skills Check (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?

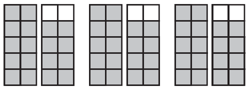
Ⓐ $11a + 15b$

Ⓑ $15a + 11b$

Ⓒ $11a \times 15b$

Ⓓ $15a \times 11b$

7 Which multiplication is shown by the model below?



Ⓐ 0.8×3

Ⓑ 1.5×2

Ⓒ 1.8×3

Ⓓ 2.8×3

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?

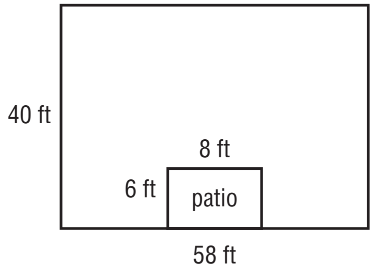
Ⓐ $\frac{16}{24} + \frac{15}{24}$

Ⓑ $\frac{32}{48} + \frac{30}{48}$

Ⓒ $\frac{16}{24} + \frac{5}{8}$

Ⓓ $\frac{4}{16} + \frac{10}{16}$

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?

Ⓐ $(40 \times 58) \times (8 \times 6)$

Ⓑ $(40 \times 8) - (58 \times 6)$

Ⓒ $(40 \times 58) + (8 \times 6)$

Ⓓ $(40 \times 58) - (8 \times 6)$

Go on

Name Date

Prerequisite Skills Check (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?

Ⓐ the unit rate of each circle
Ⓑ the area of each circle
Ⓒ an estimate for π
Ⓓ the perimeter of each circle

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?

Ⓐ 3 miles
Ⓑ 24 miles
Ⓒ 90 miles
Ⓓ 108 miles

12 How can $3 \times 3 \times 3 \times 3$ be represented using an exponent?

Ⓐ 3^4
Ⓑ 3^2
Ⓒ 3^3
Ⓓ 4^3

13 Ramon wants to find the average of his test scores below.

76%, 88%, 82%, 91%, 83%

What measure should he use?

Ⓐ mode
Ⓑ median
Ⓒ range
Ⓓ mean

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?

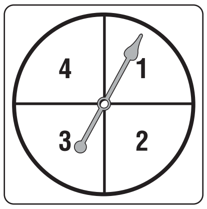
Ⓐ 2 hours
Ⓑ 2.5 hours
Ⓒ 3 hours
Ⓓ 3.5 hours

Go on

Name Date

Prerequisite Skills Check (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?



Ⓐ $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$

Ⓑ $\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$

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

Ⓓ $\frac{3}{4} + \frac{2}{4} = \frac{5}{2}$

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?

Ⓐ 10, 18, 9, 12, 20, 14, 12, 5, 20, 13, 10, 11, 10, 15, 12, 8, 16

Ⓑ 5, 18, 9, 10, 12, 20, 14, 12, 20, 13, 10, 12, 15, 8, 10

Ⓒ 20, 8, 9, 13, 12, 10, 11, 18, 14, 10, 5, 20, 15, 12

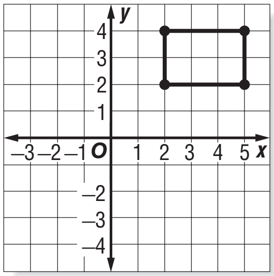
Ⓓ 10, 11, 18, 20, 8, 9, 12, 13, 14, 20, 15, 5, 12, 10, 12

Go on

Name Date

Prerequisite Skills Check (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?

Ⓐ (5, 3)
Ⓑ (5, 4)
Ⓒ (4, 5)
Ⓓ (5, 5)

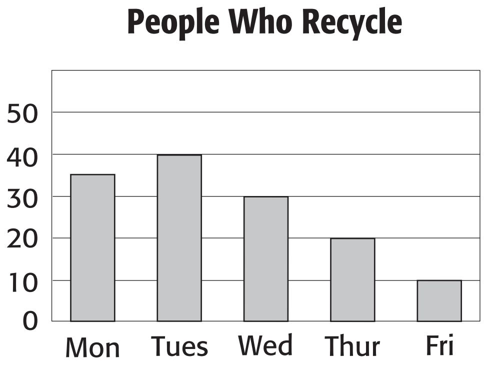
---

18 What is the solution to the following expression?

$2^3 + (9 - 3) \times 3 =$ ____

Ⓐ 26
Ⓑ 32
Ⓒ 42
Ⓓ 400

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.



Which statement is true based on the graph?

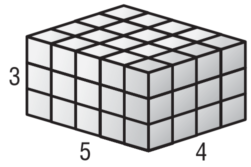
Ⓐ More people recycled at the end of the week than at the beginning of the week.
Ⓑ More people recycled at the beginning of the week than at the end of the week.
Ⓒ The same number of people recycled every day.
Ⓓ More people recycled on Wednesday than any other day.

Go on

Name Date

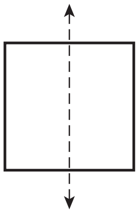
Prerequisite Skills Check (continued)

20 Which expression represents a strategy John could use to find the surface area of the figure below?



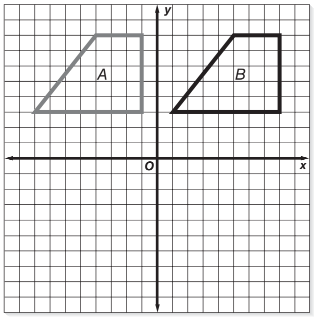
Ⓐ 2(3 × 4) + 2(4 × 5)+ 2(5 × 3)
Ⓑ (3 × 4) + (4 × 5) + (5 × 3)
Ⓒ 2(3 + 4) × 2(4 + 5) × 2(5 + 3)
Ⓓ 3 × 4 × 5

21 One line of symmetry is shown on the square below. How many total lines of symmetry does this square have?



Ⓐ 1
Ⓑ 2
Ⓒ 4
Ⓓ 6

For problems 22 and 23, use the graph below.



22 What type of transformation is represented by the figures?

Ⓐ rotation
Ⓑ translation
Ⓒ reflection
Ⓓ dilation

23 Which of the following describes the change in coordinates from figure A to figure B?

Ⓐ 2 units left and 1 unit up
Ⓑ 2 units left
Ⓒ 9 units right
Ⓓ 9 units left

Go on

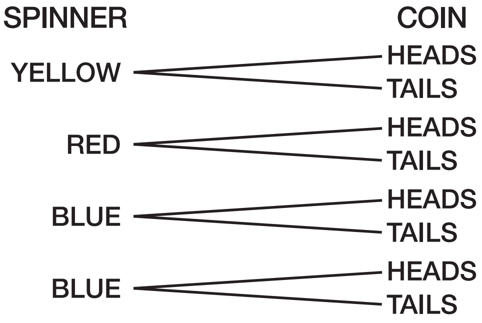
Name Date

Prerequisite Skills Check (continued)

24 Which expression is equal to 5(3 + 1)?

Ⓐ $5 \times 3 + 1$
Ⓑ $5 \times 3 \times 1$
Ⓒ $5 \times 3 + 5 \times 1$
Ⓓ $5 + 1 \times 3$

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?

Ⓐ $\frac{1}{8}$
Ⓑ $\frac{1}{4}$
Ⓒ $\frac{1}{2}$
Ⓓ $\frac{3}{4}$

26 What is the prime factorization of 60?

Ⓐ $3 \times 4 \times 5$
Ⓑ $2^2 \times 3 \times 5$
Ⓒ $2 \times 3^2 \times 5$
Ⓓ $5^2 \times 3 \times 2$

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?

Ⓐ 11
Ⓑ 13.6
Ⓒ 22
Ⓓ 33

28 Which expression is equal to $(6 \times 5) \times 8$?

Ⓐ $6 \times (5 \times 8)$
Ⓑ $(6 \times 5) + 8$
Ⓒ $(6 + 5) \times 8$
Ⓓ $6 + 5 + 8$

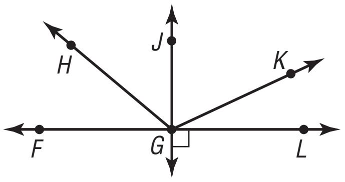
29 Laura needs to calculate the value of 10^4. Which expression shows one way that Laura can find the correct answer?

Ⓐ $10 \times 10 \times 10$
Ⓑ $10 + 10 + 10 + 10$
Ⓒ 10×4
Ⓓ $10 \times 10 \times 10 \times 10$

Go on

Prerequisite Skills Check (continued)

Use the figure below to answer questions 30 and 31.



30 Which two angles are complementary?

- Ⓐ ∠*FGH* and ∠*HGL*
- Ⓑ ∠*FGJ* and ∠*JGL*
- Ⓒ ∠*FGH* and ∠*HGJ*
- Ⓓ ∠*FGK* and ∠*KGL*

31 Which two angles are supplementary?

- Ⓐ ∠*LGH* and ∠*FGH*
- Ⓑ ∠*LGK* and ∠*KGJ*
- Ⓒ ∠*KGH* and ∠*HGF*
- Ⓓ ∠*FGK* and ∠*JGK*

32 What number completes the sentence?

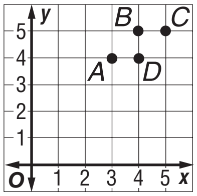
14 + _____ = 0

- Ⓐ 41
- Ⓑ 14
- Ⓒ 0
- Ⓓ –14

33 Kevin solved the equation $9t = 63$ and got the answer 7. Which equation shows how Kevin solved for *t*?

- Ⓐ $t = 63 \times 9$
- Ⓑ $t = 63 \div 9$
- Ⓒ $t = 63 + 9$
- Ⓓ $t = 63 - 9$

34 Which point represents the location of the ordered pair (4, 5)?



- Ⓐ Point *A*
- Ⓑ Point *B*
- Ⓒ Point *C*
- Ⓓ Point *D*

Go on

Name Date

Prerequisite Skills Check (continued)

35 What number completes the sentence?

$$7 \times \_\_\_\_ = -84$$

Ⓐ −12

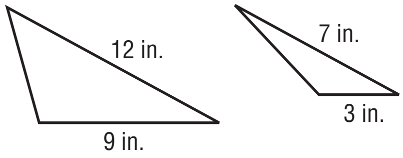
Ⓑ 12

Ⓒ −13

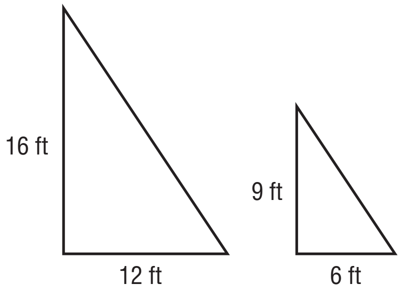
Ⓓ 13

36 Which of the following pairs of shapes are similar figures?

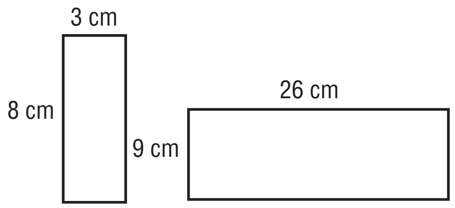
Ⓐ


12 in.
9 in.
7 in.
3 in.

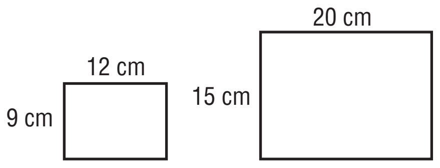
Ⓑ


16 ft
12 ft
9 ft
6 ft

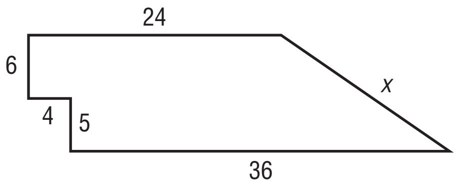
Ⓒ


3 cm
8 cm
26 cm
9 cm

Ⓓ


20 cm
12 cm
9 cm
15 cm

37 The polygon below has a perimeter of 85 units.



What expression can be used to find the length of *x*?

Ⓐ 85 + 70

Ⓑ 85 ÷ 6

Ⓒ 85 − 36

Ⓓ 85 − 75

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?

Ⓐ 6%

Ⓑ 20%

Ⓒ 50%

Ⓓ 60%

Go on

Name Date

Prerequisite Skills Check (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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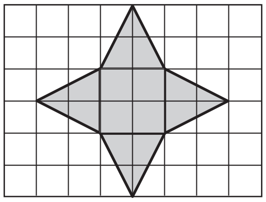
40 What is the area of the shape below? Show your work and explain your srategy for solving. Each box is equal to 1 square centimeter.



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STOP

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1 Anticipation Guide

Introduction to Algebra 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. When solving math problems, all the information given in the problem should be used.	
	2. The exponent of 4 is 1.	
	3. Numbers written with exponents are in exponential form.	
	4. The square of a number is found by finding a factor that multiplied by itself will equal the number.	
	5. The number 24 is a perfect square.	
	6. All operations within grouping symbols should be evaluated first in an expression.	
	7. The expression $(3 + 1)^2$ is equal to $3^2 + 1^2$.	
	8. The expression $8n + 4n - 6$ contains two terms.	
	9. The solution to an equation is any number that makes the equation true.	
	10. An example of the Identity Property of Multiplication is $6 \times 9 = 9 \times 6$.	
	11. In an arithmetic sequence, each term is found by adding the same number to the previous term.	
	12. A function table is a way to organize the input and output numbers of a function.	

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.

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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. Simplify the expression shown below:

$$7 + 4(12 \cdot 3) - 4^2$$

What is the value of the above expression?

A 380
B 135
C 143
D 7

2. Find the value of position n for the table below.

Position of Term	Value of Term y
1	1.75
2	3.5
3	5.25
4	7
n	?

Which equation will give the value of term n?

A $y = 1.75n$
B $y = 1.75 + n$
C $y = n + 1.75n$
D $y = 2.75 - n$

Fold here.

Solution

1. *Hint: Use order of operations when simplifying a problem that has multiple operations in it. 1. Perform all operations in parentheses and operations that involve exponents. 2. Complete multiplication and division operations. 3. Complete addition and subtraction operations from left to right.*

1. Do $12 \cdot 3$ and 4^2 first. You should now have $7 + 4(36) - 16$.
2. Do $4(36)$ next. You should now have $7 + 144 - 16$. Therefore, this is the correct answer.
3. Go from left to right for the addition and subtraction remaining. $7 + 144 = 151$; $151 - 16 = 135$.

The answer is **B.**

Solution

2. *Hint: Find the relationship between the position and value of the terms on a table. Always look beyond the first pairing. You should always check your idea with at least three pairings to be sure it is correct. Substitute the values in the table into each equation to find the best fit.*

A $y = 1.75n$

$1.75 = 1.75(1)$ ✓

$3.5 = 1.75(2)$ ✓

$5.25 = 1.75(3)$ ✓

The answer is **A.**

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1-1 Explore Through Reading

SCAS 7-1.1, 7-1.7

A Plan for Problem Solving

Get Ready for the Lesson

Read the introduction at the top of page 25 in your textbook. Write your answers below.

1. Do you have all of the information necessary to solve this problem?

2. Explain how you would solve this problem. Then solve it.

3. Does your answer make sense? Explain.

4. What can you do if your first attempt at solving the problem does not work?

Read the Lesson

5. In which step of the four-step plan do you decide which strategy you will use to solve the problem?

6. What does the four-step plan suggest you do if your answer is not correct?

7. Complete the sentence: Once you solve a problem, make sure your solution contains any appropriate __________.

Remember What You Learned

8. Think of a way to help you remember the names of each of the steps of the four-step plan in the correct order. For example, try writing a sentence using all of the words.

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1-1 Study Guide

SCAS 7-1.1, 7-1.7

A Plan for Problem Solving

Four-Step Problem-Solving Plan

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** – Get a general understanding of the problem. What information is given?
2. **Plan** – Select a strategy to solve the problem and estimate the answer.
3. **Solve** – Carry out your plan to solve the problem.
4. **Check** – Determine the reasonableness of your answer compared to your estimate.

Example 1 **Use the four-step plan to solve the problem.**

RECREATION **A canoe rental store along the Illinois River in Oklahoma has 30 canoes that it rents on a daily basis during the summer season. If canoes rent for $15 per day, how much money can the store collect for canoe rentals during the month of July?**

Understand You know that they rent 30 canoes per day for $15 each. You need to determine the total amount of money that can be collected during the month of July.

Plan First, find the total amount of money that can be collected each day by finding the product of 30 and 15. Next, multiply the previous result by 31, the number of days in July. You can estimate this result by 30. $30 \times 15 \times 30 = 13{,}500$

Solve Since $30 \times \$15 = \$450$, the canoe rental store can collect $450 in rental fees each day. This means the total amount of money that could be collected during the month of July is $\$450 \times 31$ or $13,950.

Check Is your answer reasonable? The answer is close to the estimate of $13,500.

Exercises

Use the four-step plan to solve each problem.

1. MONEY Colin works for his dad during summer vacation. His dad pays him $5.20 per hour and he works 20 hours per week. How much will Colin earn during his 8-week summer vacation?

2. BOOKS A student assistant in the school library is asked to shelve 33 books. If he puts away 9 books the first hour and then 6 books each hour after that, how long will it take him to shelve all 33 books?

3. SHOPPING Alicia bought a $48 sweater on sale for $25 and a $36 purse on sale for $22. How much did Alicia save?

4. MAIL It cost Ramon $3.73 to mail a package to his grandmother. The post office charged $2.38 for the first pound and 45 cents for each additional pound. How much did the package weigh?

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1-1 Homework Practice

SCAS 7-1.1, 7-1.7

A Plan for Problem Solving

Use the four-step plan to solve each problem.

1. **ENGINES** A car engine turns 900 revolutions per minute while idling. How many revolutions does a car engine turn in one second while idling?

2. **DISTANCE** While traveling in Montana from Butte to Sidney, Mr. Kowalski, recorded that the distance from Butte to Sidney was about 6 times the distance from Butte to Bozeman. Bozeman lies between Butte and Sidney. If the distance from Butte to Bozeman is 82 miles, what is the approximate distance from Bozeman to Sidney?

3. **NUMBERS** What are the next two numbers in the pattern?
3.1, 3.11, 33.11, 33.111, ____ , ____

4. **TIDES** The Bay of Fundy in Nova Scotia, Canada is known for large tides. On a particular day low tide was at 2.3 feet. The tide then rose 6.6 feet every hour for the next six hours. What was the height of high tide on that particular day?

5. **BASKETBALL** If team A won by 2 points what was the number of points scored by team A in the 3rd quarter?

Team	Quarter Scores 1st	2nd	3rd	4th	Final Score
A	21	18	?	17	?
B	15	19	20	25	79

6. **COOKING** A cake recipe requires a total 16 tablespoons of butter for one cake, some for the batter and some for the frosting. If 4 tablespoons of butter are needed for the batter for one cake, how many tablespoons of butter are needed for the frosting if Samantha wants to bake three cakes?

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1-1 Problem-Solving Practice

SCAS 7-1.1, 7-1.7

A Plan for Problem Solving

MAGAZINES For Exercises 1 and 2, use the table that shows the costs of several popular magazines.

Costs of Popular Magazines

Magazine	Cost of Yearly Subscription	Cost of a Single Copy
Teen World	$9.98 (12 issues)	$3.25
Soccer World	$19.97 (6 issues)	$4.99
Book Nation	$19.98 (12 issues)	$2.99
TV Weekly	$46.28 (52 issues)	$1.95

1. How much could you save by buying *Teen World* with a yearly subscription rather than 12 single copies?

2. Which of the magazines saves you the most money by purchasing a yearly subscription instead of an equivalent number of single copies? How much will you save?

3. **BICYCLING** Adriana can ride her bicycle 6 miles in one hour. How long will it take her to ride 15 miles?

4. **BASKETBALL** At Johnson Middle School an average of 500 people attended each of the 15 home basketball games. If admission was $3 per person, about how much money was collected in all?

5. **THEATER** A local theater has floor seating, balcony seating, and box seating. If the theater contains 2,500 seats with 425 seats in the balcony and 215 box seats, how many seats are on the floor?

6. **POPCORN** Janelle plans to buy three boxes of popcorn at the movies for herself and two friends. If each box costs $1.95, how much change will she receive when she pays with a ten-dollar bill?

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1-2 Explore Through Reading

SCAS **7-2.6,** 7-1.4

Powers and Exponents

Get Ready for the Lesson

Read the introduction at the top of page 30 in your textbook. Write your answers below.

1. How is doubling shown in the table?

2. How many text messages will be sent after 4 minutes?

3. What is the relationship between the number of 2s and the number of minutes?

Read the Lesson

4. What is the difference between a power and an exponent?

5. Identify the exponent in each expression.

a. 5^8

b. 8^5

c. 8^3

d. 8

6. Complete the sentence:
Numbers written with exponents are in _________ form, whereas
numbers written without exponents are in _________ form.

Remember What You Learned

7. In the expression 6^7, circle the exponent in red. Then circle the power in another color.

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1-2 Study Guide

SCAS 7-2.6, 7-1.4

Powers and Exponents

$$\overset{\text{Exponent}}{\underset{\text{Base}}{3}^{4}} = \underbrace{3 \cdot 3 \cdot 3 \cdot 3}_{\text{common factors}} = 81$$

The **exponent** tells you how many times the **base** is used as a factor.

Example 1 **Write 6^3 as a product of the same factor.**

The base is 6. The exponent 3 means that 6 is used as a factor 3 times.
$6^3 = 6 \cdot 6 \cdot 6$

Example 2 **Evaluate 5^4.**

$$\begin{aligned} 5^4 &= 5 \cdot 5 \cdot 5 \cdot 5 \\ &= 625 \end{aligned}$$

Example 3 **Write $4 \cdot 4 \cdot 4 \cdot 4 \cdot 4$ in exponential form.**

The base is 4. It is used as a factor 5 times, so the exponent is 5.
$4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 = 4^5$

Exercises

Write each power as a product of the same factor.

1. 7^3
2. 2^7
3. 9^2
4. 15^4

Evaluate each expression.

5. 3^5
6. 7^3
7. 8^4
8. 5^3

Write each product in exponential form.

9. $2 \cdot 2 \cdot 2 \cdot 2$
10. $7 \cdot 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7$
11. $10 \cdot 10 \cdot 10$
12. $9 \cdot 9 \cdot 9 \cdot 9 \cdot 9$
13. $12 \cdot 12 \cdot 12$
14. $5 \cdot 5 \cdot 5 \cdot 5$
15. $6 \cdot 6 \cdot 6 \cdot 6 \cdot 6$
16. $1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1$

NAME ______________________________ DATE ____________ PERIOD _____

1-2 Homework Practice

SCAS **7-2.6,** 7-1.4

Powers and Exponents

Write each power as a product of the same factor.

1. 5^7

2. 2^4

3. 7^2

4. 10^5

5. 3^3

6. 6^8

7. *four to the eighth power*

8. *eight cubed*

9. *ten squared*

Write each product in exponential form.

10. $9 \cdot 9 \cdot 9 \cdot 9 \cdot 9 \cdot 9$

11. $1 \cdot 1 \cdot 1 \cdot 1 \cdot 1$

12. $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

13. $6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6$

14. $5 \cdot 5$

15. $4 \cdot 4 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$

Evaluate each expression.

16. 4^3

17. 1^{11}

18. 2^5

19. 10^3

20. 9^3

21. 8^1

22. *five to fourth power*

23. *7 squared*

24. *zero to the sixth power*

Use a calculator to determine whether each sentence is *true* or *false*.

25. $2^8 = 8^2$

26. $17^2 < 172$

27. $3^2 > 1^{19}$

Order the following powers from least to greatest.

28. $7^2, 5^3, 3^4, 2^5$

29. $4^3, 1^{13}, 12^2, 8^3$

30. $3^9, 5^7, 7^5, 9^3$

31. **INTERACTIVE MAPS** Mansi is using an interactive map on her computer that allows her to zoom in or zoom out. Each time she zooms out the scale of the map increases by a power of ten. If she zooms out four times the scale is 10^4 times greater. Write this number in standard form.

32. **BACTERIA** A lab technician observed 5 bacteria growing in a lab dish. One hour later he observed 25 bacteria. Every hour he notices about 5 times as many as the hour before. After several hours of observation, he determined the lab dish had 5^9 bacteria. Use a calculator to find the number in standard form that represents the bacteria in the lab dish.

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Mini-Project

SCAS 7-2.6, 7-1.4

Powers and Exponents

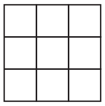
Modeling Powers and Exponents

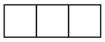
Materials

centimeter cubes, grid paper

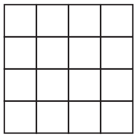
You can build a square or a cube using centimeter cubes. 3^2 is a three-by-three square and is 1 centimeter cube high. You need 9 centimeter cubes to build 3^2.

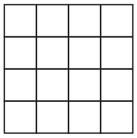
The top view of 3^2 is shown at the left below. The side view of 3^2 is shown at the right below.





You need 64 centimeter cubes to build 4^3. The top view is shown at the left below. The side view is shown at the right below.





Use centimeter cubes to build each square or cube. On grid paper, sketch the top view and the side view.

1. 2^3
top view

side view

2. 5^3
top view

side view

3. 6^2
top view

side view

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1A

Study Guide

SCAS 7-2.7

Scientific Notation

A number in scientific notation is written as the product of a factor that is at least one but less than ten and a power of ten.

Example 1 **Write 8.65×10^7 in standard form.**

$8.65 \times 10^7 = 8.65 \times 10{,}000{,}000$ $10^7 = 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10$ or $10{,}000{,}000$

$= 86{,}500{,}000$ Move the decimal point 7 places to the right.

Example 2 **Write 9.2×10^{-3} in standard form.**

$9.2 \times 10^{-3} = 9.2 \times \frac{1}{10^3}$ $10^{-3} = \frac{1}{10^3}$

$= 9.2 \times 0.001$ $\frac{1}{10^3} = \frac{1}{1{,}000}$ or 0.001

$= 0.0092$ Move the decimal point 3 places to the left.

Example 3 **Write 76,250 in scientific notation.**

$76{,}250 = 7.625 \times 10{,}000$ The decimal point moves 4 places.

$= 7.625 \times 10^4$ The exponent is positive.

Example 4 **Write 0.00157 in scientific notation.**

$0.00157 = 1.57 \times 0.001$ The decimal point moves 3 places.

$= 1.57 \times 10^{-3}$ The exponent is negative.

Exercises

Write each number in standard form.

1. 5.3×10^1

2. 9.4×10^3

3. 7.07×10^5

4. 2.6×10^{-3}

5. 8.651×10^{-2}

6. 6.7×10^{-6}

Write each number in scientific notation.

7. 561

8. 14

9. 56,400,000

10. 0.752

11. 0.0064

12. 0.000581

NAME ______________________________ DATE ____________ PERIOD _____

1A

Skills Practice

SCAS 7-2.7

Scientific Notation

Write each number in standard form.

1. 6.7×10^1

2. 6.1×10^4

3. 1.6×10^3

4. 3.46×10^2

5. 2.91×10^5

6. 8.651×10^7

7. 3.35×10^{-1}

8. 7.3×10^{-6}

9. 1.49×10^{-7}

10. 4.0027×10^{-4}

11. 5.2277×10^{-3}

12. 8.50284×10^{-2}

Write each number in scientific notation.

13. 34

14. 273

15. 79,700

16. 6,590

17. 4,733,800

18. 2,204,000,000

19. 0.00916

20. 0.29

21. 0.00000571

22. 0.0008331

23. 0.0121

24. 0.00000018

NAME ______________________________ DATE ______________ PERIOD _____

1A Homework Practice

SCAS 7-2.7

Scientific Notation

Write each number in standard form.

1. 9.03×10^2 **2.** 7.89×10^3 **3.** 4.115×10^5 **4.** 3.201×10^6

5. 5.1×10^{-2} **6.** 7.7×10^{-5} **7.** 3.85×10^{-4} **8.** 1.04×10^{-3}

Write each number in scientific notation.

9. 4,400 **10.** 75,000 **11.** 69,900,000 **12.** 575,000,000

13. 0.084 **14.** 0.0099 **15.** 0.000000515 **16.** 0.0000307

17. Which number is greater: 3.5×10^4 or 2.1×10^6?

18. Which number is less: 7.2×10^7 or 9.9×10^5?

19. **POPULATION** The table lists the populations of five countries. List the countries from least to greatest population.

Country	Population
Australia	2.0×10^7
Brazil	1.9×10^8
Egypt	7.7×10^7
Luxembourg	4.7×10^5
Singapore	4.4×10^6

Source: *The World Factbook*

20. **SOLAR SYSTEM** Pluto is 3.67×10^9 miles from the Sun. Write this number in standard form.

21. **MEASUREMENT** One centimeter is equal to about 0.0000062 mile. Write this number in scientific notation.

22. **DISASTERS** In 2005, Hurricane Katrina caused over $125 billion in damage in the southern United States. Write $125 billion in scientific notation.

NAME ______________________________ DATE ______________ PERIOD _____

1A Problem-Solving Practice

SCAS 7-2.7

Scientific Notation

1. **MEASUREMENT** There are about 25.4 millimeters in one inch. Write this number in scientific notation.

2. **POPULATION** In the year 2000, the population of Rahway, New Jersey, was 26,500. Write this number in scientific notation.

3. **MEASUREMENT** There are 5,280 feet in one mile. Write this number in scientific notation.

4. **PHYSICS** The speed of light is about 1.86×10^5 miles per second. Write this number in standard notation.

5. **COMPUTERS** A CD can store about 650,000,000 bytes of data. Write this number in scientific notation.

6. **SPACE** The diameter of the Sun is about 1.39×10^9 meters. Write this number in standard notation.

7. **ECONOMICS** The U.S. Gross Domestic Product in the year 2004 was 1.17×10^{13} dollars. Write this number in standard notation.

8. **MASS** The mass of planet Earth is about 5.98×10^{24} kilograms. Write this number in standard notation.

1-3 Explore Through Reading

SCAS 7-2.10

Squares and Square Roots

Get Ready for the Lesson

Complete the Mini Lab at the top of page 34 in your textbook. Write your answers below.

1. Using tiles, try to construct squares with areas 4, 9, and 16 square units.

2. Try to construct squares with areas 12, 18, and 20 square units.

3. Which of the areas form squares?

4. What is the relationship between the lengths of the sides and the areas of these squares?

5. Using your square tiles, create a square that has an area of 49 square units. What are the lengths of the sides of the square?

Read the Lesson 6a–c. Sample answers are given.

6. In this lesson, the word *square* is used in several different ways. Tell the meaning of the word as it is used in each phrase or sentence.
   - **a.** Find the *square* of 3.
   - **b.** 9 units *squared*
   - **c.** A boxing ring is a *square* with an area of 400 ft^2.

Remember What You Learned

7. Work with a partner. Use a calculator to find the squares of six numbers, some of them decimals. Then write only the squares in a list and exchange lists with your partner. Find the square roots of the squares in the list that you receive. Write your answers in the form $\sqrt{x} = y$.

NAME ______________________________ DATE ____________ PERIOD _____

1-3 Study Guide

SCAS 7-2.10

Squares and Square Roots

The product of a number and itself is the **square** of the number. Numbers like 4, 25, and 2.25 are called **perfect squares** because they are squares of rational numbers. The factors multiplied to form perfect squares are called **square roots**. Both $5 \cdot 5$ and $(-5)(-5)$ equal 25. So, 25 has two square roots, 5 and -5. A **radical sign**, $\sqrt{}$, is the symbol used to indicate the *positive* square root of a number. So, $\sqrt{25} = 5$.

Examples

1 Find the square of 5.

$5 \cdot 5 = 25$

2 Find the square of 16.

16 [x^2] [ENTER] **256**

3 Find $\sqrt{49}$.

$7 \cdot 7 = 49$, so $\sqrt{49} = 7$.

4 Find $\sqrt{169}$.

[2nd] [$\sqrt{}$] 169 [ENTER] **13**

So, $\sqrt{169} = 13$.

Example 5 **A square tile has an area of 144 square inches. What are the dimensions of the tile?**

[2nd] [$\sqrt{}$] 144 [ENTER] **12** Find the square root of 144.

So, the tile measures 12 inches by 12 inches.

Exercises

Find the square of each number.

1. 2 **2.** 9 **3.** 14

4. 15 **5.** 21 **6.** 45

Find each square root.

7. $\sqrt{16}$ **8.** $\sqrt{36}$ **9.** $\sqrt{256}$

10. $\sqrt{1{,}024}$ **11.** $\sqrt{361}$ **12.** $\sqrt{484}$

NAME ______________________ DATE ____________ PERIOD _____

1-3 Homework Practice

SCAS 7-2.10

Squares and Square Roots

Find the square of each number.

1. 2

2. 8

3. 10

4. 11

5. 15

6. 25

7. What is the square of 5?

8. Find the square of 16.

9. Find the square of 21.

Find each square root.

10. $\sqrt{64}$

11. $\sqrt{121}$

12. $\sqrt{169}$

13. $\sqrt{0}$

14. $\sqrt{81}$

15. $\sqrt{289}$

16. $\sqrt{900}$

17. $\sqrt{1}$

18. $\sqrt{484}$

PACKAGING **An electronics company uses three different sizes of square labels to ship products to customers. The area of each type of label is shown in the table.**

Labels	
Type	**Area**
Priority:	100 cm^2
Caution:	225 cm^2
Address:	144 cm^2

19. If the length of a side of a square is the square root of the area, what is the length of a side for each label?

20. How much larger is the Caution label than the Address label?

21. RECREATION A square hot tub is outlined by a 2-foot wide tile border. In an overhead view, the area of the hot tub and the border together is 144 square feet. What is the length of one side of the hot tub itself?

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1-3 Problem-Solving Practice

SCAS 7-2.10

Squares and Square Roots

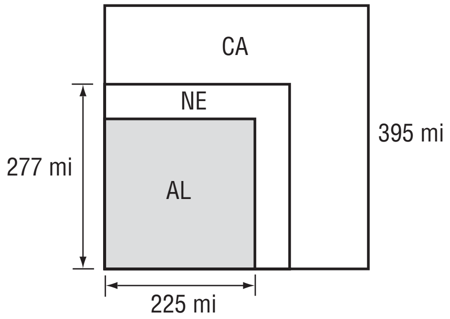
1. **FERTILIZER** John bought a bag of lawn fertilizer that will cover 400 square feet. What are the dimensions of the largest square plot of lawn that the bag of fertilizer will cover?

2. **GEOMETRY** The area A of a circle in square feet with a radius r in feet is given approximately by the formula $A \approx 3.14r^2$. What is the approximate area of a circle with a radius of 3 feet?

3. **MOTION** The time t in seconds for an object dropped from a height of h feet to hit the ground is given by the formula $t = \sqrt{\frac{2h}{32}}$. How long will it take an object dropped from a height of 500 feet to hit the ground? Round to the nearest tenth.

4. **PACKAGING** A cardboard envelope for a compact disc is a square with an area of 171.61 square centimeters. What are the dimensions of the envelope?

5. **GEOGRAPHY** Refer to the squares below. They represent the approximate areas of California, Alabama, and Nebraska. Find the area of Alabama.



6. Use the figure in Exercise 5. How much larger is California than Nebraska?

NAME ______________________________ DATE ____________ PERIOD _____

1-4 Explore Through Reading

SCAS 7-2.8

Order of Operations

Get Ready for the Lesson

Read the introduction at the top of page 38 in your textbook. Write your answers below.

1. List the differences between their calculations.

2. Whose calculations are correct?

3. Make a conjecture about what should be the first step in simplifying $6 + 4 \cdot 3$.

Read the Lesson

4. Why did mathematicians agree on an order of operations?

5. What are three ways to indicate multiplication in a mathematical expression?

Remember What You Learned

6. In your own words, describe the order of operations that is used in finding the value of a mathematical expression.

NAME ______________________________ DATE ____________ PERIOD _____

1-4 Study Guide

SCAS 7-2.8

Order of Operations

Use the **order of operations** to evaluate numerical expressions.

1. Evaluate the expressions inside grouping symbols.
2. Evaluate all powers.
3. Multiply and divide in order from left to right.
4. Add and subtract in order from left to right.

Example 1 **Evaluate $(10 - 2) - 4 \cdot 2$.**

$(10 - 2) - 4 \cdot 2 = 8 - 4 \cdot 2$	Subtract first since 10 − 2 is in parentheses.
$= 8 - 8$	Multiply 4 and 2.
$= 0$	Subtract 8 from 8.

Example 2 **Evaluate $8 + (1 + 5)^2 \div 4$.**

$8 + (1 + 5)^2 \div 4 = 8 + 6^2 \div 4$	First, add 1 and 5 inside the parentheses.
$= 8 + 36 \div 4$	Find the value of 6^2.
$= 8 + 9$	Divide 36 by 4.
$= 17$	Add 8 and 9.

Exercises

Evaluate each expression.

1. $(1 + 7) \times 3$

2. $28 - 4 \cdot 7$

3. $5 + 4 \cdot 3$

4. $(40 \div 5) - 7 + 2$

5. $35 \div 7(2)$

6. 3×10^3

7. $45 \div 5 + 36 \div 4$

8. $42 \div 6 \times 2 - 9$

9. $2 \times 8 - 3^2 + 2$

10. $5 \times 2^2 + 32 \div 8$

11. $3 \times 6 - (9 - 8)^3$

12. 3.5×10^2

NAME ________________________________ DATE ______________ PERIOD _____

1-4 Homework Practice

SCAS 7-2.8

Order of Operations

Evaluate each expression.

1. $(2 + 9) \times 4$

2. $8 - (5 + 2)$

3. $(15 \div 3) + 7$

4. $(14 + 7) \div 7$

5. $5 \cdot 6 - 12 \div 4$

6. $8 \div 2 + 8 - 2$

7. $16 - 8 \div 2 + 5$

8. $15 - 3 \cdot 5 + 7$

9. 7×10^3

10. $2 \times 5^2 + 6$

11. $7 \cdot 2^3 - 9$

12. $27 \div 3 \times 2 + 4^2$

13. $6^3 - 12 \times 4 \cdot 3$

14. $(15 - 3) \div (8 + 4)$

15. $(9 - 4) \cdot (7 - 7)$

16. $8 + 3(5 + 2) - 7 \cdot 2$

17. $5(6 - 1) - 4 \cdot 6 \div 3$

18. $(5 + 7)^2 \div 12$

19. $12 \div (8 - 6)^2$

20. $(7 + 2)^2 \div 3^2$

21. $(11 - 9)^2 \cdot (8 - 5)^2$

22. $64 \div 8 - 3(4 - 3) + 2$

23. $8 \times 5.1 - (4.1 + 1.4) + 7.1$

For Exercises 24 and 25, write an expression for each situation. Then evaluate the expression to find the solution.

24. **LAWN AREA** The Solomons need to find the area of their front and side yards since they want to reseed the lawn. Both side yards measure 3 meters by 10 meters, while the front yard is a square with a side of 9 meters. They do not need to reseed a portion of the front yard covering 16 square meters where a flower bed is located. What is the area of the yard that the Solomons want to reseed?

25. **COMMUNITY SERVICE** Jariah volunteers at the hospital during the week. She volunteers 3 hours on Monday and Thursday, 4 hours on Saturday and Sunday, and 2 hours on Tuesday. How many hours does Jariah volunteer at the hospital during the week?

NAME ______________________________ DATE ____________ PERIOD _____

1-4 Problem-Solving Practice

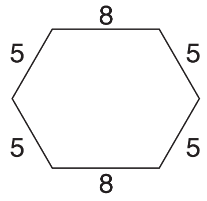
SCAS 7-2.8

Order of Operations

1. **FOOTBALL** The middle school team scored three field goals worth three points each and two touchdowns with extra points worth seven points each. Write a numerical expression to find the team's score. Then evaluate the expression.

2. **BOOKS** Juan goes to the school book fair where paperback books are $1.50 and hardback books are $3.00. Juan buys 5 paperback and 2 hardback books. Write a numerical expression to find how much Juan paid for the books. Then evaluate the expression.

3. **GEOMETRY** The perimeter of a hexagon is found by adding the lengths of all six sides of the hexagon. For the hexagon below write a numerical expression to find the perimeter. Then evaluate the expression.



4. **MONEY** Aisha bought school supplies consisting of 6 spiral notebooks costing $0.39 each, 2 packages of pencils at $0.79 each, and a 3-ring binder for $1.99. Write an expression to find the total amount Aisha spent on school supplies. Then evaluate the expression.

5. **REASONING** Use the order of operations and the digits 2, 4, 6, and 8 to create an expression with a value of 2.

6. **NUMBER SENSE** Without parentheses, the expression $8 + 30 \div 2 + 4$ equals 27. Place parentheses in the expression so that it equals 13; then 23.

7. **MONEY** Tyrone bought 5 postcards at $0.55 each and a set of postcards for $1.20. Write an expression to find the total amount Tyrone spent on postcards. Then evaluate the expression.

8. **DINING** Mr. Firewalks took his family out to eat. They ordered 3 meals costing $8.99 each, 2 sodas at $1.50 each, and 1 glass of tea for $1.25. Write an expression to find the total amount the Firewalks family spent on dinner before taxes and tip. Then evaluate the expression.

NAME ______________________________ DATE ____________ PERIOD _____

1-5 Study Guide

SCAS 7-1.3

Problem-Solving Investigation: Guess and Check

When solving problems, one strategy that is helpful to use is guess and check. Based on the information in the problem, you can make a guess of the solution. Then use computations to check if your guess is correct. You can repeat this process until you find the correct solution.

You can use guess and check, along with the following four-step problem solving plan to solve a problem.

Understand	• Read and get a general understanding of the problem.
Plan	• Make a plan to solve the problem and estimate the solution.
Solve	• Use your plan to solve the problem.
Check	• Check the reasonableness of your solution.

Example

VETERINARY SCIENCE **Dr. Miller saw 40 birds and cats in one day. All together the pets he saw had 110 legs. How many of each type of animal did Dr. Miller see in one day?**

Understand You know that Dr. Miller saw 40 birds and cats total. You also know that there were 110 legs in all. You need to find out how many of each type of animal he saw in one day.

Plan Make a guess and check it. Adjust the guess until you get the correct answer.

Solve

Number of birds	Number of cats	Total number of feet
20	20	$2(20) + 4(20) = 120$
30	10	$2(30) + 4(10) = 100$
25	15	$2(25) + 1(15) = 110$

Check 25 birds have 50 feet. 15 cats have 60 feet. Since 50 + 60 is 110, the answer is correct.

Exercise

GEOMETRY In a math class of 26 students, each girl drew a triangle and each boy drew a square. If there were 89 sides in all, how many girls and how many boys were in the class?

NAME ______________________________ DATE ____________ PERIOD _____

1-5 Skill Practice

SCAS 7-1.3

Problem-Solving Investigation: Guess and Check

Solve each problem using the guess and check problem-solving strategy.

1. **SPORTS** Susan made 2-point baskets and 3-point baskets in her last basketball game. All together she scored 9 points. How many of each type of basket did she make?

2. **ENTERTAINMENT** Tickets to the local circus cost \$3 for children and \$5 for adults. There were three times as many children tickets sold as adult tickets. All together the circus made \$700. How many children and how many adults bought tickets to the circus?

3. **NUMBERS** What are the next two numbers in the following sequence?

   5, 13, 37, 109, 325, ___, ___

4. **MONEY** Richard found \$2.40 in change while cleaning his couch. He found the same number of quarters, dimes, and nickels. How many of each coin did he find?

NAME ______________________________ DATE ______________ PERIOD _____

1-5 Homework Practice

SCAS 7-1.3

Problem-Solving Investigation: Guess and Check

Mixed Problem Solving

For Exercises 1 and 2, choose the appropriate method of computation. Then use the method to solve the problem.

1. **NUMBERS** A number is multiplied by 7. Then 5 is added to the product. The result is 33. What is the number?

2. **FOOD** Mr. Jones paid $23 for food for his family of seven at the ballpark. Everyone had a drink and either one hot dog or one hamburger. How many hamburgers were ordered?

MENU	
ITEM	**PRICE**
Hot Dog	$2
Hamburger	$3
Drink	$1

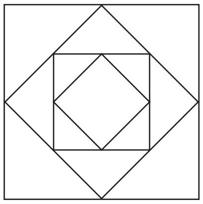
Use any strategy to solve Exercises 3–6. Some strategies are shown below.

Problem-Solving Strategies
- Guess and Check.
- Find a pattern.

3. **PATTERNS** What are the next two "words" in the pattern?

   ace, bdf, ceg, dfh, egi, ____, ____

4. **GEOMETRY** The area of each square is twice the area of the next smaller square drawn in it. If the area of the smallest square is 3 square centimeters, what is the area of the largest square?



5. **ALGEBRA** What are the next two numbers in the pattern?

   32, 28, 24, 20, ____, ____

6. **MONEY** Leeann received $60 for her birthday. The money came in $10 bills and $5 bills. If she received 8 bills, how many of each type did she receive?

7. **MONEY** Duane has four dimes, half as many nickels as dimes, and three times as many quarters as nickels. How much money does Duane have?

8. **LIBRARY** Mr. Shuck, the librarian, counted 157 books checked-in during the day. This number was 8 less than 3 times the number of books checked-out that same day. How many books were checked-out that day?

NAME ______________________________ DATE ____________ PERIOD _____

1-5 Problem-Solving Practice

SCAS 7-1.3

Problem-Solving Investigation: Guess and Check

1. Joan and Amber have a combined age of 34. If Amber is 2 years less than twice Joan's age, how old is each person?

2. A number is divided by 3. Then 14 is added to the quotient. The result is 33. What is the original number?

3. The key club made $192 at their candle sale. They sold round candles for $4 and square candles for $6. If they sold twice as many square candles as round ones, how many of each type of candle did the key club sell?

4. Landon has 37 baseball cards. If 4 cards can fit on one page, how many pages does Landon need to buy?

5. Rick earns $500 less than three times as much as Jim. If their combined salary is $49,500, how much do they each earn?

6. The square root of a number is subtracted from the sum of the number and 12. The result is 42. What is the original number?

NAME ________________________________ DATE ______________ PERIOD _____

1-9 Explore Through Reading

SCAS 7-3.1

Algebra: Arithmetic Sequences

Get Ready for the Lesson

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

1. How many centimeter cubes are used to make each figure?

2. What pattern do you see? Describe it in words.

3. Suppose this pattern continues. Complete the table to find the number of cubes needed to make each figure.

Figure	1	2	3	4	5	6	7	8
Cubes Needed	4	8	12					

4. How many cubes would you need to make the 10th figure? Explain your reasoning.

Read the Lesson

Complete each sentence.

5. In an arithmetic sequence, each term is found by __________ the same number to the previous term.

6. In a geometric sequence, each term is found by __________ the previous term by the same number.

What is the next term in each of the following sequences?

7. $1, \underbrace{\ \ }_{\times 5} 5, \underbrace{\ \ }_{\times 5} 25, \ldots$

8. $7, \underbrace{\ \ }_{+3} 10, \underbrace{\ \ }_{+3} 13, \ldots$

Remember What You Learned

9. Write down the first four terms of two of your own sequences, an arithmetic sequence and a geometric sequence. Trade with a partner. Describe your partner's sequences. How did you identify the patterns?

NAME ______________________ DATE ____________ PERIOD _____

1-9 Study Guide

SCAS 7-3.1

Algebra: Arithmetic Sequences

An **arithmetic sequence** is a list in which each term is found by adding the same number to the previous term. 1, 3, 5, 7, 9, …

+2 +2 +2 +2

Example 1 **Describe the relationship between terms in the arithmetic sequence 17, 23, 29, 35, ... Then write the next three terms in the sequence.**

17, 23, 29, 35, …. Each term is found by adding 6 to the previous term.

+6 +6 +6 $35 + 6 = 41$ $41 + 6 = 47$ $47 + 6 = 53$

The next three terms are 41, 47, and 53.

Example 2

MONEY Brian's parents have decided to start giving him a monthly allowance for one year. Each month they will increase his allowance by $10. Suppose this pattern continues. What algebraic expression can be used to find Brian's allowance after any given number of months? How much money will Brian receive for allowance for the 10th month?

Make a table to display the sequence.

Position	Operation	Value of Term
1	$1 \cdot 10$	10
2	$2 \cdot 10$	20
3	$3 \cdot 10$	30
n	$n \cdot 10$	$10n$

Each term is 20 times its position number. So, the expression is $10n$.
How much money will Brian earn after 10 months?
$10n$ Write the expression.
$10(10) = 100$ Replace n with 10

So, for the 10th month Brian will receive $100.

Exercises

Describe the relationship between terms in the arithmetic sequences. Write the next three terms in the sequence.

1. 2, 4, 6, 8, …
2. 4, 7, 10, 13, …
3. 0.3, 0.6, 0.9, 1.2, …
4. 200, 212, 224, 236, …
5. 1.5, 2.0, 2.5, 3.0, …
6. 12, 19, 26, 33, …
7. **SALES** Mama's bakery just opened and is currently selling only two types of pastry. Each month, Mama's bakery will add two more types of pastry to their menu. Suppose this pattern continues. What algebraic expression can be used to find the number of pastries offered after any given number of months? How many pastries will be offered in one year?

NAME ______________________________ DATE ____________ PERIOD _____

1-9 Homework Practice

SCAS 7-3.1

Algebra: Arithmetic Sequences

Describe the relationship between the terms in each arithmetic sequence. Then write the next three terms in each sequence.

1. 0, 5, 10, 15, …

2. 1, 3, 5, 7, …

3. 18, 27, 36, 45, …

4. 7, 19, 31, 43, …

5. 8, 18, 28, 38, …

6. 25, 26, 27, 28, …

7. 0.4, 0.8, 1.2, 1.6, …

8. 3.7, 3.7, 3.7, 3.7, …

9. 5.1, 6.2, 7.3, 8.4, …

10. 17, 31, 45, 59, …

11. 30, 50, 70, 90, …

12. 14, 41, 68, 95, …

In a *geometric sequence*, each term is found by multiplying the previous term by the same number. Write the next three terms of each geometric sequence.

13. 5, 10, 20, 40, …

14. 3, 9, 27, 81, …

15. 2, 8, 32, 128, …

NUMBER SENSE Find the 40th term in each arithmetic sequence.

16. 4, 8, 12, 16, …

17. 13, 26, 39, 52, …

18. 6, 12, 18, 24, …

19. **GEOMETRY** The lengths of the sides of a 6-sided polygon are in arithmetic sequence. The length of the shortest side is 3 meters. If the length of the next longer side is 5 meters, what is the length of the longest side?

20. **FREE FALLING OBJECT** A free falling object increases speed by a little over 22 miles per hour each second. The arithmetic sequence 22, 44, 66, …, represents the speed after each second, in miles per hour, of a dropped object. How fast is a rock falling after 8 seconds if it is dropped over the side of a cliff?

NAME ____ DATE ______________ PERIOD _____

1-9 Problem-Solving Practice

SCAS 7-3.1

Algebra: Arithmetic Sequences

1. **NUMBERS** The multiples of two form a sequence as follows: 2, 4, 6, 8, 10, 12, 14, 16, …. Describe the sequence you see? What about the multiples of three? Four? Five?	2. **OLYMPICS** The summer Olympics occur every four years. If the last summer Olympics happened in 2004, when are the next three times that it will occur? Describe the sequence the Olympic years form.
3. **BABY-SITTING** Tonya charges $3.50 per hour to baby-sit. The sequence $3.50, $7.00, $10.50, $14.00, … represents how much she charges for each subsequent hour. For example, $10.50 is the third term that represents how much she charges for 3 hours. What are the next three terms in the sequence? How much does she charge for 7 hours of baby-sitting?	4. **RECTANGLES** Suppose you start with 1 rectangle and then divide it in half. You now have 2 rectangles. You divide each of these in half, and you have 4 rectangles. The sequence for this division is 1, 2, 4, 8, 16, … rectangles after each successive division. Describe the sequence that results.
5. **BACTERIA** Three bacteria are in a dish. Each hour the number of bacteria multiplies by four. If at the end of the first hour there are 12 bacteria, how many bacteria are there at the end of the next three hours? Describe the sequence that results.	6. **ENROLLMENT** The enrollment at Grove Middle School is expected to increase by 40 students each year for the next 5 years. If their current enrollment is 600 students, find their enrollment after each of the next 5 years.
7. **SALARY** Mrs. Malone's current salary is $1,500. She expects it to increase $100 per year. Write the first 6 terms of a sequence that represents her salary. The first term should be her current salary. What does the sixth term represent?	8. **FIBONACCI** The Fibonacci sequence is named after Leonardo Fibonacci who first explored it. Look at the Fibonacci sequence below and describe its pattern. 1, 1, 2, 3, 5, 8, 13, 21, 34, …

NAME ______________________________ DATE ____________ PERIOD _____

1-10 Explore Through Reading

SCAS 7-3.2

Algebra: Equations and Functions

Get Ready for the Lesson

Read the introduction at the top of page 63 in your textbook. Write your answers below.

1. Complete the table to find the cost of 2, 3, and 4 magazines.

Magazines		
Number	**Multiply by 4**	**Cost ($)**
1	4 × 1	4
2		
3		
4		

2. Describe the pattern in the table between the cost and the number of magazines.

Read the Lesson

3. Complete each function table. Then identify the domain and range.

a.

x	$2x - 1$	y
-1		
0		
1		

b.

x	$4x$	y
-1		
0		
1		

4. **MONEY** John earns $15 per lawn that he mows.

a. Write an equation in two variables showing the relationship between lawns mowed and the money John earns.

b. How much money does John earn after mowing 3, 5, and 10 lawns?

Remember What You Learned

5. Draw a picture of a "machine" that shows how a function works. Your picture should illustrate input, a function rule, and output.

NAME ______________________________ DATE ____________ PERIOD _____

1-10 Study Guide

SCAS 7-3.2

Algebra: Equations and Functions

The solution of an equation with two variables consists of two numbers, one for each variable that makes the equation true. When a relationship assigns exactly one output value for each input value, it is called a function. Function tables help to organize input numbers, output numbers, and function rules.

Example 1 **Complete a function table for $y = 5x$. Then state the domain and range.**

Choose four values for x. Substitute the values for x into the expression. Then evaluate to find the y value.

x	$5x$	y
0	5(0)	0
1	5(1)	5
2	5(2)	10
3	5(3)	15

The domain is {0, 1, 2, 3}. The range is {0, 5, 10, 15}.

Exercises

Complete the following function tables. Then state the domain and range.

1. $y = x + 4$

x	$x + 4$	y
0		
1		
2		
3		

2. $y = 10x$

x	$10x$	y
1		
2		
3		
4		

3. $y = x - 1$

x	$x - 1$	y
2		
3		
4		
5		

4. $y = 3x$

x	$3x$	y
10		
11		
12		
13		

NAME ______________________________ DATE ____________ PERIOD _____

1-10 Homework Practice

SCAS 7-3.2

Algebra: Equations and Functions

Complete each function table. Then identify the domain and range.

1. $y = 5x$

x	$5x$	y
1		
2		
3		
4		

2. $y = 8x$

x	$8x$	y
1		
2		
3		
4		

3. $y = 7x$

x	$7x$	y
3		
4		
5		
6		

4. $y = x - 2$

x	$x - 2$	y
2		
3		
4		
5		

5. $y = x + 3$

x	$x + 3$	y
2		
3		
4		
5		

6. $y = x + 0.75$

x	$x + 0.75$	y
0		
1		
2		
3		

7. **PRODUCTION** A car manufacturer makes 15,000 hybrid cars a month. Using the function table, find the number of hybrid cars produced after 3, 6, 9, and 12 months.

m	$15{,}000m$	P
3		
6		
9		
12		

8. **SUNSPOTS** The changing activity of sunspots, which are cooler and darker areas of the sun, occur in 11-year cycles. Use the function $y = 11c$ to find the numbers of years necessary to complete 1, 2, 3, and 4 sunspot cycles.

NAME ______________________________ DATE ____________ PERIOD _____

1-10 Problem-Solving Practice

SCAS 7-3.2

Algebra: Equations and Functions

1. **TECHNOLOGY** The fee for your pager service is $22 per month. Make a function table that shows your total charge for 1, 2, 3, and 4 months of service.

2. **MEASUREMENT** Joe takes 2 steps for every one step that Kim takes. Write an equation in two variables showing the relationship between Joe's steps and Kim's steps. If Kim takes 15 steps, how many steps will Joe have to take to cover the same distance?

3. **TRAINS** Between Hiroshima and Kokura, Japan, the bullet train averages a speed of 164 miles per hour, which is the fastest scheduled train service in the world. Make a function table that shows the distance traveled at that speed in 1, 2, 3, and 4 hours.

4. **BUSINESS** Grant earns $5 for each magazine that he sells. Write an equation in two variables showing the relationship between the number of magazines sold and the amount of money made. If Grant sells 12 magazines, how much money will he make?

5. **GEOMETRY** The formula for the volume of a rectangular prism whose base has an area of 8 square units is $V = 8h$, where V is the volume and h is the height. Make a function table that shows the volume of a rectangular prism with a height of 3, 4, 5, and 6 units.

6. **GEOMETRY** The fastest insect in the world is the dragonfly with a top speed of 36 miles per hour. Write an equation in two variables describing the relationship between the length of the dragonfly's flight and the distance traveled. If a dragonfly flies for 3 hours, how far can he travel?

Name Date

Chapter 1 Test

Mastering the SC Standards

1 Which number is equivalent to 4^3?

Ⓐ 12
Ⓑ 16
Ⓒ 64
Ⓓ 256

7-2.6

2 The square root of 84 is between which two integers?

Ⓐ 7 and 8
Ⓑ 8 and 9
Ⓒ 9 and 10
Ⓓ 10 and 11

7-2.10

3 What rule can be used to find the value of a term in the *n*th position in the sequence shown in the table below?

Position	Term
1	4
2	8
3	12
4	16
5	20

Ⓐ Multiply the position number by 2.
Ⓑ Multiply the position number by 4.
Ⓒ Square the position number.
Ⓓ Cube the position number.

7-3.1

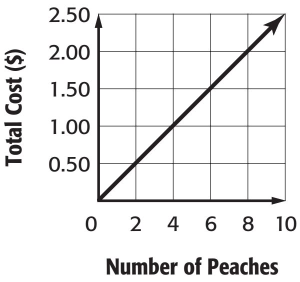
4 The table below shows how far a lion can run in different amounts of time. What is the missing value in the table?

Time	Distance
5 sec	350 ft
10 sec	700 ft
15 sec	1,050 ft
20 sec	1,400 ft
25 sec	1,750 ft
30 sec	?

Ⓐ 2,050 ft
Ⓑ 2,100 ft
Ⓒ 2,200 ft
Ⓓ 2,450 ft

7-3.2

5 South Carolina grows at least 30–40 varieties of peaches. The graph below shows the relationship between the number of peaches Allison buys and the total cost.



How much does each peach cost?

Ⓐ $4.00
Ⓑ $2.50
Ⓒ $1.00
Ⓓ $0.25

7-3.2

Name Date

Chapter 1 Test (continued)

Mastering the SC Standards

6 Marco solves the equation $4^2 + (7 - 4) \times 6$. Which equation below shows his first step?

Ⓐ $4^2 = 16$
Ⓑ $4 \times 6 = 24$
Ⓒ $4 + 7 = 11$
Ⓓ $7 - 4 = 3$

7-2.8

---

7 What is 4.59×10^6 in standard notation?

Ⓐ 4,590
Ⓑ 459,000
Ⓒ 4,590,000
Ⓓ 45,900,000

7-2.7

---

8 An adult meal at a restaurant costs one dollar less than twice the cost of *c*, a children's meal. Which equation can be used to find *a*, the cost of an adult meal?

Ⓐ $a = c - 2$
Ⓑ $a = c + 2$
Ⓒ $a = 2c - 1$
Ⓓ $a = 2c + 1$

7-1.4

9 Which sequence follows the rule $2n^2 + 3$, where *n* represents the position of a term in the sequence?

Ⓐ 5, 11, 21, 35, 53, ...
Ⓑ 5, 7, 9, 11, 13, ...
Ⓒ 4, 7, 12, 19, 28
Ⓓ 7, 19, 39, 67, 103, ...

7-3.1

---

10 John determines that he needs a piece of rope $\sqrt{58}$ long in order to connect the top of a tent pole to a stake in the ground. Between which two numbers is this length?

Ⓐ 5 and 6
Ⓑ 6 and 7
Ⓒ 7 and 8
Ⓓ 8 and 9

7-2.10

---

11 How can $4 \times 4 \times 4$ be represented using an exponent?

Ⓐ 4^4
Ⓑ 4^2
Ⓒ 4^3
Ⓓ 3^4

7-2.6

NAME ______________________________ DATE ____________ PERIOD _____

2 Anticipation Guide

Integers

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).

STEP 1 A, D, or NS	Statement	STEP 2 A or D
	1. An integer is any number from the set {…, –3, –2, –1, 0, 1, 2, 3, …}.	
	2. The absolute value of a positive integer is positive and the absolute value of a negative integer is negative.	
	3. On a number line, numbers to the left are always less than numbers to the right.	
	4. The coordinate plane is separated into four sections called quadrants.	
	5. The coordinates of the ordered pairs in quadrant IV are all negative.	
	6. The sum of any number and its opposite is 1.	
	7. To subtract an integer, add its opposite.	
	8. When a math problem has a series of numbers or a data table, finding a pattern is a good strategy to solve the problem.	
	9. The product of two negative integers is always negative.	
	10. The quotient of a positive integer divided by a negative integer will always be negative.	

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.

NAME ______________________ DATE __________ PERIOD _____

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. Order the following integers from least to greatest.

$$|-4|, 3, -10, 9, 0, -3.5, 1\frac{1}{2}$$

Which option shows the integers above in the correct order from least to greatest?

A $-3.5, |-4|, -10, 0, 1\frac{1}{2}, 3, 9$

B $-3.5, -10, 0, |-4|, 1\frac{1}{2}, 3, 9$

C $-10, -3.5, 0, 1\frac{1}{2}, 3, |-4|, 9$

D $0, 1\frac{1}{2}, 3, -3.5, |-4|, 9, -10$

2. During the junior varsity football game last Thursday night, Shane rushed for 35 yards in the first quarter. He lost 8 yards in the second quarter, lost 3 yards in the third quarter, and gained 15 yards in the fourth quarter. Which of the following expressions represents Shane's rushing performance in the game?

A $35 + 8 + 3 + 15$

B $35 - (-8) - (-3) + 15$

C $35 - 8 - 3 + 15$

D $-35 + 8 + 3 - 15$

Fold here.

Solution

1. *Hint: The farther a number is from zero in the negative direction, the smaller the value of the number. The farther a number is from zero in the positive direction, the greater the value of the number. The absolute value of a number ($|n|$) is the distance that the number is from zero, for example, $|-2| = 2$. Number lines make good tools for determining how numbers compare.*

A Incorrect: -10 is less than $|-4|$.

B Incorrect: $1\frac{1}{2}$ is less than $|-4|$.

C Correct

D Incorrect: -3.5 is less than 0.

The answer is **C.**

Solution

2. In the quarters when Shane gained yardage, the number will be positive and when he lost yardage, the number will be negative. Choice A does not allow for any negative yardage, so it is incorrect. Choice B is the same as Choice A, because subtracting a negative number is the same as adding the number. Choice C is correct. Shane gained 35 yards (+35), then lost 8 yards (−8), then lost 3 yards (−3), then gained 15 yards (+15).

The answer is **C.**

NAME ______________________________ DATE ____________ PERIOD _____

2-1 Explore Through Reading

SCAS 7-2.4, 7-1.4

Integers and Absolute Value

Get Ready for the Lesson

Read the introduction at the top of page 80 in your textbook. Write your answers below.

1. What does a value of −10 represent?

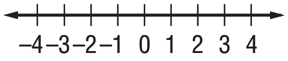
2. The top deck of a ramp is 5 feet above street level. How can you represent 5 feet above street level?

Read the Lesson

3. Express each of the following in words.

Symbols	Words
+7	
−7	
|7|	

4. Graph the set of integers {0, 3, −2, −1} on the number line.



Remember What You Learned

5. Show a classmate how a number line can be used to show negative and positive integers. Explain the difference between some integers and the absolute values of those integers. Draw a number line to show what you mean.

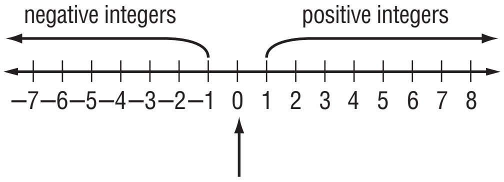
NAME ______________________________ DATE ____________ PERIOD _____

2-1 Study Guide

SCAS 7-2.4, 7-1.4

Integers and Absolute Value

Integers less than zero are **negative integers.** Integers greater than zero are **positive integers.**



zero is neither
positive nor negative

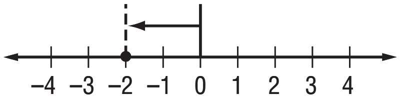
The absolute value of an integer is the distance the number is from zero on a number line. Two vertical bars are used to represent absolute value. The symbol for absolute value of 3 is $|3|$.

Example 1 **Write an integer that represents 160 feet below sea level.**

Because it represents *below* sea level, the integer is -160.

Example 2 **Evaluate $|-2|$.**

On the number line, the graph of -2 is 2 units away from 0. So, $|-2| = 2$.



Exercises

Write an integer for each situation.

1. 12°C above 0

2. a loss of $24

3. a gain of 20 pounds

4. falling 6 feet

Evaluate each expression.

5. $|12|$

6. $|-150|$

7. $|-8|$

8. $|75|$

9. $|-19|$

10. $|84|$

NAME ______________________________________ DATE ______________ PERIOD _____

2-1 Homework Practice

SCAS **7-2.4,** 7-1.4

Integers and Absolute Value

Write an integer for each situation.

1. a profit of \$12

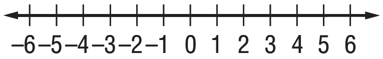
2. 1,440 feet below sea level

3. 22°F below 0

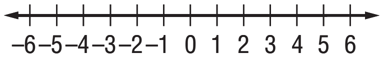
4. a gain of 31 yards

Graph each set of integers on a number line.

5. $\{-5, 0, 5\}$



6. $\{-3, -2, 1, -4\}$



Evaluate each expression.

7. $|-11|$

8. $|-5| + 8$

9. $|-4| - |-4|$

10. $|12| \div 2 \times |-5|$

11. $|-4| + 7 - |3|$

12. $9 + |-6| \div 1^2$

13. **HEALTH** A veterinarian recommends that a St. Bernard lose weight. Write an integer to describe the dog losing 25 pounds.

14. **GEOGRAPHY** Mount Kilimanjaro is the highest peak in Africa. Write an integer to represent the elevation of Mount Kilimanjaro of 5,895 meters above sea level.

15. **ECONOMY** Gasoline prices occasionally fluctuate during a two month period of time. Prices increased 34 cents per gallon during the month of April and decreased 17 cents per gallon during the month of May. What integers can be used to describe each change in price?

NAME ______________________________ DATE ____________ PERIOD _____

2-1 Problem-Solving Practice

SCAS 7-2.4, 7-1.4

Integers and Absolute Value

1. **DEATH VALLEY** The lowest point in the United States is Death Valley in California. Its altitude is 282 feet below sea level. Write an integer to represent the altitude of Death Valley.

2. **RAIN** A meteorologist reported that in the month of April there were 3 inches more rainfall than normal. Write an integer to represent the amount of rainfall above normal in April.

3. **ARCHIMEDES** A famous mathematician and physicist named Archimedes was born in 287 B.C. Write an integer to express the year of his birth.

4. **TEMPERATURE** In our world's tropical rain forests, the average temperature of every month is 64 degrees above zero or higher. Write an integer to express this temperature.

5. **STOCK MARKET** A certain stock gained 5 points in one day and lost 4 points the next day. Write integers to represent the stock's gains and losses for the two days.

6. **ALTITUDE** An airplane pilot changed his altitude by 100 meters. Describe what this could mean.

NAME ______________________________ DATE ______________ PERIOD _____

2-4 Explore Through Reading

SCAS **7-2.8,** 7-1.7

Adding Integers

Get Ready for the Lesson

Read the introduction at the top of page 95 in your textbook. Write your answers below.

1. Represent the number of electrons in an atom of helium with an integer.

2. Represent the number of protons in an atom of helium with an integer.

3. Each proton-electron pair has a value of 0. What is the total charge of an atom of helium?

Read the Lesson

For Exercises 4 and 5, tell how you would find each sum on a number line. Then add.

4. $-7 + (-9)$

5. $-7 + 9$

6. What property are you applying when you add a number and its opposite only to find that its result is zero?

7. How many units away from 0 is the number 17? How many units away from 0 is the number -17? What are 17 and -17 called?

Remember What You Learned

8. Work with a partner. Tell your partner how to use absolute values to add integers with different signs when the positive integer has the greater absolute value. Then have your partner explain to you how to use absolute values to add integers with different signs when the negative integer has the greater absolute value.

NAME ______________________________ DATE ____________ PERIOD _____

2-4 Study Guide

SCAS **7-2.8,** 7-1.7

Adding Integers

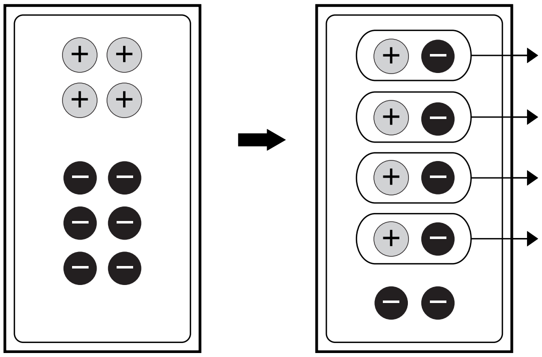
For integers with the same sign:
- the sum of two positive integers is positive.
- the sum of two negative integers is negative.

For integers with different signs, subtract their absolute values. The sum is:
- positive if the positive integer has the greater absolute value.
- negative if the negative integer has the greater absolute value.

To add integers, it is helpful to use counters or a number line.

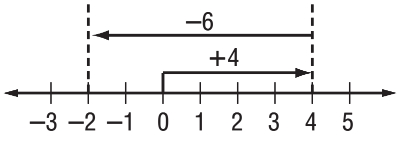
Example **Find 4 + (–6).**

Method 1 Use counters.
Combine a set of 4 positive counters and a set of 6 negative counters on a mat.



4 + (–6)   4 + (–6) = –2

Method 2 Use a number line.
- Start at 0.
- Move 4 units right.
- Then move 6 units left.



4 + (–6) = –2

Exercises

Add.

1. $-5 + (-2)$

2. $8 + 1$

3. $-7 + 10$

4. $16 + (-11)$

5. $-22 + (-7)$

6. $-50 + 50$

7. $-10 + (-10)$

8. $100 + (-25)$

9. $-35 + -20$

Evaluate each expression if $a = 8$, $b = -8$, and $c = 4$.

10. $a + 15$

11. $b + (-9)$

12. $a + b$

13. $b + c$

14. $-10 + c$

15. $12 + b$

NAME ______________________________ DATE ____________ PERIOD _____

2-4 Homework Practice

SCAS **7-2.8,** 7-1.7

Adding Integers

Add.

1. $34 + 22$

2. $-29 + 30$

3. $9 + (-32)$

4. $-16 + (-28)$

5. $4 + (-50)$

6. $-12 + (-63)$

7. $-42 + 42$

8. $-28 + 14$

9. $13 + 63$

10. $18 + (-12) + 5$

11. $-22 + (-10) + 15$

12. $-14 + 0 + 13$

Write an addition expression to describe each situation. Then find each sum and explain its meaning.

13. **WEIGHT** An actor gains 20 pounds for a part and then loses 15 pounds during the filming of a movie to go along with the story.

14. **TEMPERATURE** At 4:00 A.M., the outside temperature was −28°F. By 4:00 P.M. that same day, it rose 38 degrees.

ALGEBRA **Evaluate each expression if $a = 12$, $b = -15$, and $c = -10$.**

15. $a + (-12)$

16. $-20 + b$

17. $c + 23$

18. $b + c$

19. $a + c$

20. $a + b$

21. **ROLLER COASTERS** The latest thrill ride at a popular theme park takes roller coaster fans on an exciting ride. In the first 20 seconds, it carries its passengers up a 100-meter hill, plunges them down 72 meters, and quickly takes them back up a 48-meter rise. How much higher or lower from the start of the ride are they after these 20 seconds?

NAME ______________________________ DATE ____________ PERIOD _____

2-4 Problem-Solving Practice

Adding Integers

SCAS **7-2.8,** 7-1.7

Write an addition expression to describe each situation. Then find each sum.

1. **FOOTBALL** A team gains 20 yards. Then they lose 7 yards.

2. **MONEY** Roger owes his mom $5. He borrows another $6 from her.

3. **GOLF** Juanita's score was 5 over par on the first 9 holes. Her score was 4 under par on the second 9 holes.

4. **HOT AIR BALLOON** A balloon rises 340 feet into the air. Then it descends 130 feet.

5. **CYCLING** A cyclist travels downhill for 125 feet. Then she travels up a hill 50 feet.

6. **AIRPLANE** A plane descends 1,200 feet. Then it descends another 500 feet.

NAME ______________________________ DATE ____________ PERIOD _____

2-5 Explore Through Reading

SCAS **7-2.8,** 7-1.4

Subtracting Integers

Get Ready for the Lesson

Complete the Mini Lab at the top of page 103 in your textbook. Write your answers below.

1. Write a related addition sentence for the subtraction sentence.

Use a number line to find each difference. Write an equivalent addition sentence for each.

2. $1 - 5$

3. $-2 - 1$

4. $-3 - 4$

5. $0 - 5$

Read the Lesson

Tell how you would solve each of the following on a number line. Then solve.

6. $-8 - (-6)$

7. $6 - 8$

Remember What You Learned

8. Write the rule that tells how to subtract integers. Then give an example.

NAME ________________________ DATE ____________ PERIOD _____

2-5 Study Guide

SCAS **7-2.8,** 7-1.4

Subtracting Integers

To subtract an integer, add its opposite.

Example 1 **Find 6 − 9.**

$6 - 9 = 6 + (-9)$ To subtract 9, add −9.

$= -3$ Simplify.

Example 2 **Find −10 − (−12).**

$-10 - (-12) = -10 + 12$ To subtract −12, add 12.

$= 2$ Simplify.

Example 3 **Evaluate $a - b$ if $a = -3$ and $b = 7$.**

$a - b = -3 - 7$ Replace *a* with −3 and *b* with 7.

$= -3 + (-7)$ To subtract 7, add −7.

$= -10$ Simplify.

Exercises

Subtract.

1. $7 - 9$

2. $20 - (-6)$

3. $-10 - 4$

4. $0 - 12$

5. $-7 - 8$

6. $13 - 18$

7. $-20 - (-5)$

8. $-8 - (-6)$

9. $25 - (-14)$

10. $-75 - 50$

11. $15 - 65$

12. $19 - (-10)$

Evaluate each expression if $m = -2$, $n = 10$, and $p = 5$.

13. $m - 6$

14. $9 - n$

15. $p - (-8)$

16. $p - m$

17. $m - n$

18. $-25 - p$

NAME ______________________________ DATE ____________ PERIOD _____

2-5 Homework Practice

SCAS 7-2.8, 7-1.4

Subtracting Integers

Subtract.

1. $16 - 14$

2. $-4 - 2$

3. $9 - (-2)$

4. $-6 - (-8)$

5. $-20 - 10$

6. $-28 - (-13)$

7. $-33 - 33$

8. $28 - 14$

9. $13 - (-63)$

10. $-18 - (-12)$

11. $52 - (-30)$

12. $-15 - 0$

13. **WEATHER** The highest and lowest recorded temperatures for the state of Texas are 120°F and −23°F. Find the difference in these extreme temperatures.

ALGEBRA **Evaluate each expression if $x = -8$, $y = 7$, and $z = -11$.**

14. $x - 7$

15. $-13 - y$

16. $-11 - z$

17. $x - z$

18. $z - y$

19. $y - x$

20. $x - (-z)$

21. $|y - z|$

22. $x - z - y$

ANALYZE TABLES In golf, scores are often stated as the number of strokes above or below par for the course. Four golfers played two rounds of golf during the weekend. The table lists their scores for each round in relation to par.

Golfer	Patrick	Diane	James	Juanita
Round 1	−6	+1	+2	−3
Round 2	−2	−4	+7	+6

For Exercises 23 and 24, use the information in the table.

23. Find the difference between James's Round 2 score and Diane's Round 2 score.

24. Find the difference between Patrick's lower score and Juanita's higher score.

NAME ______________________________ DATE ____________ PERIOD _____

2-5 Problem-Solving Practice

SCAS **7-2.8,** 7-1.4

Subtracting Integers

Subtract.

1. **FOOTBALL** A team gained 5 yards on their first play of the game. Then they lost 6 yards. Find the total change in yardage.

2. **CHECKING** Your checking account is overdrawn by $50. You write a check for $20. What is the balance in your account?

3. **TEMPERATURE** The average temperature in Calgary, Canada, is 22°C in July and −11°C in January. Find the range of the highest and lowest temperatures in Calgary.

4. **ROLLER COASTER** A roller coaster begins at 90 feet above ground level. Then it descends 105 feet. Find the height of the coaster after the first descent.

5. **SAVINGS** Sonia has $235 in her savings account. She withdraws $45. What is left in her savings account?

6. **BEACH** Wai and Kuri were digging in the sand at the beach. Wai dug a hole that was 15 inches below the surface, and Kuri dug a hole that was 9 inches below the surface. Find the difference in the depths of their holes.

NAME ______________________________ DATE ____________ PERIOD _____

2-6 Explore Through Reading

SCAS 7-2.8

Multiplying Integers

Get Ready for the Lesson

Complete the Mini Lab at the top of page 107 in your textbook. Write your answers below.

1. Write a multiplication sentence that describes the model.

Find each product using counters or a drawing.

2. 3(−2)

3. 4(−3)

4. 1(−7)

5. 5(−2)

Read the Lesson

6. Give an example that shows how multiplication is the same as repeated addition. In your example, tell what the addend is.

7. How does the sentence $4(-2) = -2(4)$ illustrate the Commutative Property of Multiplication?

8. Complete each of the following sentences with the word *positive* or *negative.*

a. The product of two integers with different signs is ________________.

b. The product of two integers with the same sign is ________________.

Remember What You Learned

9. You know the rule for determining the sign of the product of two integers when the signs are alike or different. Consider the product of three integers. With a partner summarize the signs of the products of 3 integers when three, two, one or none of the integers are positive.

NAME ______________________________ DATE ____________ PERIOD _____

2-6 Study Guide

SCAS 7-2.8

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 5(–2).**

$5(-2) = -10$ The integers have different signs. The product is negative.

Example 2 **Multiply –3(7).**

$-3(7) = -21$ The integers have different signs. The product is negative.

Example 3 **Multiply –6(–9).**

$-6(-9) = 54$ The integers have the same sign. The product is positive.

Example 4 **Multiply $(-7)^2$.**

$(-7)^2 = (-7)(-7)$ There are 2 factors of –7.

$= 49$ The product is positive.

Example 5 **Simplify –2(6*c*).**

$-2(6c) = (-2 \cdot 6)c$ Associative Property of Multiplication

$= -12c$ Simplify.

Example 6 **Simplify 2(5*x*).**

$2(5x) = (2 \cdot 5)x$ Associative Property of Multiplication

$= 10x$ Simplify.

Exercises

Multiply.

1. $-5(8)$
2. $-3(-7)$
3. $10(-8)$
4. $-8(3)$
5. $-12(-12)$
6. $(-8)^2$

ALGEBRA **Simplify each expression.**

7. $-5(7a)$
8. $3(-2x)$
9. $4(6f)$
10. $7(6b)$
11. $-6(-3y)$
12. $7(-8g)$

ALGEBRA **Evaluate each expression if $a = -3$, $b = -4$, and $c = 5$.**

13. $-2a$
14. $9b$
15. ab
16. $-3ac$
17. $-2c^2$
18. abc

NAME ______________________________ DATE ______________ PERIOD _____

2-6 Homework Practice

SCAS 7-2.8

Multiplying Integers

Multiply.

1. $4(-7)$	**2.** $-14(5)$	**3.** $9(-12)$
4. $-6(-8)$	**5.** $27(-3)$	**6.** $-11(-13)$
7. $-55(0)$	**8.** $(-7)(-7)$	**9.** $78(-1)$
10. $(-3)^3$	**11.** $(-1)^4$	**12.** $(-8)^2$

13. Find -5 cubed.

14. Find the product of 13 and -31.

ALGEBRA Evaluate each expression if $a = -5$, $b = 4$, $c = -1$, and $d = 8$.

15. $5b$	**16.** $3c$	**17.** ad
18. $-7bd$	**19.** abc	**20.** $-5c^3$
21. $-a^2b$	**22.** $-4d - a$	**23.** $b^2 - 4ac$

24. **RECREATION** Hiking up a mountain, you notice that the air temperature drops 10°C for every 1,000 meters increase in elevation. Write a multiplication expression to represent the decrease in temperature if you hike up the mountain 3,000 meters. Then evaluate the expression and explain its meaning.

NAME ____ DATE ______________ PERIOD _____

2-6 Problem-Solving Practice

SCAS 7-2.8

Multiplying Integers

Multiply.

1. TEMPERATURE Suppose the temperature outside is dropping 3 degrees each hour. How much will the temperature change in 8 hours?	**2. DIVING** A deep-sea diver descends below the surface of the water at a rate of 60 feet each minute. What is the depth of the diver after 10 minutes?
3. STOCK A computer stock lost 2 points each hour for 6 hours. Describe the total change in the stock after 6 hours.	**4. DROUGHT** A drought can cause the level of the local water supply to drop by a few inches each week. Suppose the level of the water supply drops 2 inches each week. How much will it change in 4 weeks?
5. MONEY Mrs. Rockwell lost money on an investment at a rate of $4 per day. Describe the change in her investment after two weeks.	**6. TENNIS BALLS** Josh purchased 8 cans of tennis balls. The cans came with 3 balls in each can. How many balls did Josh purchase?

NAME ______________________________ DATE ______________ PERIOD _____

2-8 Explore Through Reading

SCAS 7-2.8

Dividing Integers

Get Ready for the Lesson

Complete the Mini Lab at the top of page 114 in your textbook. Write your answers below.

Find each quotient using counters or a drawing.

1. $-6 \div 2$

2. $-12 \div 3$

Read the Lesson

Write two division sentences related to each of the following multiplication sentences.

3. $-6(-3) = 18$

4. $-21(-2) = 42$

5. $-6(3) = -18$

6. $2(-21) = -42$

7. Complete each of the following sentences with the word *positive* or *negative.*

a. The quotient of two integers with different signs is ____________________.

b. The quotient of two integers with the same sign is ____________________.

8. In the division sentence $-72 \div 8 = -9$, identify the dividend, the divisor, and the quotient.

Remember What You Learned

9. Describe how the operations of multiplication and division are opposite of each other. Are these operations opposite in all cases? What is the one integer that cannot be a divisor?

NAME ______________________ DATE ____________ PERIOD _____

2-8 Study Guide

SCAS 7-2.8

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 **Divide $30 \div (-5)$.**

$30 \div (-5)$	The integers have different signs.
$30 \div (-5) = -6$	The quotient is negative.

Example 2 **Divide $-100 \div (-5)$.**

$-100 \div (-5)$	The integers have the same sign.
$-100 \div (-5) = 20$	The quotient is positive.

Exercises

Divide.

1. $-12 \div 4$

2. $-14 \div (-7)$

3. $\frac{18}{-2}$

4. $-6 \div (-3)$

5. $-10 \div 10$

6. $\frac{-80}{-20}$

7. $350 \div (-25)$

8. $-420 \div (-3)$

9. $\frac{540}{45}$

10. $\frac{-256}{16}$

ALGEBRA **Evaluate each expression if $d = -24$, $e = -4$, and $f = 8$.**

11. $12 \div e$

12. $40 \div f$

13. $d \div 6$

14. $d \div e$

15. $f \div e$

16. $e^2 \div f$

17. $\frac{-d}{e}$

18. $ef \div 2$

19. $\frac{f^2}{e^2}$

20. $\frac{de}{f}$

NAME ______________________________ DATE ____________ PERIOD _____

2-8 Homework Practice

SCAS 7-2.8

Dividing Integers

Divide.

1. $42 \div (-7)$

2. $45 \div (-5)$

3. $-9 \div 3$

4. $-64 \div (-8)$

5. $-39 \div (-13)$

6. $-121 \div 11$

7. $\frac{-48}{12}$

8. $\frac{-35}{7}$

9. $\frac{-38}{-2}$

10. $\frac{32}{-16}$

11. $\frac{55}{-5}$

12. $(-8)^2$

13. Divide 75 by −25.

14. Find the quotient of −30 and −15.

ALGEBRA **Evaluate each expression if $f = -15$, $g = 5$, and $h = -45$.**

15. $-20 \div g$

16. $90 \div h$

17. $h \div f$

18. $fg \div 25$

19. $\frac{f-h}{10}$

20. $\frac{g-5}{-1}$

21. $-f^2 \div g$

22. $\frac{h-3g}{f}$

23. $\frac{f+h}{-g}$

ZOOLOGY The table below shows the weight in pounds of large adult males in the cat family.

Cat	Cheetah	Cougar	Leopard	Lion	Tiger
Weight	143	227	200	550	400

Source: www.sandiegozoo.org

For Exercises 24 and 25 use the information in the table.

24. What is the mean weight of these *cats*?

25. What is the mean weight of the two largest *cats*?

NAME ______________________________________ DATE ______________ PERIOD _____

2-8 Problem-Solving Practice

SCAS 7-2.8

Dividing Integers

Divide.

1. **STOCK MARKET** During a 5-day workweek, the stock market decreased by 65 points. Find the average daily change in the market for the week.	2. **MOTION** Mr. Diaz decreased the speed of his car by 30 miles per hour over a period of 10 seconds. Find the average change in speed each second.
3. **WEATHER** Over the past seven days, Mrs. Cho found that the temperature outside had dropped a total of 35 degrees. Find the average change in temperature each day.	4. **BASKETBALL** The basketball team lost their last 6 games. They lost by a total of 48 points. Find their average number of points relative to their opponents.
5. **POPULATION** The enrollment at Davis Middle School dropped by 60 students over a 5-year period. What is the average yearly drop in enrollment?	6. **SUBMARINE** A submarine descends at a rate of 60 feet each minute. How long will it take it to descend to a depth of 660 feet below the surface?

Name Date

Chapter 2 Test

Mastering the SC Standards

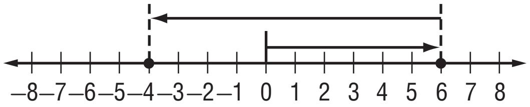
1 Which symbol makes the sentence true?

$$-7 \ \square \ -2$$

Ⓐ $<$
Ⓑ $>$
Ⓒ $=$
Ⓓ $\geq$

7-2.3

2 Which expression does this model show?


–8
–7
–6
–5
–4
–3
–2
–1
0
1
2
3
4
5
6
7
8

Ⓐ $10 + 6$
Ⓑ $-6 + 10$
Ⓒ $10 - 6$
Ⓓ $6 - 10$

7-2.8

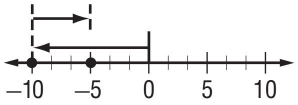
3 Which expression has the greatest value?

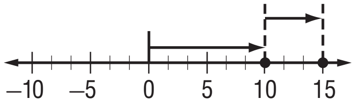
Ⓐ $|-13.5|$
Ⓑ $|-3.7|$
Ⓒ $|8.1|$
Ⓓ $|-15|$

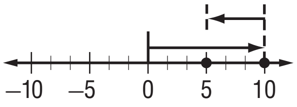
7-2.4

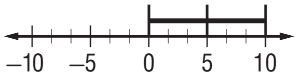
4 Which model matches the following problem?

Marta owes her mother \$10. Marta pays her \$5. How much money does Marta still owe her mother?

Ⓐ


Ⓑ


Ⓒ


Ⓓ


7-2.8

5 Which of the following integers is closest to zero?

Ⓐ 5
Ⓑ 3
Ⓒ -2
Ⓓ -8

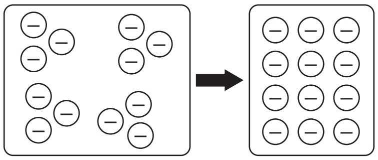
7-2.3

Name   Date

Chapter 2 Test (continued)

Mastering the SC Standards

6 Which problem does the model show?



Ⓐ Awan has 4 model airplanes. His friend gives him 3 more. How many models does he have in all?

Ⓑ Mia gives 4 dollars to each of her 3 friends. How many dollars does Mia have now?

Ⓒ Roberto gives 3 pieces of blue granite from his rock collection to each of his 4 friends. How many pieces of granite does he give away?

Ⓓ Kuri has 4 extra notebooks in her desk. She gives 3 of them to her sister. How many extra notebooks does she have now?

7-2.8

7 Which number has the smallest absolute value?

Ⓐ 2

Ⓑ -8

Ⓒ -4.5

Ⓓ 6

7-2.4

8 Which list shows the following integers in order from least to greatest?

$$2, -12, 6, -6, 3, -5$$

Ⓐ $-5, -6, -12, 2, 3, 6$

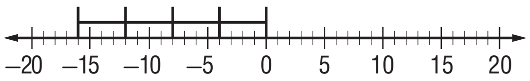
Ⓑ $-12, -6, -5, 2, 3, 6$

Ⓒ $6, 3, 2, -5, -6, -12$

Ⓓ $-12, -6, -5, 6, 3, 2$

7-2.3

9 Which equation does this model show?



Ⓐ $16 \div 4 = -4$

Ⓑ $16 \div -4 = 4$

Ⓒ $-16 \div 4 = 4$

Ⓓ $-16 \div 4 = -4$

7-2.8

10 Which symbol makes the sentence true?

$$-5 \; \boxed{} \; -9$$

Ⓐ $<$

Ⓑ $>$

Ⓒ $=$

Ⓓ $\leq$

7-2.3

NAME ______________________________ DATE ____________ PERIOD _____

3 Anticipation Guide

Algebra: Linear Equations and Functions

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).

STEP 1 A, D, or NS	Statement	STEP 2 A or D
	1. The words *difference*, *less than*, and *decreased by* in a problem suggest subtraction.	
	2. The words *twice*, *per*, and *separate* in a problem suggest multiplication.	
	3. *Twice a number less than 3* is the same as $2n - 3$.	
	4. Addition and subtraction are inverse operations.	
	5. The Addition Property of Equality states that if the same number is added to both sides of an equation, the two sides will remain equal.	
	6. To solve the equation $2.4t = 12$, multiply both sides of the equation by 2.4.	
	7. To solve the equation $6x - 4 = 20$, you would first divide both sides of the equation by 6.	
	8. The formula for the area of a rectangle is $A = \ell \cdot w$.	
	9. To graph the equation $y = 4x$, substitute one value for x and solve for y.	
	10. An equation whose graph is a straight line is called a linear equation.	

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.

NAME ______________________________ DATE ____________ PERIOD _____

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.

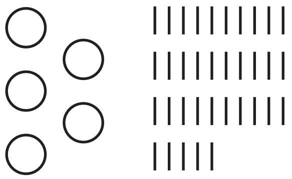
1. Yvonne went to the store to purchase \$10.00 worth of soda. It was on sale and only cost \$2.50 for each 12-pack. How many 12-packs did she buy?

Which equation could be used to solve this problem?

A $10n = 2.5$
B $\frac{n}{2.5} = 10$
C $2.5n = 10$
D $2.5 \cdot 10 = n$

2. Use the circles and tally marks below to help you solve the following equation:

$$5n = 35$$



A $n = 5$
B $n = 7$
C $n = 175$
D $n = \frac{1}{7}$

Fold here.

Solution

1. *Hint: In order to write an equation, a letter is sometimes used to replace an unknown quantity. In this case, n is used to represent the number of 12-packs Yvonne purchased.*

You know that a certain number of 12-packs (n) cost \$10. You also know that each 12-pack costs \$2.50. If you multiply the cost of the 12-packs by the number of 12-packs purchased (2.5×10), it should be equal to total amount of money spent (\$10).

The answer is **C.**

Solution

2. *Hint: You should evenly divide the tally marks between the 5 circles. The number of tally marks in each circle will be the answer. This works because in order to solve a multiplication equation, you perform the inverse function, which is division.*

The tally marks divide evenly into 5 groups of 7.

The answer is **B.**

NAME ______________________________ DATE ____________ PERIOD _____

3-4 Study Guide

SCAS 7-1.1, 7-1.3

Problem-Solving Investigation: Work Backward

By working backward from where you end to where you began, you can solve problems. Use the four-step problem solving model to stay organized when working backward.

Example 1 **Jonah put half of his birthday money into his savings account. Then he paid back the $10 that he owed his brother for dance tickets. Lastly, he spent $3 on lunch at school. At the end of the day he was left with $12. How much money did Jonah receive for his birthday?**

Understand	You know that he had $12 left and the amounts he spent throughout the day. You need to find out how much money he received for his birthday.
Plan	Start with the amount of money he was left with and work backward.
Solve	He had $12 left. 12 Undo the $3 he spent on lunch. $+\ 3$ 15 Undo the $10 he gave back to his brother. $+\ 10$ 25 Undo the half put into his savings account. $\times\ 2$ So, Jonah received $50 for his birthday. 50
Check	Assume that Jonah receive $50 for his birthday. After putting half into his savings account he had $50 ÷ 2 or $25. Then he gave $10 to his brother for dance tickets, so he had $25 − $10 or $15. Lastly, he spent $3 on lunch at school, so he had $15 − $3, or $12. So, our answer of $50 is correct.

Exercises

Solve each problem by using the work backward strategy.

1. On Monday everyone was present in Mr. Miller's class. At 12:00, 5 students left early for doctors' appointments. At 1:15, half of the remaining students went to an assembly. Finally, at 2:00, 6 more students left for a student council meeting. At the end of the day, there were only 5 students in the room. Assuming that no students returned after having left, how many students are in Mr. Miller's class?

2. Jordan was trading baseball cards with some friends. He gave 15 cards to Tommy and got 3 back. He gave two-thirds of his remaining cards to Elaine and kept the rest for himself. When he got home he counted that he had 25 cards. How many baseball cards did Jordan start with?

NAME ______________________________________ DATE ______________ PERIOD _____

3-4 Skills Practice

SCAS 7-1.1, 7-1.3

Problem-Solving Investigation: Work Backward

Solve. Use the work backward strategy.

1. **GOVERNMENT** There are 99 members in the Ohio House of Representatives. All of them were present when a vote was taken on a piece of legislation. If 6 of them did not vote, and 13 more voted “yes” than voted “no”, how many “no” votes were there?

2. **MONEY** Jessie and Amar eat lunch at a restaurant and their bill is $21.65. Amar gives the cashier a coupon for $6 off their bill, and also hands the cashier two bills. If he receives $4.35 in change, what were the denominations of the two bills he gave the cashier?

3. **AGE** Justine is 13 years younger than her uncle Stewart. Stewart is 18 years older than Justine’s sister, Julia. Julia's mother is 8 year older than Stewart, and 28 years older than her youngest child, Jared. If Jared is 12 years old, how old is Justine?

4. **NUMBER THEORY** A number is divided by 6. Then 7 is added to the divisor. After dividing by 4, the result is 4. What is the number?

5. **COMPACT DISCS** Carmella borrowed half as many CDs from the library as her friend Ariel. Ariel borrowed 2 more than Juan, but four less than Sierra. Sierra borrowed 12 CDs. How many did each person borrow?

6. **TIME** Ashish needs to leave for the bus stop 15 minutes earlier than his friend Rami. Rami leaves five minutes later than Susan, but 10 minutes earlier than Raphael. If Raphael leaves for the bus stop at 8:15, what time does Ashish need to leave?

3-4 Homework Practice

SCAS 7-1.1, 7-1.3

Problem-Solving Investigation: Work Backward

Mixed Problem Solving

Use the work backward strategy to solve Exercises 1 and 2.

1. **NUMBER THEORY** A number is divided by 5. Then 3 is added to the quotient. After subtracting 10, the result is 30. What is the number?

2. **COUPONS** Kendra used 35 cents more in coupons at the store than Leanne. Leanne used 75 cents less than Teresa, who used 50 cents more than Jaclyn. Jaclyn used 40 cents in coupons. What was the value of the coupons Kendra used?

Use any strategy to solve Exercises 3–6. Some strategies are shown below.

Problem-Solving Strategies
• Look for a pattern
• Guess and check.
• Work backward

3. **PATTERNS** What are the next three numbers in the following pattern?

   2, 3, 5, 9, 17, 33, . . .

4. **AGES** Mr. Gilliam is 3 years younger than his wife. The sum of their ages is 95. How old is Mr. Gilliam?

5. **GRAND CANYON** The elevation of the North Rim of the Grand Canyon is 2,438 meters above sea level. The South Rim averages 304 meters lower than the North Rim. What is the average elevation of the South Rim?

6. **WATER BILL** The water company charges a residential customer $41 for the first 3,000 gallons of water used and $1 for every 200 gallons used over 3,000 gallons. If the water bill was $58, how many gallons of water were used?

NAME ______________________________ DATE ____________ PERIOD _____

3-4 Problem-Solving Practice

SCAS 7-1.1, 7-1.3

Problem-Solving Investigation: Work Backward

For Exercises 1-3, use the information below.

WEATHER The temperature in Columbus, Ohio on Monday is 35 degrees warmer than it was on Sunday. Saturday's temperature was 7 degrees cooler than Sunday's. At 45 degrees, Friday's temperature was 22 degrees warmer than Saturday's.

For Exercises 4-6, refer to the table below.

MONEY Shelly needs to go to the grocery store to get some items for a dinner party she is hosting with her brother Preston.

Green Pepper	$1.79
Flank Steak	$8.54
Wild Rice	$3.29
Romaine Lettuce	$3.79
Cucumber	$0.99

1. What was the temperature on Monday?

2. Estimate the average temperature for the time period from Saturday to Monday.

3. How many degrees cooler was the temperature on Friday than Monday?

4. How much money should she take to purchase the items contained in the table?

5. If Shelly has $24.00 in her purse before she goes to the store, how much will she have left after she shops?

6. If Preston pays Shelly for half the cost of the groceries, how much does he pay?

7. **NUMBER THEORY** How many different two-digit numbers can you make using the numbers 3, 7, 9, and 2 if no digit is repeated within a number?

8. **PATTERNS** The following numbers follow a pattern: 2, 8, 32, 128. What would the fifth number in the pattern be?

NAME ______________________________ DATE ____________ PERIOD _____

3-5 Explore Through Reading

SCAS 7-3.4, 7-1.4

Solving Two-Step Equations

Get Ready for the Lesson

Complete the Mini Lab at the top of page 151 in your textbook. Write your answers below.

Solve each equation using models or a drawing.

1. $2x + 1 = 5$ **2.** $3x + 2 = 8$ **3.** $2 = 5x + 2$

Read the Lesson

4. Describe in words each step shown for solving the equation.

$\mathbf{12 + 7s = -9}$

$$\begin{array}{rcl} 12 + 7s & = & -9 \\ \underline{-12 \qquad} & \underline{=} & \underline{-12} \\ 7s & = & -21 \\ \dfrac{7s}{7} & = & \dfrac{-21}{7} \\ s & = & -3 \end{array}$$

____

____

____

____

____

5. Number the steps in the correct order for solving the equation $-4v + 11 = -5$.

______ Simplify.

______ Divide each side by -4.

______ Subtract 11 from each side.

______ Write the equation.

______ Simplify.

______ Check the solution.

6. Check the solution given for each equation. If it is correct, write *correct*. If it is incorrect, solve to show the correct solution.

a. $9a + 2 = -25; a = -4$ **b.** $-6f - 10 = 32; f = -7$ **c.** $-18 + 3n = 21; n = 9$

Remember What You Learned

7. In your own words, describe the steps necessary to solve a two-step equation. Will these steps work for all two-step equations?

NAME ______________________________ DATE ____________ PERIOD _____

3-5 Study Guide

SCAS 7-3.4, 7-1.4

Solving Two-Step Equations

To solve two-step equations, you need to add or subtract first. Then divide to solve the equation.

Example 1 **Solve $7v - 3 = 25$. Check your solution.**

$7v - 3 = 25$	Write the equation.
$+3 = +3$	Add 3 to each side.
$7v = 28$	Simplify.
$\frac{7v}{7} = \frac{28}{7}$	Divide each side by 7.
$v = 4$	Simplify.

Check $7v - 3 = 25$	Write the original equation.
$7(4) - 3 \overset{?}{=} 25$	Replace *v* with 4.
$28 - 3 \overset{?}{=} 25$	Multiply.
$25 = 25$ ✓	The solution checks.

The solution is 4.

Example 2 **Solve $-10 = 8 + 3x$. Check your solution.**

$-10 = 8 + 3x$	Write the equation.
$-8 = -8$	Subtract 8 from each side.
$-18 = 3x$	Simplify.
$\frac{-18}{3} = \frac{3x}{3}$	Divide each side by 3.
$-6 = x$	Simplify.

Check $-10 = 8 + 3x$	Write the original equation.
$-10 \overset{?}{=} 8 + 3(-6)$	Replace *x* with −6.
$-10 \overset{?}{=} 8 + (-18)$	Multiply.
$-10 = -10$ ✓	The solution checks.

The solution is −6.

Exercises

Solve each equation. Check your solution.

1. $4y + 1 = 13$

2. $6x + 2 = 26$

3. $-3 = 5k + 7$

4. $6n + 4 = -26$

5. $7 = -3c - 2$

6. $-8p + 3 = -29$

7. $-5 = -5t - 5$

8. $-9r + 12 = -24$

9. $11 + 7n = 4$

10. $35 = 7 + 4b$

11. $15 + 2p = 9$

12. $49 = 16 + 3y$

13. $2 = 4t - 14$

14. $-9x - 10 = 62$

15. $30 = 12z - 18$

16. $7 + 4g = 7$

17. $24 + 9x = -3$

18. $50 = 16q + 2$

19. $3c - 2.5 = 4.1$

20. $9y + 4.8 = 17.4$

NAME ______________________________ DATE ____________ PERIOD _____

3-5 Homework Practice

SCAS **7-3.4,** 7-1.4

Solving Two-Step Equations

Solve each equation. Check your solution.

1. $4h + 6 = 30$

2. $7y + 5 = -9$

3. $-3t + 6 = 0$

4. $-8 + 8g = 56$

5. $5k - 7 = -7$

6. $19 + 13x = 32$

7. $-5b - 12 = -2$

8. $-1n + 1 = 11$

9. $9f + 15 = 51$

10. $5d - 3.3 = 7.2$

11. $3 = 0.2m - 7$

12. $1.3z + 1.5 = 5.4$

13. **KITTENS** Kittens weigh about 100 grams when born and gain 7 to 15 grams per day. If a kitten weighed 100 grams at birth and gained 8 grams per day, in how many days will the kitten triple its weight?

14. **TEMPERATURE** Room temperature ranges from 20°C to 25°C. Find the range of room temperature in °F. Use the formula, $F - 32 = 1.8C$, to convert from the Celsius scale to the Fahrenheit scale.

NAME ________________________________ DATE ______________ PERIOD _____

3-5 Problem-Solving Practice

SCAS 7-3.4, 7-1.4

Solving Two-Step Equations

1. **GOLF** It costs $12 to attend a golf clinic with a local pro. Buckets of balls for practice during the clinic cost $3 each. How many buckets can you buy at the clinic if you have $30 to spend?

2. **MONEY** Paulo has $145 in his savings account. He earns $36 a week mowing lawns. If Paulo saves all of his earnings, after how many weeks will he have $433 saved?

3. **RETAIL** An online retailer charges $6.99 plus $0.55 per pound to ship electronics purchases. How many pounds is a DVD player for which the shipping charge is $11.94?

4. **MONEY** Caitlin has a $10 gift certificate to the music store. She has chosen a number of CDs from the $7 bargain bin. If the cost of the CDs is $32 after the gift certificate is credited, how many CDs did Caitlin buy?

5. **EMPLOYMENT** Mrs. Jackson earned a $500 bonus for signing a one-year contract to work as a nurse. Her salary is $22 per hour. If her first week's check including the bonus is $1,204, how many hours did Mrs. Jackson work?

6. **PHOTOGRAPHY** Morgan subscribes to a website for processing her digital pictures. The subscription is $5.95 per month and 4 by 6 inch prints are $0.19 each. How many prints did Morgan purchase if the charge for January was $15.83?

NAME ______________________________ DATE ____________ PERIOD _____

3A Study Guide

SCAS 7-3.4, 7-3.5

Solving Two-Step Inequalities

When you multiply of divide each side of an inequality by a positive number, the inequality remains true. However, when you multiply or divide each side of an inequality by a negative number, the direction of inequality must be reversed for the inequality to remain true.

Example 1 **Solve $\frac{t}{-7} \le -3$. Check your solution. Then graph the solution on a number line.**

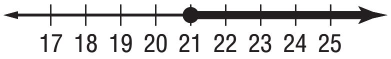
$\frac{t}{-7} \le -3$ Write the inequality.

$\frac{t}{-7}(-7) \le -3(-7)$ Multiply each side by −7 and reverse the inequality symbol

$t \ge 21$ Simplify.

The solution is $t \ge 21$. You can check this solution by replacing t in the original inequality with 21 and a number greater than 21.

To graph the solution, place a closed circle at 21 and draw a line and arrow to the right.



Some inequalities involve more than one operation.

Example 2 **Solve $4x - 5 < 27$. Check your solution.**

$4x - 5 < 27$ Write the inequality.

$4x - 5 + 5 < 27 + 5$ Add 5 to each side.

$4x < 32$ Simplify.

$\frac{4x}{4} < \frac{32}{4}$ Divide each side by 4.

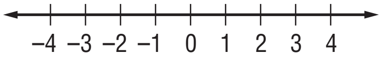
$x < 8$ Simplify.

The solution is $x < 8$. You can check this solution by substituting numbers less than 8 into the original inequality.

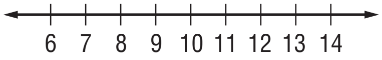
Exercises

Solve each inequality and check your solution. Then graph the solution on a number line.

1. $3a > 6$



2. $40 > 4r + 4$



Solve each inequality. Check your solution.

3. $c + 2 \ge -2$

4. $13 > -2y - 3$

5. $\frac{h}{-5} - 6 < -10$

NAME ________________________________ DATE ______________ PERIOD _____

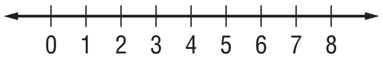
3A Skills Practice

SCAS 7-3.4, 7-3.5

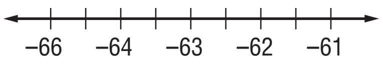
Solving Two-Step Inequalities

Solve each inequality and check your solution. Then graph the solution on a number line.

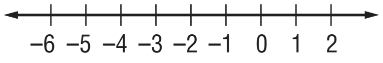
1. $2v > 10$



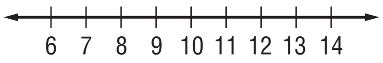
2. $\frac{p}{3} < -21$


−66 −64 −63 −62 −61

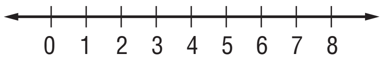
3. $5c + 9 < -11$



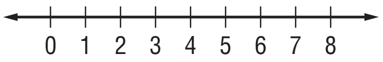
4. $67 \geq 5c + 7$


6 7 8 9 10 11 12 13 14

5. $8 - 4p > 20$

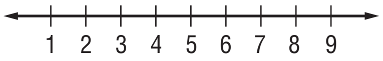


6. $18 - 2n \geq 6$



7. $\frac{b}{3} + 9 > 8$

8. $-3 - 4d \geq 25$



Solve each inequality. Check your solution.

9. $3a + 2 < -4$

10. $5b - 4 \geq -29$

11. $\frac{m}{4} + 6 < 10$

12. $-7d + 8 \leq 1$

13. $\frac{z}{-8} - 5 < -2$

14. $2 + \frac{r}{6} > -1$

15. $4v - 6 \leq 2$

16. $3 + \frac{h}{-7} \geq 1$

17. $-2y - 5 \leq 19$

Write an inequality for each sentence.

18. Four more than six times a number is less than 60.

19. The quotient of a number and 2 is more than −11.

20. The quotient of a number and 5 is at most 25.

21. Two times a number minus 3 is more than 36.

22. One less than negative three times a number is at least −60.

23. Four times a number plus 2 is greater than −56.

NAME ______________________________ DATE ______________ PERIOD _____

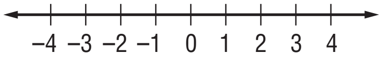
3A Homework Practice

SCAS 7-3.4, 7-3.5

Solving Two-Step Inequalities

Solve each inequality and check your solution. Then graph the solution on a number line.

1. $-17 \leq 4w - 9$



2. $16 - 6a > -62$

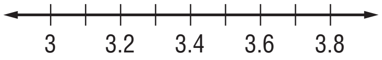
3. $-12 - 25t \leq 388$

4. $25 > -2g + 7$

5. $-1.3 + \frac{y}{4} \geq 1.1$

6. $-5 + \frac{r}{-2} < -7$

7. $-5 > \frac{k}{-0.4} + 3$



8. $2 + \frac{m}{-7} \leq 32$

Solve each inequality. Check your solution.

9. $5 + 2c < -9$

10. $3x + 9 < 18$

11. $\frac{m}{3} + 5 \geq 2$

12. $\frac{c}{4} + 7 \geq 5$

13. $20 - 2n > 26$

14. $5 - 2k \leq 15$

15. $\frac{n}{4} - 9 > 5$

16. $5 - 4c \leq 17$

17. $7 + 2p < -14$

Write an inequality for each sentence. Then solve the inequality.

18. Five times a number is more than 55.

19. The quotient of a number and 12 is no more than three.

20. The product of -6 and a number is at least 54.

21. The product of $-\frac{1}{3}$ and a number is less than -36.

22. The quotient of a number and 3 is at least -5.

23. A number divided by 4 is more than 16.

NAME ______________________________ DATE ______________ PERIOD _____

3A Problem-Solving Practice

SCAS 7-3.4, 7-3.5

Solving Two-Step Inequalities

1. **PLANTS** Monroe needs more than 45 cubic feet of soil to fill the planter he built. Each bag of soil contains 2.5 cubic feet. Write and solve an inequality to find how many bags of soil Monroe will need.

2. **ART** Lois is making a rectangular collage. The area of the rectangle is 255 square inches, and the area of each photo is 15 square inches. She will overlap the photos so the total area of the photos is more than 255 square inches. Write and solve an inequality to find how many photos Lois will need.

3. **PETS** Kendra can spend no more than $19 at the pet store. She wants to buy some goldfish and a package of rocks for her tank. The package of rocks costs $4. If the fish cost $3 each, write and solve an inequality to find how many goldfish Kendra can buy.

4. **HOT DOG BUNS** Hot dog buns come in packages of 8 or 12. Curt purchased the last package of 12 at the store. Write and solve an inequality to show how many packages of 8 Curt would need to purchase to have enough hot dog buns for at least 60 hot dogs.

5. **QUARTERS** Jemma has $3.20 in her pocket and a mug of change containing quarters. Write and solve an inequality showing the least number of quarters she can take from the mug to pay for an item that is $5.49.

6. **ENTERTAINMENT** Gabrielle went to a movie with her sister. They had $21 to spend. If they spent $8.50 on snacks, write and solve an inequality to find much they had to spend on each ticket.

NAME ______________________________ DATE ____________ PERIOD _____

3-6 Explore Through Reading

SCAS 7-5.3

Measurement: Perimeter and Area

Get Ready for the Lesson

Read the introduction at the top of page 156 in your textbook. Write your answers below.

1. If the students run around the gym 5 times, how far would they run?

2. Explain how you can use both multiplication and addition to find the distance.

Read the Lesson

3. Explain in your own words what the formula $p = 2\ell + 2w$ means?

4. How is the perimeter of a figure different from the area of the figure?

5. Explain how to find the perimeter and area of a rectangle whose length is 8 feet and whose width is 2 feet.

Remember What You Learned

6. The word *perimeter* comes from two Greek words that mean "a measure (*metron*) around (*peri*)." Tell how you can find the perimeter of a rectangle.

NAME ______________________________ DATE ____________ PERIOD _____

3-6 Study Guide

SCAS 7-5.3

Measurement: Perimeter and Area

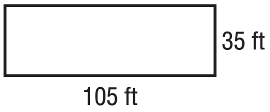
The distance around a geometric figure is called the **perimeter**.

To find the perimeter of any geometric figure, you can use addition or a formula.

The perimeter of a rectangle is twice the length ℓ plus twice the width w.

$$P = 2\ell + 2w$$

Example 1 **Find the perimeter of the figure at right.**



$P = 105 + 105 + 35 + 35$ or 280

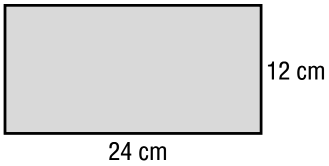
The perimeter is 280 inches.

The measure of the surface enclosed by a geometric figure is called the **area**.

The area of a rectangle is the product of the length ℓ and width w.

$$A = \ell \cdot w$$

Example 2 **Find the area of the rectangle.**



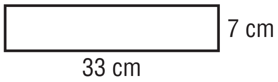
$A = \ell \cdot w$
$= 24 \cdot 12$ or 288

The area is 288 square centimeters.

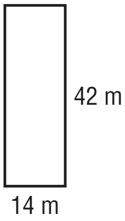
Exercises

Find the perimeter of each figure.

1\.

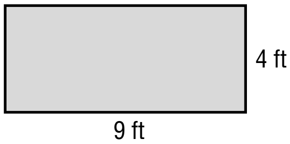


2\.

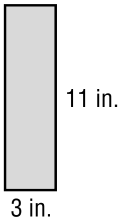


Find the perimeter and area of each rectangle.

3\.



4\.



5. $\ell = 8$ ft, $w = 5$ ft

6. $\ell = 3.5$ m, $w = 2$ m

7. $\ell = 8$ yd, $w = 4\frac{1}{3}$ yd

8. $\ell = 29$ cm, $w = 7.3$ cm

NAME ______________________________ DATE ____________ PERIOD _____

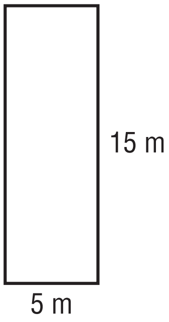
3-6 Homework Practice

SCAS 7-5.3

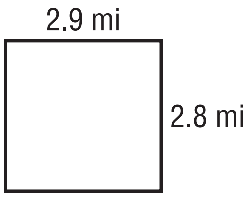
Measurement: Perimeter and Area

Find the perimeter of each rectangle.

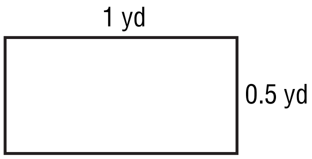
1.



2.

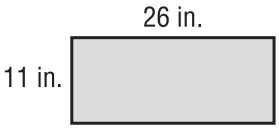


3.

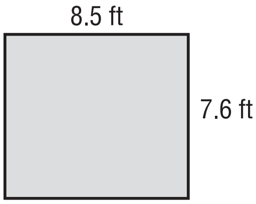


Find the area of each rectangle.

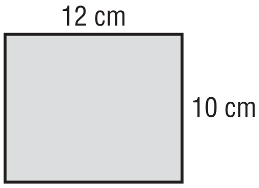
4.



5.



6.



Find the missing side.

7. $P = 83.4$ km, $\ell = 27.8$ km

8. $A = 337.68$ yd^2, $w = 60.3$ yd

LAWN CARE **For Exercises 9 and 10, use the following information.**
Yuri’s dad needs to fertilize the grass in the yard. The back yard measures 55 feet by 30 feet, while the front yard is a square with a length of 42 feet on each side.

9. Yuri’s dad wants to rope off the two areas to keep people from disturbing the lawn after he fertilizes the grass. How much rope will he need to go around both areas?

10. If a bag of fertilizer covers 600 square feet of lawn, how many bags of fertilizer will Yuri’s dad need to fertilize the front and back yards?

NAME ______________________________ DATE ____________ PERIOD _____

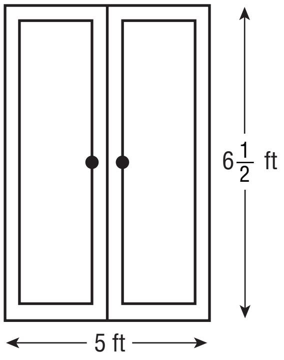
3-6 Problem-Solving Practice

SCAS 7-5.3

Measurement: Perimeter and Area

1. **BUILD A FENCE** Mrs. Chen wants to build a fence around her yard so that her dog, Fluffy, can run free. The yard she wants to fence is 60 feet by 30 feet. The fencing is sold by the linear foot, so in order to figure out how much fencing she needs, Mrs. Chen needs to know the perimeter of the yard. Find the yard's perimeter.

2. **WINDOWS** Mrs. Johnson was planning to caulk around the frame of her patio doors that measure 5 feet by $6\frac{1}{2}$ feet. In order to help her to know how much caulk to buy, find the perimeter of the doors.



3. **SOCCER** The dimensions of a field for Men's and Women's NCAA soccer can be no more than 80 yards by 120 yards. If the field has those dimensions what is the perimeter of the field?

4. **FENCING** Mr. Lao is planning to build a rectangular cattle pen that measures 50 feet by 75 feet. Find the total length of fencing that he will need to purchase.

5. **CARPET** Mr. Yuji plans on buying carpet for his bedroom that measures 12 feet by 12 feet. So he will know how much carpet to buy, find the area of his bedroom.

6. **BORDER** Mrs. Jackson is going to put up a wallpaper border along the top of the walls in her dining room. If the dining room measures 16 feet by 12 feet, how much border should she buy?

7. **LOBBY** A hotel lobby measures 40 yards by 60 yards. Find the area and perimeter of the lobby's floor.

8. **MURAL** An artist painted a mural measuring 9 feet by $20\frac{1}{2}$ feet. Find the area and perimeter of the mural.

NAME ____ DATE ______________ PERIOD _____

3-7 Explore Through Reading

SCAS 7-3.2

Functions and Graphs

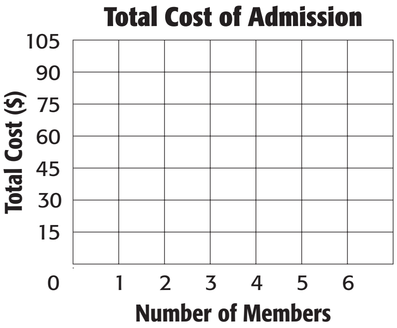
Get Ready for the Lesson

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

1. Complete the function table for the total cost of admission.

Total Cost of Admission		
Number of Members	**15*m***	**Total Cost ($)**
1	15(1)	15
2	15(2)	30
3	15(3)	
4		
5		
6		

2. Graph the ordered pairs (number of members, total cost).



3. Describe how the points appear on the graph.

Read the Lesson

4. Complete each function table.

a.

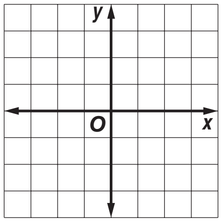
x	$2x - 1$	y
−1		
0		
1		

b.

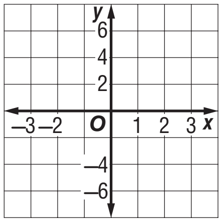
x	$4x$	y
−1		
0		
1		

5. Graph the functions in Exercise 4 above.

a.



b.



Remember What You Learned

6. Draw a picture of a "machine" that shows how a function works. Your picture should illustrate input, a function rule, and output.

NAME ______________________________ DATE ____________ PERIOD _____

3-7 Study Guide

SCAS 7-3.2

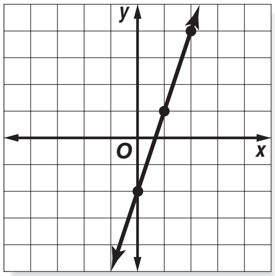
Functions and Graphs

The solution of an equation with two variables consists of two numbers, one for each variable, that make the equation true. The solution is usually written as an ordered pair (*x, y*), which can be graphed. If the graph for an equation is a straight line, then the equation is a linear equation.

Example 1 **Graph $y = 3x - 2$.**

Select any four values for the input x. We chose 3, 2, 0, and −1. Substitute these values for x to find the output y.

x	$3x - 2$	y	(x, y)
2	$3(2) - 2$	4	(2, 4)
1	$3(1) - 2$	1	(1, 1)
0	$3(0) - 2$	−2	(0, −2)
−1	$3(-1) - 2$	−5	(−1, −5)

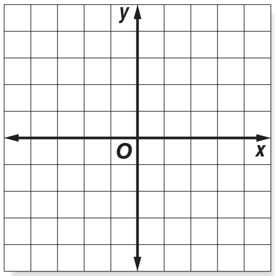


Four solutions are (2, 4), (1, 1), (0, −2), and (−1, −5). The graph is shown at the right.

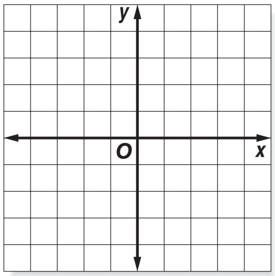
Exercises

Graph each equation.

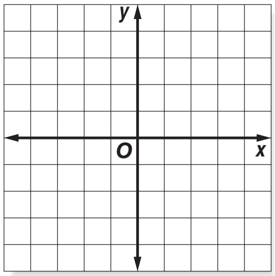
1. $y = x - 1$



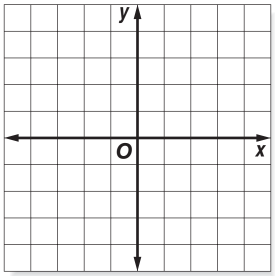
2. $y = x + 2$



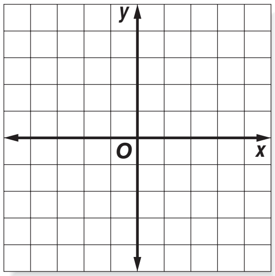
3. $y = -x$



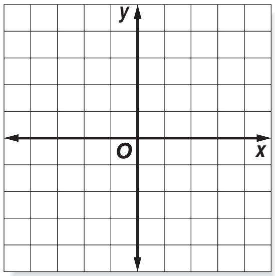
4. $y = 4x$



5. $y = 2x + 4$



6. $y = 2x$



NAME ________________________________ DATE ____________ PERIOD _____

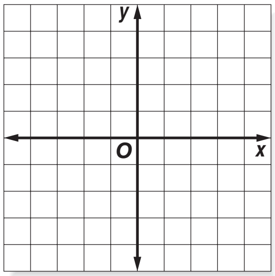
3-7 Homework Practice

SCAS 7-3.2

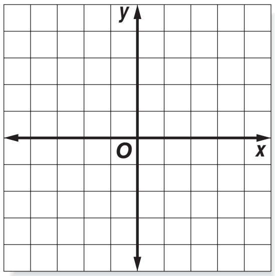
Functions and Graphs

Graph each equation.

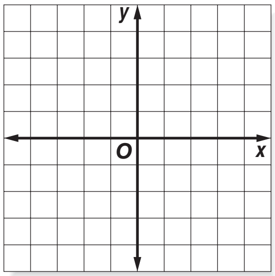
1. $y = x - 2$



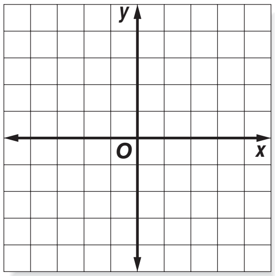
2. $y = -x$



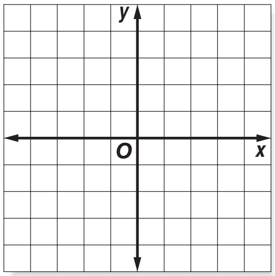
3. $y = 2x - 1$



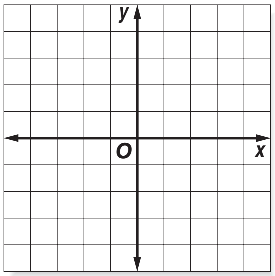
4. $y = 0.75x$



5. $y = x - 0.5.$



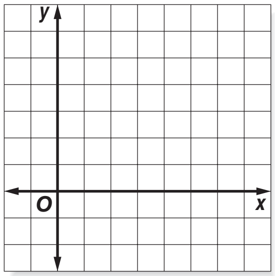
6. $y = 0.5x + 2$



Graph the function represented by each table.

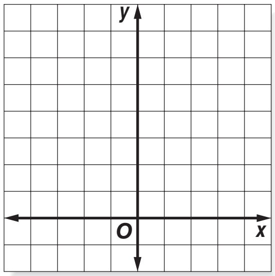
7.

x	y
0	3.5
1	2.5
2	1.5
3	0.5

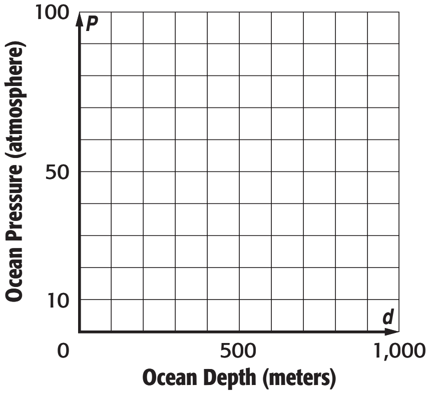


8.

x	y
1	6
0	4.5
−1	3
−2	1.5



9. PRESSURE Ocean pressure increases about one atmosphere for every 10 meters of water depth. This can be represented by the function $p = 0.1d$ where p represents the pressure in atmospheres at a depth d. Represent this function with a graph.



NAME ______________________ DATE ____________ PERIOD _____

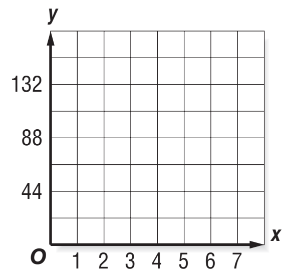
3-7 Problem-Solving Practice

SCAS 7-3.2

Functions and Graphs

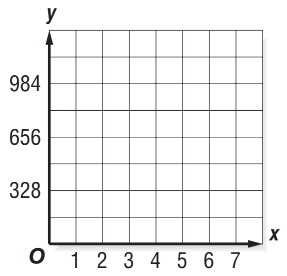
1. TECHNOLOGY The fee for your pager service is $22 per month. Make a function table that shows your total charge for 1, 2, 3, and 4 months of service.

2. TECHNOLOGY Use the information in Exercise 1 to write an equation in which x represents the number of months and y represents the total charge. Then graph the equation.

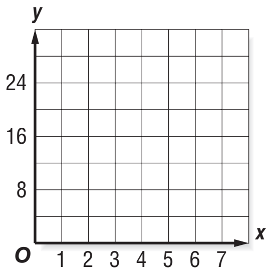


3. TRAINS Between Hiroshima and Kokura, Japan, the bullet train averages a speed of 164 miles per hour, which is the fastest scheduled train service in the world. Make a function table that shows the distance traveled at that speed in 1, 2, 3, and 4 hours.

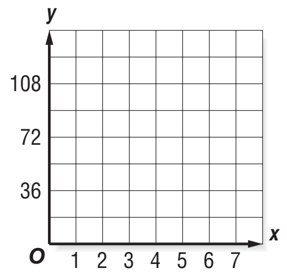
4. TRAINS Use the information in Exercise 3 to write an equation in which x represents the number of hours and y represents the distance. Then graph the equation.



5. GEOMETRY The formula for the volume of a rectangular prism whose base has an area of 8 square units is $V = 8h$, where V is the volume and h is the height. Graph the function.



6. ANIMALS The fastest insect in the world is the dragonfly with a top speed of 36 miles per hour. Write an equation using x to represent hours and y to represent distance. Then graph the equation.



Name Date

Chapter 3 Test

Mastering the SC Standards

1 Hannah solves for b in the equation below. Which choice shows the same equation after Hannah adds 3 to each side?

$$9b - 3 = 24$$

Ⓐ $b - 3 = 6$
Ⓑ $9b = 27$
Ⓒ $b - 3 = 3$
Ⓓ $9b = 18$

7-3.4

---

2 George spends 30 hours each week training for triathlons. He is either at work or training 55 hours a week. If he works the same number of hours each day, Monday through Friday, which equation can be used to find h, the number of hours he spends at work each day?

Ⓐ $h = \frac{55 + 30}{5}$
Ⓑ $h = \frac{55 - 30}{5}$
Ⓒ $h = \frac{55 + 30}{7}$
Ⓓ $h = \frac{55 - 30}{7}$

Review of 6-3.3

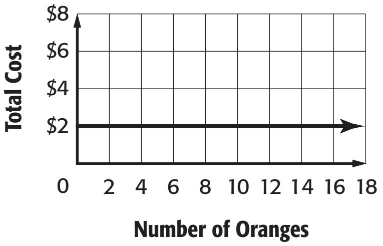
---

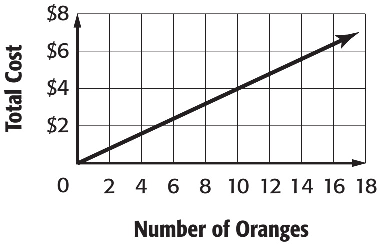
3 What is the value of y in the equation $8y = 56$?

Ⓐ $y = 7$
Ⓑ $y = 8$
Ⓒ $y = 9$
Ⓓ $y = 12$

Review of 6-3.5

4 Oranges can be purchased at a farmer's market in Greenville at a price of 5 for $2. Which graph represents this relationship?

Ⓐ


Ⓑ


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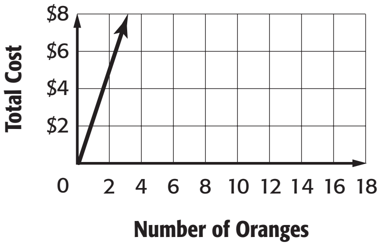

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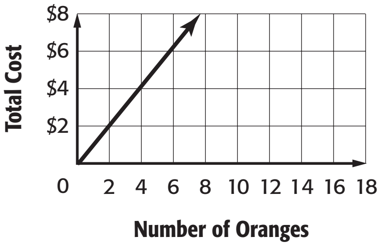


7-3.2

Name Date

Chapter 3 Test (continued)

Mastering the SC Standards

5 Last year, Leon and his mom went camping in the Piedmont region of South Carolina. They counted the number of spotted salamanders, South Carolina's state amphibian, they saw. This year, they went back to the same campsite and counted 7 more salamanders than last year. They counted a total of 18 salamanders this year. To find out how many salamanders they found last year, or s, Leon wrote the equation $s + 7 = 18$. What should Leon do to solve the equation?

Ⓐ Divide both sides of the equation by 7.
Ⓑ Add 7 to both sides of the equation.
Ⓒ Multiply both sides of the equation by 7.
Ⓓ Subtract 7 from both sides of the equation.

Review of 6-3.5

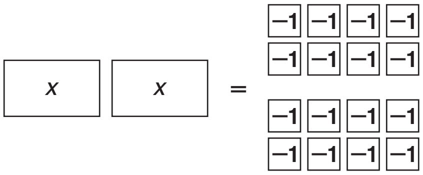
6 Which color printer is the fastest in the table below?

Name of Printer	Printing Speed
Colorific	1 page every 5 seconds
Rainbow	15 pages per minute
Reliable	80 pages every 5 minutes
Smart Copy	400 pages every 30 minutes

Ⓐ Colorific
Ⓑ Rainbow
Ⓒ Reliable
Ⓓ Smart Copy

7-3.2

7 Using the model below, what is the solution to the equation $2x = -16$?



Ⓐ $x = -2$
Ⓑ $x = -4$
Ⓒ $x = -8$
Ⓓ $x = -18$

7-1.4

8 Trinh wants to solve the equation below for x.

$$8x + 5 = 21$$

Which operations can Trinh do to both sides of the equation to find x?

Ⓐ Subtract 5, then divide by 8.
Ⓑ Divide by 8, then add 5.
Ⓒ Subtract 5, then add 8.
Ⓓ Add 5, then multiply by 8.

7-3.4

9 What is the value of t in the equation $3t - 4 = 20$?

Ⓐ $t = 4$
Ⓑ $t = 6$
Ⓒ $t = 8$
Ⓓ $t = 9$

7-3.4

NAME ______________________________ DATE ____________ PERIOD _____

4 Anticipation Guide

Fractions, Decimals, and Percents

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. A composite number is a number with two or more digits.	
	2. A factor tree is used to find the prime factorization of a number.	
	3. The greatest common factor of two prime numbers is 1.	
	4. Two fractions are equivalent only if they have the same numerator and the same denominator.	
	5. A fraction is in simplest form only when the greatest common factor of the numerator and denominator is 1.	
	6. $\frac{1}{2}$ is equivalent to 1.2.	
	7. To write a fraction as a decimal, divide the denominator into the numerator.	
	8. The following are all ratios: 12 out of 65, 12:65, and $\frac{12}{65}$.	
	9. To write $\frac{25}{35}$ as a percent, first you must write the fraction in simplest form.	
	10. Moving a decimal point two places to the right is the same as dividing by 100.	
	11. To find the least common multiple of two numbers, make a list of multiples of both numbers.	
	12. When comparing two fractions, first rewrite the fractions with a common denominator.	

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.

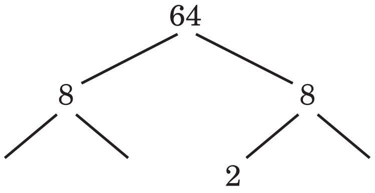
NAME ______________________ DATE ____________ PERIOD _____

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. Use the factor tree started below to help you find the prime factorization of 64.



Which shows the prime factorization of 64?

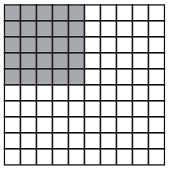
A $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

B 2^5

C $64 \div 6$

D $2 \cdot 2^3$

2. Twenty-five percent is represented on the grid below.



Which fractions are equivalent to 25%?

A $\frac{1}{5}, \frac{2}{10}, \frac{3}{15}$

B $\frac{1}{3}, \frac{2}{6}, \frac{3}{9}$

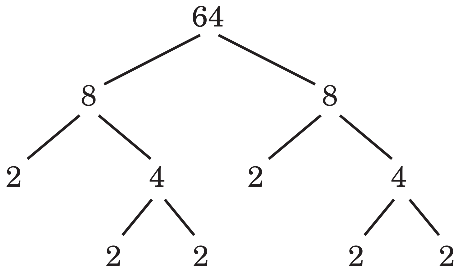
C $\frac{1}{8}, \frac{2}{16}, \frac{3}{24}$

D $\frac{1}{4}, \frac{2}{8}, \frac{3}{12}$

Solution

1. *Hint: Prime factorization is the expression of a number as the product of prime numbers. A prime number is a number that is only divisible by 1 and itself.*

The prime factorization of 64 is shown below.



It can be expressed as $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$ or 2^6.

The answer is **A**.

Solution

2. *Hint: As shown in the shaded region, 25% is $\frac{25}{100}$ or $\frac{1}{4}$, so any fraction that is equivalent to 25% should reduce to $\frac{1}{4}$.* In options A through C, a reduced fraction other than $\frac{1}{4}$ is listed, such as $\frac{1}{5}$, $\frac{1}{3}$, and $\frac{1}{8}$. These options can be eliminated.

Option D contains $\frac{1}{4}$ and two other fractions that can be reduced to $\frac{1}{4}$, so all of the fractions listed are equivalent to 25%.

The answer is **D**.

NAME ______________________ DATE ____________ PERIOD _____

4-3 Study Guide

SCAS **7-6.8,** 7-1.1

Problem-Solving Investigation: Make an Organized List

When solving problems often times it is useful to make an organized list. By doing so you can see all the possible solutions to the problem being posed.

Example 1 LUNCH **Walnut Hills School has a deli line where students are able to select a meat sandwich, a side, and fruit. Meat choices are ham or turkey. The side choices are pretzels or chips. Fruit options are an apple or a pear. How many different combinations are possible?**

Understand You know that students can choose a sandwich, a side, and fruit. There are 2 meat choices, 2 side choices, and 2 fruit choices. You need to find all possible combinations.

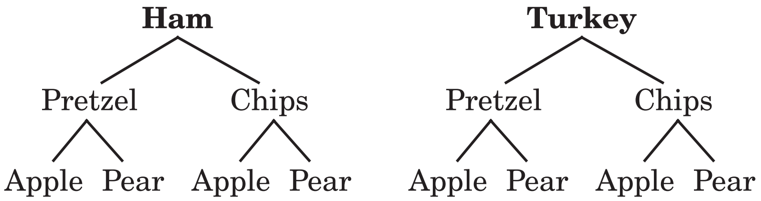
Plan Make an organized list.

Solve

	1	2	3	4	5	6	7	8
Meat	Ham	Ham	Ham	Ham	Turkey	Turkey	Turkey	Turkey
Side	Pretzel	Pretzel	Chips	Chips	Pretzel	Pretzel	Chips	Chips
Fruit	Apple	Pear	Apple	Pear	Apple	Pear	Apple	Pear

There are 8 possibilities.

Check Draw a tree diagram to check the result.



Exercises

1. Susan has 3 shirts; red, blue, and green; 2 pants; jeans and khakis; and 3 shoes; white, black, and tan, to choose from for her school outfit. How many different outfits can she create?

2. The Motor Speedway is awarding money to the first two finishers in their annual race. If there are four cars in the race numbered 1 through 4, how many different ways can they come in first and second?

NAME ____ DATE ______________ PERIOD _____

4-3 Skills Practice

SCAS **7-6.8,** 7-1.1

Problem-Solving Investigation: Make An Organized List

Solve by making an organized list.

1. **BAKING** Virginia and Robert have 1 dozen of each of the following types of cookies: chocolate chip, oatmeal raisin, snickerdoodles, and shortbread. If they want to divide the cookies into packages of two dozen, with one dozen of each of two types of cookie per package, how many different ways can they group the cookies?

2. **NUMBER THEORY** How many different two-digit numbers can be made using the digits 2, 9, 6, and 3?

3. **FOOD** Takanae is ordering lunch at a deli and is trying to decide what she would like on her sandwich. She has her choice of turkey, ham, or roast beef and a choice of cheddar, swiss, or muenster cheese. How many combinations of sandwich could she choose assuming that each sandwich has one type of meat and one type of cheese?

4. **TELEPHONES** How many phone numbers are possible for one area code if the first four numbers are 202-1, in that order, and the last three numbers are 1-7-8 in any order?

5. **CLOTHES** Sheila has four different shirts and two skirts with her on a business trip. How many different outfits can she create?

6. **SPORTS** Juan and Andrew are planning the schedule for a softball tournament. If there are 6 teams, how many different pairings could they make for the first tournament game?

NAME ______________________________ DATE ____________ PERIOD _____

4-3 Homework Practice

SCAS 7-6.8, 7-1.1

Problem-Solving Investigation: Make An Organized List

Mixed Problem Solving

For Exercises 1 and 2, solve each problem by making an organized list.

1. VACATION Kessler, Kacy, and their parents sit in different seats in the car while driving to their grandparents for vacation. If only the parents take turns driving, how many different ways can all four people sit in the car with 2 front and 2 back seats?

2. PIZZA Everyone at the table likes pepperoni, sausage, onions, and black olives on pizza. List the different possibilities of ordering a 2-topping pizza.

Use any strategy to solve Exercises 3–6. Some strategies are shown below.

Problem-Solving Strategies
• Guess and Check. • Work backward. • Make an organized list.

3. NUMBER SENSE A number is increased by 12. When this sum is divided by 3, the result is the original number. What is the number?

4. COINS Three coins are tossed: a quarter, a nickel, and a dime. Complete the table showing the 8 different ways the coins could land by using H for heads and T for tails.

Quarter	H	H						
Nickel	H	H						
Dime	H	T						

5. MEASUREMENT Eight furlongs is equal to one mile. If a mile is 5,280 feet, how many feet are in 5 furlongs?

6. TIME Greg works at the hardware store on weekends. He worked a total of 53 hours during the month of April. How many hours did Greg work during the last weekend in April, if he worked 14 hours, 12 hours, and 15 hours the other weekends?

NAME ______________________________ DATE ____________ PERIOD _____

4-3 Problem-Solving Practice

SCAS 7-6.8, 7-1.1

Problem-Solving Investigation: Make an Organized List

Solve using any method.

1. NUMBER THEORY How many different 2-digit numbers can be made using the digits 3, 7, 8, 9, 2?	**2. MONEY** Raul is shopping and stops at the drug store, grocery and the mall. He spent \$6.99, \$12.49, and \$16.45 at each respective store, and has \$11.20 in his wallet when he returns home. How much money did he have when he began shopping?
3. BIRTH MONTH Renee is comparing her birth month to the birth month of the other girls in her class. Sherry was born two months before Renee, and Angela was born 4 months after Sherry. Corrine was born 3 months before Angela but 1 month after Allison. If Allison was born in July, in what month was Renee born?	**4. PATTERNS** The following numbers form a pattern: 1, 2, 4, 8. What is the fifth number in the sequence?
5. TIME Juanita is trying to get used to waking up earlier in the morning. She wakes up at 8:30 now, but wants to wake up at 7:15. If she wakes up five minutes earlier each morning, how many mornings will it be until she wakes up at 7:15?	**6. MILEAGE** Julie is making a trip by car. Julie knows that her car gets 32 miles per gallon, and holds ten gallons of gasoline. If Julie has $\frac{1}{4}$ of a tank of gas left, how many more miles can she travel before she needs to refuel?
7. CLOTHES Carly is taking a vacation with her family and packs three pairs of shorts and four tops. How many different outfits can she make if she wears each top with each pair of shorts?	**8. FOOD** Carlos is making a fruit salad and wants to use only 2 types of fruit. If he has blueberries, strawberries, grapes, oranges, and bananas on hand, how many combinations could he make?

NAME ______________________________ DATE ____________ PERIOD _____

4-6 Explore Through Reading

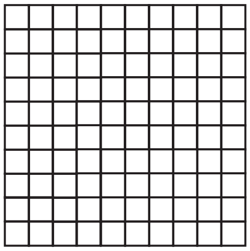
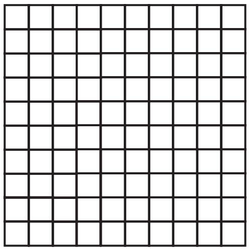
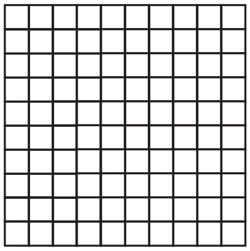
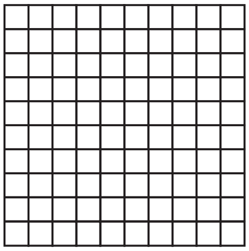
SCAS 7-2.1

Fractions and Percents

Get Ready for the Lesson

Read the introduction at the top of page 202 in your textbook. Write your answers below.

1. For each sport, shade a 10 × 10 grid that represents the number of students that chose the sport.

2. What fraction of the students chose swimming?

Read the Lesson

3. There is more than one way to write a ratio. Write the ratio that compares 4 to 25 in three different ways.

4. Write the ratio in Exercise 3 as a percent.

5. How does having ratios written as percents make it easier to compare amounts?

Remember What You Learned

6. Work with a partner. Explain to your partner how to convert a ratio that does *not* compare a number to 100 as a percent. Then have your partner explain to you how to change from a percent to a fraction in simplest form. Both of you should use examples as well as general explanations.

NAME ______________________________ DATE ____________ PERIOD _____

4-6 Study Guide

SCAS 7-2.1

Fractions and Percents

A **ratio** is a comparison of two numbers by division. When a ratio compares a number to 100, it can be written as a **percent**. To write a ratio or fraction as a percent, find an equivalent fraction with a denominator of 100. You can also use the meaning of percent to change percents to fractions.

Example 1 **Write $\frac{19}{20}$ as a percent.**

$$\begin{tikzcd} \frac{19}{20} \arrow[r, bend left, "\times 5"] \arrow[r, bend right, "\times 5"'] & \frac{95}{100} = 95\% \end{tikzcd}$$

Since 100 ÷ 20 = 5, multiply the numerator and denominator by 5.

Example 2 **Write 92% as a fraction in simplest form.**

$92\% = \frac{92}{100}$ Definition of percent

$= \frac{23}{25}$ Simplify.

Exercises

Write each ratio as a percent.

1. $\frac{14}{100}$

2. $\frac{27}{100}$

3. 34.5 per 100

4. 18 per 100

5. 21:100

6. 96:100

Write each fraction as a percent.

7. $\frac{3}{100}$

8. $\frac{14}{100}$

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

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

11. $\frac{13}{25}$

12. $\frac{4}{10}$

Write each percent as a fraction in simplest form.

13. 35%

14. 18%

15. 75%

16. 80%

17. 16%

18. 15%

NAME ______________________________ DATE ______________ PERIOD _____

4-6 Homework Practice

SCAS 7-2.1

Fractions and Percents

Write each ratio as a percent.

1. 56 out of 100 CDs sold

2. 75 per 100 adults

3. 89.2 out of 100 hours worked

4. 26.5:100 Calories

5. $45\frac{7}{8}$ out of 100 meters

6. $33\frac{1}{3}$:100 minutes

Write each fraction as a percent.

7. $\frac{6}{10}$

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

9. $\frac{21}{25}$

10. $\frac{12}{50}$

11. $\frac{1}{2}$

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

13. $\frac{20}{90}$

14. $\frac{24}{25}$

Write each percent as a fraction in simplest form.

15. 40%

16. 35%

17. 72%

18. 44%

19. 90%

20. 17%

21. 5%

22. 26%

Replace each ● with >, <, or = to make a true sentence.

23. $\frac{1}{10}$ ● 15%

24. $\frac{3}{4}$ ● 72%

25. 85% ● $\frac{17}{20}$

26. $\frac{21}{25}$ ● 21%

27. 27% ● $\frac{27}{50}$

28. $\frac{4}{5}$ ● 60%

29. **SPORTS** If twenty-seven out of every 50 sports fans attend at least one professional game every year, what percent of sports fans attend at least one professional game every year?

30. **WEATHER** It rained 18 days during the month of April. What percent of the days during the month of April did it not rain?

NAME ______________________________ DATE ____________ PERIOD _____

4-6 Problem-Solving Practice

SCAS 7-2.1

Fractions and Percents

1. **LUNCHES** Three out of every 10 students in Mr. Chan's class bring their lunch to school. Write this ratio as a percent.

2. **COMPUTERS** In 2007, 57 out of every 100 school age children (ages 6 to 17 years) had access to a computer both at home and at school. Write this ratio as a percent.

3. **SALES TAX** In one town, the sales tax is 8%. Write this percent as a fraction in simplest form.

4. **HYGIENE** Ms. Agosto surveyed her class and found that 15 out of 30 students brushed their teeth more than twice a day. What percent of students brushed more than twice a day?

5. **DISCOUNT** A local retail store was having a sale and offered all their merchandise at a 25% discount. Write this percent as a fraction in simplest form.

6. **SPACE FLIGHT** About 64% of all individuals who have flown in space from 1961 to 2001 are from the United States. Write this percent as a fraction in simplest form.

NAME ______________________________ DATE ____________ PERIOD _____

4-7 Explore Through Reading

SCAS 7-2.1

Percents and Decimals

Get Ready for the Lesson

Read the introduction at the top of page 206 in your textbook. Write your answers below.

1. Write the percent of students who chose black as a fraction.

2. Write the fraction as a decimal.

3. What do you notice about the percent and decimal forms for students who chose black?

Read the Lesson

4. Describe each step in changing a percent to a decimal.

5. Describe each step in changing a percent to a decimal by first writing the percent as a fraction.

6. Describe how to write a percent as a decimal without writing the percent as a fraction.

Remember What You Learned

7. Work with a partner. Think of a way that will help you remember which way to move the decimal when you go from a percent to a decimal and which way to move it when you go from a decimal to a percent.

NAME ______________________________ DATE ____________ PERIOD _____

4-7 Study Guide

SCAS 7-2.1

Percents and Decimals

To write a percent as a decimal, divide the percent by 100 and remove the percent symbol. To write a decimal as a percent, multiply the decimal by 100 and add the percent symbol.

Example 1 **Write 42.5% as a decimal.**

$42.5\% = \frac{42.5}{100}$ Write the percent as a fraction.

$= \frac{42.5 \times 10}{100 \times 10}$ Multiply by 10 to remove the decimal in the numerator.

$= \frac{425}{1{,}000}$ Simplify.

$= 0.425$ Write the fraction as a decimal.

Example 2 **Write 0.625 as a percent.**

$0.625 = 062.5$ Multiply by 100.

$= 62.5\%$ Add the % symbol.

Exercises

Write each percent as a decimal.

1. 6%

2. 28%

3. 81%

4. 84%

5. 35.5%

6. 12.5%

7. 14.2%

8. 11.1%

Write each decimal as a percent.

9. 0.47

10. 0.03

11. 0.075

12. 0.914

NAME ______________________________ DATE ____________ PERIOD _____

4-7 Homework Practice

SCAS 7-2.1

Percents and Decimals

Write each percent as a decimal.

1. 35%
2. 90%
3. 5%
4. 1%

5. 21.8%
6. 64.8%
7. 4.1%
8. 8.5%

9. $39\frac{21}{50}\%$
10. $17\frac{2}{5}\%$
11. $40\frac{3}{4}\%$
12. $88\frac{3}{5}\%$

Write each decimal as a percent.

13. 0.4
14. 0.8
15. 3.7
16. 9.1

17. 0.77
18. 0.03
19. 0.25
20. 0.59

21. 0.375
22. 0.123
23. 0.005
24. 0.6019

Replace each ● with >, <, or = to make a true sentence.

25. 1.5 ● 15%
26. 0.88 ● 8.8%
27. 33% ● 0.33

28. 90% ● 0.09
29. 0.26 ● 27%
30. 65.4% ● 0.645

ANALYZE TABLES **For Exercises 31–33, use the table and the information given.**

The table lists the approximate milk fat content of 5 types of milk products.

31. Which product has the highest milk fat content?

32. Find the approximate number of grams of milk fat in a 200-gram serving of whole milk.

33. Which milk product will have approximately 15.36 grams of milk fat in an 80-gram serving?

Milk Product	Percent Milk Fat
Heavy Cream	36.7%
Light Cream	19.2%
Whole Milk	3.5%
Low-Fat Milk	1.5%
Skim Milk	0.05%

NAME ______________________________ DATE ____________ PERIOD _____

4-7 Problem-Solving Practice

SCAS 7-2.1

Percents and Decimals

1. **AREA** New Mexico's land area is about 0.03 of the total area of the United States. What percent is New Mexico's land area of the total area of the United States?

2. **SCALE MODEL** A scale model of a building is 0.25 the actual size. What percent of the actual size of the building is the model?

3. **NFL COACHES** Don Shula ranks among the most successful coaches in the National Football League. In his career, he won 0.665 of his games. Write the decimal as a percent.

4. **SOFTBALL** Jenny's batting average is 0.346. Write the decimal as a percent.

5. **VITAMINS** A multiple vitamin contains 450 milligrams of calcium. This is 45% of the recommended daily allowance. Write the percent as a decimal.

6. **BASKETBALL** Tao makes 74% of his free throws. Write the percent as a decimal.

7. **SALES TAX** The sales tax in a town is 7.25%. Write the percent as a decimal.

8. **FIELD TRIP** In Ms. Silver's English class, $20\frac{1}{4}\%$ of the students signed up to visit a local museum. Write the percent as a decimal.

NAME ______________________________ DATE ____________ PERIOD _____

4-9 Explore Through Reading

SCAS 7-2.3

Comparing and Ordering Rational Numbers

Get Ready for the Lesson

Complete the Mini Lab at the top of page 215 in your textbook. Write your answers below.

1. $-\frac{7}{8}, -\frac{3}{8}$

2. $-\frac{5}{8}, -1\frac{1}{8}$

3. $-\frac{13}{8}, -\frac{3}{8}$

4. $-1\frac{7}{8}, -1\frac{5}{8}$

5. $-\frac{1}{2}, -\frac{3}{4}$

6. $1\frac{1}{4}, -1\frac{1}{4}$

7. **MAKE A CONJECTURE** Which number is less: $-\frac{4}{7}$ or $-\frac{6}{7}$? Use a number line to explain your reasoning.

Read the Lesson

8. What are two ways in which you can compare fractions?

9. Complete the table of common fraction-decimal-percent equivalents.

Fraction	Decimal	Percent
$\frac{1}{5}$		20%
	0.6	
$\frac{7}{10}$		
		25%

10. How are the following sets of numbers related: whole numbers, rational numbers, integers?

Remember What You Learned

11. In this lesson you learned about the LCD. What do each of the following abbreviations stand for: LCD, LCM, and GCF? How are the LCD and LCM related?

NAME ______________________ DATE ____________ PERIOD _____

4-9 Study Guide

SCAS 7-2.3

Comparing and Ordering Rational Numbers

To compare fractions, rewrite them so they have the same denominator. The **least common denominator (LCD)** of two fractions is the LCM of their denominators.

Another way to compare fractions is to express them as decimals. Then compare the decimals.

Example 1 **Which fraction is greater, $\frac{3}{4}$ or $\frac{4}{5}$?**

Method 1 Rename using the LCD.

$$\frac{3}{4} = \frac{3 \times 5}{4 \times 5} = \frac{15}{20}$$

$$\frac{4}{5} = \frac{4 \times 4}{5 \times 4} = \frac{16}{20}$$

The LCD is 20.

Because the denominators are the same, compare numerators.

Since $\frac{16}{20} > \frac{15}{20}$, then $\frac{4}{5} > \frac{3}{4}$.

Method 2 Write each fraction as a decimal. Then compare decimals.

$$\frac{3}{4} = 0.75$$

$$\frac{4}{5} = 0.8$$

Since $0.8 > 0.75$, then $\frac{4}{5} > \frac{3}{4}$.

Exercises

Find the LCD of each pair of fractions.

1. $\frac{1}{2}, \frac{1}{8}$

2. $\frac{1}{3}, \frac{3}{4}$

3. $\frac{3}{4}, \frac{7}{10}$

Replace each ● with <, >, or = to make a true sentence.

4. $\frac{1}{2}$ ● $\frac{4}{9}$

5. $\frac{4}{5}$ ● $\frac{8}{10}$

6. $\frac{3}{4}$ ● $\frac{7}{8}$

7. $\frac{1}{2}$ ● $\frac{5}{9}$

8. $\frac{9}{14}$ ● $\frac{10}{17}$

9. $\frac{5}{7}$ ● $\frac{6}{11}$

10. $\frac{8}{17}$ ● $\frac{1}{2}$

11. $\frac{9}{10}$ ● $\frac{17}{19}$

NAME ______________________ DATE ____________ PERIOD _____

4-9 Homework Practice

SCAS 7-2.3

Comparing and Ordering Rational Numbers

Replace each ● with >, <, or = to make a true sentence.

1. $\frac{5}{6}$ ● $\frac{1}{3}$

2. $\frac{4}{5}$ ● $\frac{9}{10}$

3. $\frac{6}{9}$ ● $\frac{4}{6}$

4. $\frac{2}{7}$ ● $\frac{1}{8}$

5. $\frac{15}{21}$ ● $\frac{12}{18}$

6. $\frac{24}{32}$ ● $\frac{36}{48}$

7. $\frac{8}{11}$ ● $\frac{10}{13}$

8. $\frac{14}{15}$ ● $\frac{19}{20}$

9. $4\frac{1}{5}$ ● $4\frac{2}{10}$

10. $7\frac{4}{9}$ ● $7\frac{2}{3}$

11. $1\frac{17}{20}$ ● $1\frac{8}{10}$

12. $9\frac{3}{2}$ ● $9\frac{5}{6}$

13. 50% ● 8 out of 10

14. 0.65 ● 65 out of 100

15. 4 out of 5 ● 75%

16. 1 out of 3 ● 1.3

17. $\frac{2}{3}$ mile ● $\frac{2}{5}$ mile

18. $\frac{7}{10}$ gram ● 0.72 gram

Determine whether each number is rational. Write *yes* or *no*. Explain your reasoning.

19. $\frac{8}{21}$

20. 0.50550555 . . .

21. $1.\overline{142857}$

Order each set of numbers from least to greatest.

22. 63%, $\frac{2}{3}$, 0.65

23. $\frac{7}{8}$, 0.98, 98.5%,

24. 0.2, 2%, $\frac{1}{12}$

25. **BASEBALL** The pitchers for the home team had 12 strikeouts for 32 batters, while the pitchers for the visiting team had 15 strikeouts for 35 batters. Which pitching team had a greater fraction of strikeouts?

26. **TRANSPORTATION** To get to school, 38% of the students ride in the family vehicle, 5 out of 12 students ride on the school bus, and 0.12 of the students ride a bike. Order the types of transportation students use to get to school from least to greatest.

NAME ______________________ DATE ____________ PERIOD _____

4-9 Problem-Solving Practice

SCAS 7-2.3

Comparing and Ordering Rational Numbers

1. **RAIN** The amount of rainfall was measured after a recent storm. The north side of town received $\frac{7}{8}$ inch of rain, and the south side received $\frac{13}{15}$ inch of rain. Which side of town received more rain from the storm?

2. **MOVIES** Because he sees movies at his local theater so often, Delmar is being offered a discount. He can have either $\frac{1}{3}$ off his next ticket or 30% off his next ticket. Which discount should Delmar choose? Explain.

3. **TRACK** Willie runs the 110-meter hurdles in $17\frac{3}{5}$ seconds, and Anier runs it in $17\frac{6}{11}$ seconds. Which runner is faster?

4. **FARMING** Cassie successfully harvested $\frac{7}{12}$ of her crop, and Robert successfully harvested 58% of his crop. Which person successfully harvested the larger portion of his or her crop?

5. **TRANSPORTATION** My-Lien has enough room in her truck to move 3.385 tons of gravel. Her father has asked her to move $3\frac{5}{16}$ tons. Will My-Lien be able to move all of the gravel in only one trip? Explain.

6. **WOOD WORKING** Kishi has a bolt that is $\frac{5}{8}$ inch wide, and she drilled a hole 0.6 inch wide. Is the hole large enough to fit the bolt? Explain.

7. **PIZZA** In a recent pizza-eating contest, Alfonso ate $1\frac{3}{8}$ pizzas, Della ate $1\frac{3}{10}$ pizzas, and Delsin ate $1\frac{4}{9}$ pizzas. Which person won the contest?

8. **STUDYING** For a recent algebra exam, Pat studied $1\frac{8}{15}$ hours, Toni studied $1\frac{11}{20}$ hours, and Morgan studied $1\frac{9}{16}$ hours. List the students in order by who studied the most.

Name Date

Chapter 4 Test

Mastering the SC Standards

1 What is the prime factorization of 180?

Ⓐ $2^2 \times 3^2 \times 3$
Ⓑ $2 \times 3 \times 5$
Ⓒ $2^2 \times 3^2 \times 7$
Ⓓ $2^2 \times 3^2 \times 5$

Review of 6-2.8

2 Which number is equal to $\frac{3}{4}$%?

Ⓐ 0.0075
Ⓑ 0.075
Ⓒ 0.75
Ⓓ 7.5

7-2.1

3 The Piedmont Region in South Carolina makes up about $\frac{1}{3}$ of the area of South Carolina. How can $\frac{1}{3}$ be represented as a decimal rounded to the nearest tenth?

Ⓐ 0.2
Ⓑ 0.3
Ⓒ 0.6
Ⓓ 0.7

Review of 6-2.3

4 Which of the following is a true statement?

Ⓐ $\frac{2}{5} < 0.40 < 40\%$
Ⓑ $\frac{2}{5} = 0.04 = 4\%$
Ⓒ $\frac{2}{5} > 0.40 > 40\%$
Ⓓ $\frac{2}{5} = 0.40 = 40\%$

7-2.3

5 Which symbol correctly compares the numbers below?

$$0.8 \ \square \ \frac{4}{7}$$

Ⓐ >
Ⓑ <
Ⓒ =
Ⓓ +

7-2.3

6 Which of the following percents represents 0.015?

Ⓐ 0.15%
Ⓑ $1\frac{1}{2}$%
Ⓒ 15%
Ⓓ 150%

7-2.1

7 What is the greatest common factor of 24 and 36?

Ⓐ 4
Ⓑ 6
Ⓒ 8
Ⓓ 12

Review of 6-2.8

8 Which number is the best estimate for $\frac{1}{4}$% of 794?

Ⓐ 1
Ⓑ 2
Ⓒ 4
Ⓓ 8

7-2.1

Name Date

Chapter 4 Test (continued)

Mastering the SC Standards

9 Meiko and Ella went bird watching for Carolina Wrens, South Carolina's state bird. Out of the 8 birds Meiko saw, 2 were Carolina Wrens. One out of the 3 birds Ella saw was a Carolina Wren. When the girls added the fractional amounts of Carolina Wrens that they saw, they got $\frac{14}{24}$. Which fraction shows their answer in simplest form?

Ⓐ $\frac{1}{2}$

Ⓑ $\frac{2}{3}$

Ⓒ $\frac{7}{12}$

Ⓓ $\frac{7}{24}$

Review of 6-2.8

10 A painting company is painting 4 different houses. They have completed $\frac{5}{8}$, $\frac{1}{4}$, $\frac{3}{4}$, and $\frac{3}{8}$ of the work on the houses. Which list shows the percentage of work completed on the houses in order from least to greatest?

Ⓐ 25%, 40%, 60%, 75%

Ⓑ 75%, 62.5%, 37.5%, 25%

Ⓒ 0.25%, 0.375%, 0.625%, 0.75%

Ⓓ 25%, 37.5%, 62.5%, 75%

7-2.1

11 Carlos wants to find $\frac{1}{2}$% of 404. Which number is the best estimate for his answer?

Ⓐ 0.5

Ⓑ 1

Ⓒ 2

Ⓓ 4

7-2.1

12 Which symbol correctly compares the numbers below?

$$30\% \ \square \ \frac{2}{5}$$

Ⓐ >

Ⓑ <

Ⓒ =

Ⓓ +

7-2.3

13 Which of the following is a true statement?

Ⓐ $\frac{6}{8} > 0.66 > 60\%$

Ⓑ $\frac{6}{8} = 0.66 = 6\%$

Ⓒ $\frac{6}{8} < 0.66 < 60\%$

Ⓓ $\frac{6}{8} = 0.66 = 60\%$

7-2.3

NAME ______________________________ DATE ____________ PERIOD _____

5 Anticipation Guide

Applying 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. To estimate a problem containing mixed numbers, round to the nearest whole number.	
	2. $\frac{2}{7}$ would round up to 1.	
	3. The sum of two fractions with like denominators can be found by adding the numerators and keeping the denominator the same.	
	4. The difference of $\frac{5}{13}$ and $\frac{1}{8}$ is $\frac{4}{5}$.	
	5. To subtract $2\frac{4}{5}$ from $4\frac{4}{5}$, $4\frac{4}{5}$ can be renamed $3\frac{12}{5}$.	
	6. When answering multiple choice questions, estimation can help eliminate answers that are not reasonable.	
	7. To multiply two fractions with different denominators, first find a common denominator.	
	8. Before finding a product of two mixed numbers, rewrite the mixed numbers as improper fractions.	
	9. To solve $\frac{d}{5} = 8$, multiply both sides of the equation by 5.	
	10. To divide two fractions, multiply their reciprocals.	

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 piece of paper to write an example of why you disagree. Use examples, if possible.

NAME ______________________________ DATE ____________ PERIOD _____

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. Ernesto is baking a double batch of cookies. To do this, he must first figure out how much of each ingredient to use since his recipe is only written for a single batch of cookies. The recipe calls for $3\frac{3}{4}$ cups of flour and $1\frac{1}{3}$ cups of sugar. How much flour and sugar will Ernesto need to make the double batch of cookies?

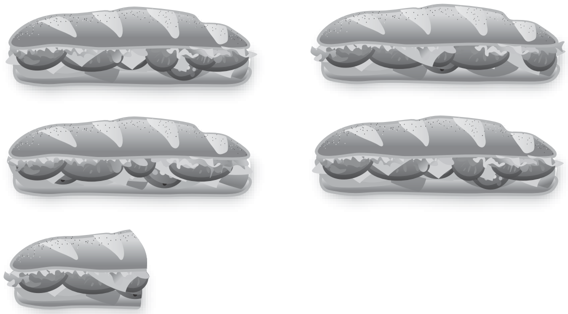
A $7\frac{1}{2}$ cups of flour and $2\frac{2}{3}$ cups of sugar

B $6\frac{6}{8}$ cups of flour and $2\frac{2}{6}$ cups of sugar

C $3\frac{3}{4}$ cups of flour and $3\frac{2}{3}$ cups of sugar

D $6\frac{6}{4}$ cups of flour and $2\frac{2}{3}$ cups of sugar

2. Nicole has $4\frac{1}{2}$ six-inch subs to share with her friends. She is going to share equal parts of the subs with her 8 friends, leaving no leftovers. Use the graphic below to figure out how much each girl will get.



How many inches of sub will each girl get?

A 2 in.

B 3 in.

C 4 in.

D 5 in.

Fold here.

Solution

1. *Hint: When you multiply fractions by a whole number, the result may be greater than 1.*

If you double $3\frac{3}{4}$, the result is: $3 \times 2 = 6$ and $\frac{3}{4} \times 2 = \frac{6}{4}$ or $1\frac{1}{2}$.

Adding, he will need $7\frac{1}{2}$ cups of flour.

For the sugar, $1 \times 2 = 2$ and $\frac{1}{3} \times 2 = \frac{2}{3}$, so he will need $2\frac{2}{3}$ cups of sugar.

The answer is **A.**

Solution

2. *Hint: Nicole is sharing with her 8 friends, but don't forget that Nicole is going to be eating the sandwich, too!*

From the graphic, there are $6 \times 4 + 3$, or 27 inches of sandwich to be shared. There are nine girls eating the sadwich (Nicole plus her 8 friends), so each girl will get $27 \div 9$, or 3 inches of sandwich.

OR

If you divide each whole sub in half, there are 9 equal pieces −1 per girl. Each is three inches long.

The answer is **B.**

NAME ______________________________ DATE ____________ PERIOD _____

5-1 Explore Through Reading

SCAS 7-2.2, 7-1.5

Estimating with Fractions

Get Ready for the Lesson

Read the introduction at the top of page 230 in your textbook. Write your answers below.

1. Graph $9\frac{1}{4}$ on a number line. To the nearest whole number, how long is an American Bison?

2. Graph $3\frac{3}{4}$ on a number line. To the nearest whole number, how long is a dingo?

3. About how much longer is an American Bison than a dingo?

Read the Lesson

4. Which operation does each of the following math words indicate?

sum
product

difference
quotient

5. Write a definition of the math term *mixed number*. Then give an example of a mixed number.

6. All of the sums, products, differences, and quotients in the examples in this lesson use the word *about*. Why is the word *about* used? Why is it important to include the word *about* in these answers?

Remember What You Learned

7. Explain what compatible numbers are and how they are useful. Give an example.

NAME ______________________ DATE ____________ PERIOD _____

5-1

Study Guide

SCAS **7-2.2,** 7-1.5

Estimating with Fractions

Use rounding to estimate with fractions.

Estimating: For mixed numbers, round to the nearest whole number.

$4\frac{1}{6} + 3\frac{7}{8} \rightarrow 4 + 4 = 8$

$4\frac{1}{6} + 3\frac{7}{8}$ is *about* 8.

For fractions, round to 0, $\frac{1}{2}$, or 1.

$\frac{11}{12} - \frac{4}{9} \rightarrow 1 - \frac{1}{2} = \frac{1}{2}$

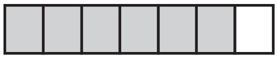
$\frac{11}{12} - \frac{4}{9}$ is *about* $\frac{1}{2}$.

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

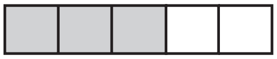
$2\frac{2}{3} \times 4\frac{1}{4} \rightarrow 3 \times 4 = 12$

The product is *about* 12.

Example 2 **Estimate $\frac{6}{7} - \frac{3}{5}$.**



$\frac{6}{7}$ is about 1.



$\frac{3}{5}$ is about $\frac{1}{2}$.

$\frac{6}{7} - \frac{3}{5} \rightarrow 1 - \frac{1}{2} = \frac{1}{2}$ The difference is *about* $\frac{1}{2}$.

Exercises

Estimate.

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

2. $2\frac{1}{6} \times 3\frac{2}{3}$

3. $\frac{7}{12} - \frac{1}{10}$

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

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

6. $\frac{5}{9} \times \frac{13}{14}$

7. $\frac{1}{6} \div \frac{8}{9}$

8. $\frac{6}{7} \div \frac{9}{10}$

9. $13\frac{4}{5} \div 1\frac{7}{8}$

10. $12\frac{1}{4} \div 5\frac{7}{8}$

NAME ______________________________ DATE ______________ PERIOD _____

5-1 Homework Practice

SCAS 7-2.2, 7-1.5

Estimating with Fractions

Estimate.

1. $7\frac{1}{6} + 5\frac{8}{9}$

2. $4\frac{2}{10} + 1\frac{1}{2}$

3. $\frac{11}{13} - \frac{15}{16}$

4. $6\frac{4}{5} \cdot 3\frac{2}{7}$

5. $\frac{6}{11} - \frac{1}{5}$

6. $8\frac{1}{4} \div 3\frac{7}{8}$

7. $\frac{1}{8} \div \frac{17}{20}$

8. $\frac{5}{8} \cdot \frac{9}{10}$

9. $9\frac{14}{15} - 2\frac{3}{4}$

10. $5\frac{3}{5} \div \frac{5}{6}$

11. $\frac{10}{11} \cdot 1\frac{1}{9}$

12. $4\frac{1}{14} + 5\frac{7}{8}$

13. $5\frac{1}{9} + 1\frac{6}{7} + \frac{5}{6}$

14. $4\frac{9}{10}\left(2\frac{1}{3} + \frac{7}{8}\right)$

15. $3\frac{1}{5}\left(7\frac{2}{3} - 1\frac{8}{9}\right)$

Estimate using compatible numbers.

16. $\frac{1}{5} \cdot 44$

17. $\frac{1}{7} \cdot 29$

18. $33\frac{1}{10} \div 4\frac{1}{3}$

19. $\frac{1}{8} \cdot 62$

20. $20\frac{5}{6} \div 6\frac{2}{5}$

21. $19\frac{4}{5} \div 8\frac{2}{3}$

ANALYZE TABLES **For Exercises 22–24, use the following information and the table shown.**

For a recent year, the table shows the approximate number of dollars spent in each category by consumers in Kansas City for every $100 spent.

Expenditure	Dollars Spent for Every $100 Spent
Apparel	$3\frac{7}{10}$
Health Care	$5\frac{3}{5}$
Entertainment	$5\frac{3}{10}$

22. About how many dollars are spent on apparel and entertainment for every $100 spent?

23. What is the approximate difference in spending for health care and entertainment for every $100 spent?

24. What is the approximate amount of money spent for all three areas for every $100 spent?

NAME ______________________________ DATE ____________ PERIOD _____

5-1 Problem-Solving Practice

SCAS 7-2.2, 7-1.5

Estimating with Fractions

COOKING For Exercises 1–4, use the recipe shown below.

Lightning Creamed Potatoes
$\frac{1}{3}$ cup water
$1\frac{1}{2}$ teaspoon salt
$3\frac{3}{4}$ cups pared potatoes, cut in bite-size pieces
$\frac{1}{3}$ cup finely chopped onion
$\frac{1}{2}$ cup light cream

serves 6

1. Daniel wants to serve twelve people the Lightning Creamed Potatoes. Estimate how much salt he will need if he doubles the recipe.

2. Rosita wants to triple the recipe above. Estimate how many cups of pared potatoes she will need.

3. Alvin is going to serve six people. He only has $1\frac{1}{4}$ cups of pared potatoes. About how many cups of potatoes will he have to borrow?

4. Katrina wants to make half of the recipe. About how many cups of potatoes will she need?

5. **CARPENTRY** A board is $17\frac{3}{4}$ inches long. Carmen wants to shorten the length by about $1\frac{7}{8}$ inches. Estimate the length of the board after the board has been shortened.

6. **TRACK** Akira ran two miles. He ran the first mile in $7\frac{3}{4}$ minutes and the second mile in $8\frac{3}{4}$ minutes. Estimate how long it took Akira to run two miles.

NAME ______________________________ DATE ______________ PERIOD _____

5-4 Study Guide

SCAS 7-1.2

Problem-Solving Investigation: Eliminate Possibilities

By **eliminating possibilities** when problem solving, you can methodically reduce the number of potential answers.

Example

Joan has $20 to spend on her sister for her birthday. She has already bought her a DVD for $9.75. There are three shirts that she likes which cost $8.75, $10.00, and $11.00. Which shirt should she buy so that she spends most of her money without going over $20?

Understand	You know that the total amount of money she has to spend must be $20 or less.
Plan	Eliminate answers that are not reasonable.
Solve	She couldn't spend $11.00 because $9.75 + $11.00 = $20.75. So eliminate that choice. Now check $10.00 $9.75 + 10.00 = $19.75 Since this is less than $20, this is the correct choice. She should buy her sister the $10.00 shirt.
Check	By buying the $8.75 shirt, she would only spend a total of $9.75 + $8.75 = $18.50. This is less than the $20 minimum, but not the most she could possibly spend.

Exercises

Solve the following problems by eliminating possibilities first.

1. **TELEPHONE** Susan talked on her cellular telephone for 120 minutes last month. Her plan charges her a $15.00 fee per month plus $0.10 a minute after the first 60 minutes, which are included in the $15 fee. What was her total bill for last month?

A. $12.00 B. $27.00 C. $21.00 D. $6.00

2. **HOME SALES** 450 homes sold in your area in the last year. What number shows a good estimate of the number of homes sold per month?

A. 38 homes B. 32.5 homes C. 2 homes D. 45 homes

3. **CAR SALES** Derrick sells cars for a living. He sells an average of 22 cars a month. What will his total average car sales be in 5 years?

A. 110 cars B. 264 cars C. 1320 cars D. 27 cars

4. **TELEVISION** Myra is allowed to watch 6 hours of television on a weekend. She watched $2\frac{1}{2}$ hours this morning. How much television will she be allowed to watch at most this afternoon?

A. 4 hours B. $4\frac{1}{2}$ hours C. $2\frac{1}{2}$ hours D. 3 hours

NAME ______________________________ DATE ____________ PERIOD _____

5-4 Skills Practice

SCAS 7-1.2

Problem-Solving Investigation: Eliminate Possibilities

Eliminate possibilities to solve.

1. **CELL PHONES** Justin has a cell phone plan that costs \$25 per month plus \$0.05 per minute for each minute he talks. How much will it cost Justin for the month of March if he talked for 120 minutes?

A \$25

B \$25.05

C \$31

D \$22

2. **PUPPIES** A puppy gains weight at a rate of 1.5 pounds every two weeks for the first 6 months after it is born. If Sam's puppy weighs 6 pounds right now, how much will it weigh six weeks from now?

F 6 pounds

G 10.5 pounds

H 15 pounds

J 13 pounds

3. **RECIPES** Ryan needs $3\frac{1}{4}$ cups of flour for the cookie recipe she is baking. She has already added $2\frac{1}{2}$ cups of flour. How much more flour does she need to add?

A $2\frac{1}{2}$ cups

B 1 cup

C $3\frac{1}{4}$ cups

D $\frac{3}{4}$ cup

4. **HOMEWORK** Jordan does 30 minutes of homework per day. How many hours of homework does she do in one week?

F $3\frac{1}{2}$ hours

G 2 hours

H $\frac{1}{2}$ hour

J 3 hours

5. **FENCING** A rectangular garden is surrounded by a fence. The length of the garden is $3\frac{1}{2}$ feet and the width of the garden is $1\frac{1}{2}$ feet. How much fencing must be used to surround the garden?

A 5 feet

B $3\frac{1}{2}$ feet

C 10 feet

D $1\frac{1}{2}$ feet

6. **PARTIES** The 6th grade class is renting the pool at the recreation center for a holiday party. It costs \$75 plus \$1.50 per person to rent the pool. How much will it cost to rent the pool if 120 people plan on attending?

F \$76.50

G \$195

H \$255

J \$120

NAME ______________________________ DATE ____________ PERIOD _____

5-4 Homework Practice

SCAS 7-1.2

Problem-Solving Investigation: Eliminate Possibilities

Mixed Problem Solving

Eliminate the possibilities to solve Exercises 1 and 2.

1. **STAIRCASE** A staircase has 14 steps between floors. If the second floor is 10 feet above the first floor, what is the approximate height of each step of the staircase?

A 2 inches
C 9 inches
B 12 inches
D 15 inches

2. **NEWSPAPER** Mr. Kemper delivers the morning newspaper to about 500 customers each day. About how many newspapers does he deliver in a month?

F 50
H 500
G 5,000
J 15,000

Use any strategy to solve Exercises 3 and 4. Some strategies are shown below.

Problem-Solving Strategies
• Look for a pattern. • Choose the method of computation. • Eliminate possibilities.

3. **PATTERNS** What are the next three fractions in the pattern?

$$\frac{1}{12}, \frac{1}{6}, \frac{1}{4}, \frac{1}{3}, \frac{5}{12}, \ldots$$

4. **OFFICE SUPPLIES** Printer ink costs $23.42 per cartridge if bought separately. If bought by the case of 24 cartridges, the cost per cartridge is only $19.53. About how much is the difference in cost of buying 4 cases than buying the same number of cartridges separately?

A $4
C $84
B $374
D $1,550

Select the Operation

For Exercises 5 and 6, select the appropriate operation(s) to solve the problem. Justify your selection(s) and solve the problem.

5. **YARDWORK** David mowed $\frac{3}{10}$ of the yard while his brother mowed $\frac{1}{4}$ of it. What fraction of the yard still needs to be mowed?

6. **DOGS** On average, dogs require about 35 Calories per pound of body weight per day. The Parkers own three dogs that weigh 22 pounds, 34 pounds, and 9 pounds. What is the total Calorie requirement for the dogs each day?

NAME ______________________ DATE ____________ PERIOD _____

5-4 Problem-Solving Practice

SCAS 7-1.2

Problem-Solving Investigation: Eliminate Possibilities

Solve each problem using any strategy you have learned.

1. SHOPPING Jillian has \$125 to buy school clothes. She bought a sweater for \$45, two pairs of jeans for \$35 each, and 2 headbands that cost \$1.50 each. If socks are \$3.00 per pack, how many packs can she buy?

2. PATTERNS List the next three terms in the sequence.

21, 24, 27,…

3. CAKE Libby ate $\frac{1}{4}$ of her birthday cake and Scott ate $\frac{1}{3}$ of her birthday cake. The rest was wrapped up and sent home with the Thomas family. What fraction of the cake was sent home with the Thomas family?

4. SNACKS Jesse eats an apple every day after school. On weekends, he eats 2 apples each day. How many apples does Jesse eat in one week where he goes to school for five days and is at home for two days on the weekend?

A 7 apples **C** 14 apples

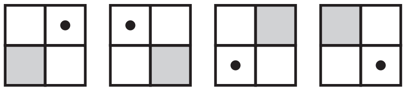
B 5 apples **D** 9 apples

5. LEMONADE Amber is making lemonade for her Yearbook Club meeting. She wants to have $4\frac{1}{2}$ gallons and has already made $3\frac{1}{4}$ gallons. How much more does she have to make?

F $3\frac{1}{4}$ gallons **H** $4\frac{1}{2}$ gallons

G $1\frac{1}{4}$ gallons **J** 2 gallons

6. GEOMETRY Draw the next two figures in the pattern.



7. ROLLER COASTERS A roller coaster has a weight limit of 500 pounds. If a group of teenagers is waiting to ride the roller coaster and the average weight of the teens is 140 pounds, how many can ride the roller coaster?

8. WORK The table below shows the number of hours Antoine has worked this week. If he wants to work a total of 25 hours, how many hours does he need to work on Saturday?

Day	Hours
Sunday	8
Monday	3
Tuesday	2
Wednesday	3
Thursday	0
Friday	4

NAME ______________________________ DATE ____________ PERIOD _____

5-5 Explore Through Reading

SCAS 7-2.9

Multiplying Fractions and Mixed Numbers

Get Ready for the Lesson

Read the introduction at the top of page 252 in your textbook.
Write your answers below.

1. How many students ordered cheese?

2. What fraction of students at the lunch table ordered a cheeseburger?

3. How are the numerators and denominators of $\frac{2}{3}$ and $\frac{1}{2}$ related to the fraction in Exercise 2?

Read the Lesson

4. What is the rule for multiplying fractions? Give an example.

5. What does GCF stand for? How is it helpful in the multiplication of fractions? Give an example.

Remember What You Learned

6. In this lesson, you learned two methods to multiply mixed numbers. Work with a partner and describe how to use one of the methods to find $\frac{3}{5} \times 3\frac{2}{3}$. Have your partner describe how to use the other method to find the result.

NAME ______________________________ DATE ____________ PERIOD _____

5-5 Study Guide

SCAS 7-2.9

Multiplying Fractions and Mixed Numbers

To multiply fractions, multiply the numerators and multiply the denominators.

$$\frac{5}{6} \times \frac{3}{5} = \frac{5 \times 3}{6 \times 5} = \frac{15}{30} = \frac{1}{2}$$

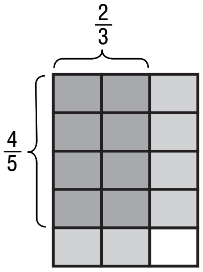
To multiply mixed numbers, rename each mixed number as a fraction. Then multiply the fractions.

$$2\frac{2}{3} \times 1\frac{1}{4} = \frac{8}{3} \times \frac{5}{4} = \frac{40}{12} = 3\frac{1}{3}$$

Example 1 **Find $\frac{2}{3} \times \frac{4}{5}$. Write in simplest form.**

$\frac{2}{3} \times \frac{4}{5} = \frac{2 \times 4}{3 \times 5}$ ← Multiply the numerators. ← Multiply the denominators.

$= \frac{8}{15}$ Simplify.



Example 2 **Find $\frac{1}{3} \times 2\frac{1}{2}$. Write in simplest form.**

$\frac{1}{3} \times 2\frac{1}{2} = \frac{1}{3} \times \frac{5}{2}$ Rename $2\frac{1}{2}$ as an improper fraction, $\frac{5}{2}$.

$= \frac{1 \times 5}{3 \times 2}$ Multiply.

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

Exercises

Multiply. Write in simplest form.

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

2. $\frac{1}{2} \times \frac{7}{8}$

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

4. $\frac{5}{9} \times 4$

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

6. $3\frac{3}{4} \times 1\frac{1}{6}$

7. $\frac{3}{4} \times 1\frac{2}{3}$

8. $3\frac{1}{3} \times 2\frac{1}{2}$

9. $4\frac{1}{5} \times \frac{1}{7}$

10. $\frac{7}{5} \times 8$

11. $2\frac{1}{3} \times \frac{4}{6}$

12. $\frac{1}{8} \times 2\frac{3}{4}$

NAME ______________________________ DATE ____________ PERIOD _____

5-5 Homework Practice

SCAS 7-2.9

Multiplying Fractions and Mixed Numbers

Multiply. Write in simplest form.

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

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

3. $10 \times \frac{1}{3}$

4. $\frac{5}{8} \times 7$

5. $\frac{1}{7} \times \frac{7}{9}$

6. $\frac{6}{11} \times \frac{1}{6}$

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

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

9. $\frac{3}{8} \times \frac{8}{9}$

10. $\frac{4}{7} \times \frac{21}{32}$

11. $\frac{5}{8} \times \frac{18}{25}$

12. $\frac{20}{21} \times \frac{3}{5}$

13. $3\frac{1}{5} \times \frac{3}{8}$

14. $\frac{2}{3} \times 4\frac{1}{3}$

15. $15 \times 2\frac{2}{5}$

16. $5\frac{1}{2} \times 4$

17. $8 \times 3\frac{3}{8}$

18. $10 \times 1\frac{1}{15}$

19. $5\frac{1}{4} \times 4\frac{2}{3}$

20. $2\frac{2}{7} \times 1\frac{1}{8}$

For Exercises 21 and 22, use measurement conversions.

21. Find $\frac{1}{10}$ of $\frac{1}{100}$ of a meter.

22. Find $\frac{1}{60}$ of $\frac{1}{60}$ of an hour.

For Exercises 23–25, evaluate each verbal expression.

23. one-fourth of two-thirds

24. three-fifths of one-sixth

25. two-fifths of one-half

26. **GASOLINE** Jamal filled his gas tank and then used $\frac{7}{16}$ of the tank for traveling to visit his grandfather. He then used $\frac{1}{3}$ of the remaining gas in the tank to run errands around town. What fraction of the tank is filled with gasoline?

27. **HIKING** A hiker averages $6\frac{3}{8}$ kilometers per hour. If he hikes for $5\frac{1}{3}$ hours, how many kilometers did he hike?

ALGEBRA Evaluate each expression if $x = 3\frac{1}{3}$, $y = 4\frac{5}{6}$, and $z = 2$.

28. $x \times z - y$

29. $y \times z + x$

30. $3yz$

NAME ______________________________ DATE ____________ PERIOD _____

5-5 Problem-Solving Practice

SCAS 7-2.9

Multiplying Fractions and Mixed Numbers

1. **POPULATION** If $\frac{4}{5}$ of the population of a certain town is considered to be middle class and the population of the town is 2,000, how many people are considered middle class?

2. **READING** Robin has read $\frac{3}{4}$ of a book. Mark said he had read $\frac{1}{2}$ as much as Robin. What fraction of the book has Mark read?

3. **RADIO** A radio station spends $\frac{1}{40}$ of each 24 hours on public service announcements. How much time is spent on public service announcements each day?

4. **SALE** A bicycle is on sale for $\frac{2}{3}$ of its original price. If the original price is \$354, what is the sale price?

5. **STUDENT POPULATION** One sixth of the students at a local college are seniors. The number of freshmen students is $2\frac{1}{2}$ times that amount. What fraction of the students are freshmen?

6. **SEWING** Anna wants to make 4 sets of curtains. Each set requires $5\frac{1}{8}$ yards of fabric. How much fabric does she need?

7. **RUNNING** It takes Awan $8\frac{1}{3}$ minutes to run one mile. It takes Kate $1\frac{1}{5}$ times longer. How long does it take Kate to run one mile?

8. **STOCK** Carl bought some stock at \$25 a share. The stock increased to $1\frac{1}{2}$ times its value. How much is the stock per share?

NAME ______________________________ DATE ______________ PERIOD _____

5-6 Explore Through Reading

SCAS 7-3.4

Algebra: Solving Equations

Get Ready for the Lesson

Read the introduction at the top of page 258 in your textbook. Write your answers below.

1. Write a multiplication expression to find how much time Shawnda spends doing homework. Then find the product.

2. Complete the table below.

$\frac{3}{2} \times \frac{2}{3} =$ ____	$\frac{1}{5} \times$ ■ $= 1$ ____	$\frac{5}{6} \times \frac{6}{5} =$ ■ ____	$\frac{7}{8} \times \frac{8}{7} =$ ■ ____
■ $\times \frac{5}{7} = 1$ ____	$\frac{2}{6} \times \frac{6}{2} =$ ____	$\frac{7}{1} \times$ ■ $= 1$ ____	■ $\times 8 = 1$ ____

3. What is true about the numerators and denominators in the fractions in Exercise 2?

Read the Lesson

4. Write the Multiplication Property of Equality.

5. When the coefficient of x in an equation is a fraction, explain how the reciprocal, or multiplicative inverse, of the coefficient is used to solve the equation.

Remember What You Learned

6. The word *inverse* comes from a Latin verb that means “to turn upside down.” How does this definition relate to the content of this lesson?

NAME ________________________________ DATE ______________ PERIOD _____

5-6 Study Guide

SCAS 7-3.4

Algebra: Solving Equations

Multiplicative inverses, or **reciprocals,** are two numbers whose product is 1.To solve an equation in which the coefficient is a fraction, multiply each side of the equation by the reciprocal of the coefficient.

Example 1 **Find the multiplicative inverse of $3\frac{1}{4}$.**

$3\frac{1}{4} = \frac{13}{4}$	Rename the mixed number as an improper fraction.
$\frac{13}{4} \cdot \frac{4}{13} = 1$	Multiply $\frac{13}{4}$ by $\frac{4}{13}$ to get the product 1.

The multiplicative inverse of $3\frac{1}{4}$ is $\frac{4}{13}$.

Example 2 **Solve $\frac{4}{5}x = 8$. Check your solution.**

$\frac{4}{5}x = 8$	Write the equation.
$\left(\frac{5}{4}\right)\frac{4}{5}x = \left(\frac{5}{4}\right)8$	Multiply each side by the reciprocal of $\frac{4}{5}$, $\frac{5}{4}$.
$x = 10$	Simplify.

The solution is 10.

Exercises

Find the multiplicative inverse of each number.

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

2. $\frac{12}{13}$

3. $-\frac{15}{4}$

4. $6\frac{1}{7}$

Solve each equation. Check your solution.

5. $\frac{3}{5}x = 12$

6. $16 = \frac{10}{3}a$

7. $\frac{c}{2} = 7$

8. $\frac{15}{7}y = 3$

9. $\frac{m}{6} = -4$

10. $\frac{14}{3} = -\frac{7}{9}b$

NAME ______________________________ DATE ____________ PERIOD _____

5-6 Homework Practice

SCAS 7-3.4

Algebra: Solving Equations

Find the multiplicative inverse of each number.

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

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

3. $\frac{1}{9}$

4. $\frac{1}{12}$

5. 4

6. 15

7. $4\frac{1}{3}$

8. $5\frac{4}{5}$

Solve each equation. Check your solution.

9. $\frac{a}{8} = 5$

10. $15 = \frac{y}{2}$

11. $\frac{h}{3.1} = 7$

12. $1 = \frac{x}{6.3}$

13. $0.9 = \frac{m}{2.5}$

14. $\frac{t}{5.4} = 9$

15. $\frac{3}{7}g = 9$

16. $28 = \frac{4}{5}d$

17. $\frac{3}{8}n = \frac{1}{4}$

18. $\frac{2}{5} = \frac{4}{5}c$

19. $\frac{2}{3}z = 4\frac{1}{4}$

20. $\frac{5}{6}b = 1\frac{7}{8}$

21. $\frac{p}{-4} = 7$

22. $-3 = \frac{w}{-5}$

23. $27.3 = \frac{3}{4}y$

24. $\frac{4}{7}x = -1.6$

25. **DRAWING** An architect needs to make a scale drawing of a home. The width w of the home in the drawing, in inches, is given by the equation $\frac{w}{0.6} = 9.5$. What is the width of the home in the scale drawing?

26. **VOLUNTEERS** At a local shelter, 36 people volunteered to help prepare meals for disaster victims. If this represented $\frac{9}{16}$ of the volunteers at the shelter, write and solve an equation to determine how many volunteers helped at the local shelter.

NAME ______________________________ DATE ____________ PERIOD _____

5-6 Problem-Solving Practice

SCAS 7-3.4

Algebra: Solving Equations

1. **BIKING** The speed s that Brandon can ride his bike if he rides $\frac{3}{5}$ of an hour and travels 4 miles is given by the equation $4 = \frac{3}{5}s$. What is Brandon's speed?

2. **BAND** The woodwind section of the middle school band makes up $\frac{1}{4}$ of the band. There are 9 members in the woodwind section. Use the equation $\frac{1}{4}m = 9$ to find the number of members m in the band.

3. **SALE** A coat is selling for $\frac{3}{4}$ of the original price. The sale price is $180. The original price p can be found using the equation $\frac{3}{4}p = 180$. Find the original price.

4. **SALARIES** Aaron's annual salary is $\frac{2}{3}$ as much as Juanita's salary. Aaron makes $46,000. Find Juanita's salary x using the equation $46{,}000 = \frac{2}{3}x$.

5. **ENDANGERED SPECIES** In the U. S., there are $\frac{14}{29}$ as many endangered species of birds as of reptiles. The number of endangered species of birds b can be compared to the 14 endangered species of reptiles using $\frac{14}{29}b = 14$. Find the number of endangered species of birds.

6. **SALES TAX** The sticker price p of a purchase with $\frac{1}{10}$ sales tax and a total price (including tax) of $5.28 can be found using the equation $\frac{11}{10}p = 5.28$. What is the sticker price?

7. **SEWING** Each costume uses $\frac{3}{4}$ yard of fabric. The number of costumes c that can be made using $11\frac{1}{4}$ yards of fabric can be found using the equation $\frac{3}{4}c = 11\frac{1}{4}$. Find the number of costumes that can be made.

8. **SAVINGS** Jasmine saves $46 each month from her part-time job. She saves $\frac{2}{5}$ of her earnings. Her earnings a can be found by using the equation equation $\frac{2}{5}a = 46$. Find her earnings.

NAME ______________________________ DATE ____________ PERIOD _____

5-7 Explore Through Reading

SCAS 7-2.9

Dividing Fractions and Mixed Numbers

Get Ready for the Lesson

Complete the Mini Lab at the top of page 265 in your textbook. Write your answers below.

1. How many $\frac{1}{4}$'s are in 2 plates?

2. How would you model $3 \div \frac{1}{2}$?

3. What is true about $3 \div \frac{1}{2}$ and 3×2?

Read the Lesson

4. How does dividing a number by a fraction involve multiplication?

5. Rewrite each of the following division expressions as multiplication expressions.

a. $\frac{7}{8} \div \frac{2}{3}$

b. $14 \div 3\frac{2}{5}$

c. $\frac{5}{6} \div 2\frac{1}{4}$

d. $2\frac{1}{3} \div 1\frac{1}{6}$

Remember What You Learned

6. To divide a mixed number by another mixed number can take up to 5 steps. List the steps in order.

NAME ______________________________ DATE ____________ PERIOD _____

5-7 Study Guide

SCAS 7-2.9

Dividing Fractions and Mixed Numbers

To divide by a fraction, multiply by its multiplicative inverse or reciprocal. To divide by a mixed number, rename the mixed number as an improper fraction.

Example 1 **Find $3\frac{1}{3} \div \frac{2}{9}$. Write in simplest form.**

$3\frac{1}{3} \div \frac{2}{9} = \frac{10}{3} \div \frac{2}{9}$ Rename $3\frac{1}{3}$ as an improper fraction.

$= \frac{10}{3} \cdot \frac{9}{2}$ Multiply by the reciprocal of $\frac{2}{9}$, which is $\frac{9}{2}$.

$= \frac{\overset{5}{\cancel{10}}}{\underset{1}{\cancel{3}}} \cdot \frac{\overset{3}{\cancel{9}}}{\underset{1}{\cancel{2}}}$ Divide out common factors.

$= 15$ Multiply.

Exercises

Divide. Write in simplest form.

1. $\frac{2}{3} \div \frac{1}{4}$

2. $\frac{2}{5} \div \frac{5}{6}$

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

4. $5 \div \frac{1}{2}$

5. $\frac{5}{8} \div 10$

6. $7\frac{1}{3} \div 2$

7. $\frac{5}{6} \div 3\frac{1}{2}$

8. $36 \div 1\frac{1}{2}$

9. $2\frac{1}{2} \div 10$

10. $5\frac{2}{5} \div 1\frac{4}{5}$

11. $6\frac{2}{3} \div 3\frac{1}{9}$

12. $4\frac{1}{4} \div \frac{3}{8}$

13. $4\frac{6}{7} \div 2\frac{3}{7}$

14. $12 \div 2\frac{1}{2}$

15. $4\frac{1}{6} \div 3\frac{1}{6}$

NAME ______________________________ DATE ____________ PERIOD _____

5-7 Homework Practice

SCAS 7-2.9

Dividing Fractions and Mixed Numbers

Divide. Write in simplest form.

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

2. $\frac{4}{7} \div \frac{8}{9}$

3. $\frac{6}{7} \div \frac{5}{6}$

4. $\frac{1}{4} \div \frac{1}{2}$

5. $7 \div \frac{1}{3}$

6. $\frac{6}{11} \div 2$

7. $4\frac{1}{5} \div 7$

8. $8 \div 4\frac{2}{3}$

9. $\frac{3}{4} \div 1\frac{1}{6}$

10. $\frac{7}{9} \div 2\frac{5}{8}$

11. $3\frac{2}{5} \div 5\frac{1}{10}$

12. $4\frac{8}{9} \div \frac{2}{3}$

13. $2\frac{3}{5} \div 1\frac{1}{4}$

14. $7\frac{1}{2} \div 2\frac{1}{2}$

15. $5\frac{1}{4} \div \frac{7}{8}$

16. $8\frac{1}{3} \div \frac{5}{9}$

17. COOKING Mrs. Lau rolls out $2\frac{3}{4}$ feet of dough to make noodles. If the noodles are $\frac{3}{8}$ of an inch wide, how many noodles will she make?

PIZZA **For Exercises 18 and 19, use the table that shows the weights of three sizes of pizza.**

18. How many times heavier is the extra-large pizza than the small pizza?

19. How many times heavier is the medium pizza than the small pizza?

Pizza Size	Weight (lbs)
Extra large	$6\frac{1}{2}$
Medium	$3\frac{1}{4}$
Small	$1\frac{5}{8}$

ALGEBRA **Evaluate each expression if $a = \frac{2}{5}$, $b = \frac{3}{10}$, and $c = 2\frac{1}{2}$.**

20. $b \div a$

21. $a \div c$

22. $3a \div b$

23. $\frac{1}{5}c \div a$

NAME ______________________________ DATE ____________ PERIOD _____

5-7 Problem-Solving Practice

SCAS 7-2.9

Dividing Fractions and Mixed Numbers

1. **PUPPETS** If a puppet requires $\frac{3}{4}$ yards of material, how many puppets can be made from 9 yards of material?

2. **COOKING** A batch of cookies requires $1\frac{1}{2}$ cups of sugar. How many batches can Ty make with $7\frac{1}{2}$ cups of sugar?

3. **FOOD** Julia has $3\frac{1}{2}$ pounds of dog food. She plans to split it equally among her 7 dogs. How much dog food will each dog receive?

4. **SNOW CONES** Roger has a 28-pound block of ice for his snow cone stand. If each snow cone requires $\frac{2}{3}$ pound of ice, how many snow cones can Roger make?

5. **APPLES** Juan took 6 apples and cut each into one-eighths. How many pieces of apple did he have?

6. **VACATION** The Torres family drove 1,375 miles during their $6\frac{1}{4}$-day vacation. Find the average number of miles they traveled each day.

7. **RUNNING** Hugo just joined the cross-country team and can run at a rate of $\frac{1}{7}$ mile each minute. How long will it take him to run a 5-mile race?

8. **LUMBER** Mrs. Shin has a piece of lumber that is $11\frac{5}{8}$ inches wide. She plans to split the width of lumber into 3 equal pieces. How wide will each piece be?

Name Date

Chapter 5 Test

Mastering the SC Standards

1 Tanya subtracts $\frac{3}{8}$ from $\frac{5}{6}$. She finds the lowest common denominator for both fractions and rewrites both fractions with the new denominator. Which expression shows how Tanya rewrites the two fractions?

Ⓐ $\frac{5}{14} - \frac{3}{14}$

Ⓑ $\frac{20}{24} - \frac{1}{24}$

Ⓒ $\frac{5}{6} - \frac{9}{24}$

Ⓓ $\frac{20}{24} - \frac{9}{24}$

Review of 6-2.4

2 Which of the following expressions represents finding how many times $\frac{1}{4}$ goes into $\frac{5}{7}$?

Ⓐ $\frac{5}{7} \div \frac{1}{4}$

Ⓑ $\frac{5}{7} + \frac{1}{4}$

Ⓒ $\frac{5}{7} \times \frac{1}{4}$

Ⓓ $\frac{5}{7} - \frac{1}{4}$

7-2.9

3 Katie has about $\frac{5}{8}$ lb of macaroni salad left over from dinner. She wants to divide it equally between 2 containers. About how many pounds of macaroni salad will be in each container?

Ⓐ about an eighth of a pound

Ⓑ about a quarter of a pound

Ⓒ about a half of a pound

Ⓓ about three-eighths of a pound

7-2.9

4 Which expression shows a strategy for solving $\frac{2}{5} \times \frac{4}{7}$?

Ⓐ $(2 \times 4) + (5 \times 7)$

Ⓑ $(2 \times 4) - (5 \times 7)$

Ⓒ $(2 \times 4) \times (5 \times 7)$

Ⓓ $(2 \times 4) \div (5 \times 7)$

7-2.9

5 Maria needs to solve the problem $8\frac{2}{3} \div 4\frac{1}{4}$. Which should be her first step?

Ⓐ Multiply the two numerators together.

Ⓑ Multiply the two denominators together.

Ⓒ Multiply by the reciprocal of the divisor.

Ⓓ Change each mixed number into an improper fraction.

7-2.9

Name Date

Chapter 5 Test (continued)

Mastering the SC Standards

6 Michelle and her friend Miriam mountain bike on two trails in Hickory Knob State Resort Park. They ride down the Beaver Run trail, which is $2\frac{1}{2}$ miles long, and the Turkey Ridge trail, which is $1\frac{7}{10}$ miles long. Michelle wants to find the total number of miles they rode and gets $3\frac{12}{10}$ miles as her answer. Michelle needs to do one more step to find the final answer. What is the final answer?

Ⓐ $3\frac{1}{5}$ miles

Ⓑ $3\frac{3}{5}$ miles

Ⓒ $4\frac{1}{5}$ miles

Ⓓ $4\frac{3}{10}$ miles

Review of 6-2.4

7 Which expression shows a strategy to solve $3\frac{2}{3} \times 5\frac{3}{4}$?

Ⓐ $\frac{11}{3} \times \frac{23}{4}$

Ⓑ $\frac{18}{3} \times \frac{60}{4}$

Ⓒ $(3 \times 5) \times \left(\frac{2}{3} \times \frac{3}{4}\right)$

Ⓓ $\frac{8}{3} \times \frac{12}{4}$

7-2.9

8 Enrico needs to solve the following problem, $5\frac{3}{4} - 2\frac{1}{3}$. Which expression shows the first step?

Ⓐ $5\frac{3}{4} - 2\frac{4}{12}$

Ⓑ $5\frac{9}{12} - 2\frac{4}{12}$

Ⓒ $5\frac{9}{12} - 2\frac{1}{3}$

Ⓓ $5\frac{6}{12} - 2\frac{4}{12}$

Review of 6-2.4

9 Badri solved the problem $\frac{3}{5} \times \frac{4}{7} = \frac{12}{35}$. Which expression shows how he got his answer?

Ⓐ $\frac{3 \times 4}{5 + 7}$

Ⓑ $\frac{3 + 4}{5 \times 7}$

Ⓒ $\frac{3 \times 4}{5 \times 7}$

Ⓓ $\frac{7 \times 4}{5 + 3}$

7-2.9

NAME ______________________________ DATE ____________ PERIOD _____

6 Anticipation Guide

Ratios and Proportions

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. To determine if two ratios are equivalent, write both ratios in simplest form.	
	2. A rate is called a unit rate only when it has a denominator of 1 unit.	
	3. When converting larger units to smaller units in the Customary measurement system division is used.	
	4. Since there are 2 cups in a pint, 8 cups is equal to 4 pints.	
	5. The cross products of $\frac{2}{5}$ and $\frac{7}{8}$ are 14 and 40.	
	6. A blue print drawing of a house with a scale of 1 inch = 6 feet would be larger than a blue print drawing of the same house with a scale of $\frac{1}{4}$ inch = 1.5 feet.	
	7. $\frac{1}{3}$ is the same as $33\frac{1}{3}\%$.	
	8. To write a fraction as a percent you could first write the fraction as a decimal, and then convert the decimal to a percent.	
	9. To divide a decimal by 100, move the decimal point 2 places to the right.	
	10. Percents can only be written with whole numbers.	

STEP 2 ***After you complete Chapter 6***

- Reread each statement and complete the last column by entering an A or a D.
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a piece of paper to write an example of why you disagree.

NAME ______________________ DATE ____________ PERIOD _____

6

Family Activity

State Test Practice

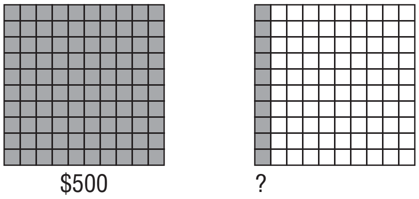
Fold the page along the dashed line. Work each problem on another piece of paper. Then unfold the page to check your work.

1. A nutrition label on the back of a bag of potato chips states that there are 130 calories per serving. One serving is 10 potato chips. Eddie ate 70 potato chips. Use a proportion to find how many calories are in the 70 chips.

How many calories were in the chips Eddie ate?

A 700 calories
B 910 calories
C 1,300 calories
D 9,100 calories

2. Joan had $500 in her savings account last month. After putting some more money into her account this month, she now has 110% of that amount. Use the grids below to help you determine how much money Joan has in her saving account.



How much money does Joan have now?

A $450
B $500.50
C $550
D $600

Fold here.

Solution

1. *Hint: In a proportion, the top and bottom numbers are always multiplied or divided by the same number to get an equivalent ratio.*

The following proportion can be used to find the number of calories in the chips Eddie ate.

$$\frac{130 \text{ calories}}{10 \text{ chips}} = \frac{? \text{ calories}}{70 \text{ chips}}$$

Since 70 is 7 times more than 10, 130 must also be multiplied by 7 to find the number of calories in 70 chips.

$$130 \times 7 = 910$$

The answer is **B.**

Solution

2. *Hint: You can use a fraction of the total or a percentage to solve this problem.*

The area of the second grid that is shaded represents $\frac{1}{10}$ of a whole, or 10%. Each square of the first whole represents $5. So the 10 shaded squares in the second whole represent $50.
$500 + $50 = $550

The answer is **C.**

NAME ______________________________ DATE ____________ PERIOD _____

6-1 Explore Through Reading

SCAS 7-2.5

Ratios

Get Ready for the Lesson

Read the introduction at the top of page 282 in your textbook. Write your answers below.

1. Write the student-teacher ratio of Prairie Lake Middle School as a fraction. Then write this fraction with a denominator of 1.

2. Can you determine which school has the lower student-teacher ratio by examining just the number of teachers at each school? Just the number of students at each school? Explain.

Read the Lesson

For Exercises 3 and 4, review the introduction to this lesson.

3. What two things are being compared?

4. What is the comparison of the size of the larger school to the size of the smaller school called?

5. When you simplify a ratio written as an improper fraction, should you rewrite the fraction as a mixed number?

Remember What You Learned

6. Comparing measurements requires you to know how to convert measurements easily. Complete the following table to help you remember some common conversions.

Unit	Equivalent Unit
1 foot	__________ inches
1 yard	__________ feet
1 year	__________ weeks
1 pound	__________ ounces
1 gallon	__________ quarts
1 quart	__________ pints

NAME ______________________________ DATE ____________ PERIOD _____

6-1 Study Guide

SCAS 7-2.5

Ratios

Any ratio can be written as a fraction. To write a ratio comparing measurements, such as units of length or units of time, both quantities must have the same unit of measure. Two ratios that have the same value are **equivalent ratios**.

Example 1 **Write the ratio 15 to 9 as a fraction in simplest form.**

$15 \text{ to } 9 = \frac{15}{9}$ Write the ratio as a fraction.

$= \frac{5}{3}$ Simplify.

Written as a fraction in simplest form, the ratio 15 to 9 is $\frac{5}{3}$.

Example 2 **Determine whether the ratios *10 cups of flour in 4 batches of cookies* and *15 cups of flour in 6 batches of cookies* are equivalent ratios.**

Compare ratios written in simplest form.

$10 \text{ cups:4 batches} = \frac{10 \div 2}{4 \div 2} \text{ or } \frac{5}{2}$ Divide the numerator and denominator by the GCF, 2

$15 \text{ cups:6 batches} = \frac{15 \div 3}{6 \div 3} \text{ or } \frac{5}{2}$ Divide the numerator and denominator by the GCF, 3

Since the ratios simplify to the same fraction, the ratios of cups to batches are equivalent.

Exercises

Write each ratio as a fraction in simplest form.

1. 30 to 12

2. 5:20

3. 49:42

4. 15 to 13

5. 28 feet:35 feet

6. 24 minutes to 18 minutes

7. 75 seconds:150 seconds

8. 12 feet:60 feet

Determine whether the ratios are equivalent. Explain.

9. $\frac{3}{4}$ and $\frac{12}{16}$

10. 12:17 and 10:15

11. $\frac{25}{35}$ and $\frac{10}{14}$

12. 2 lb:36 oz and 3 lb:44 oz

13. 1 ft:4 in. and 3 ft:12 in.

NAME ________________________________ DATE ____________ PERIOD _____

6-1 Homework Practice

Ratios

SCAS 7-2.5

SURVEY For Exercises 1–3, use the responses to a survey to write each ratio as a fraction in simplest form.

Survey Response		
Yes	No	Not Sure
18	4	6

1. *yes* responses: *no* responses

2. *no* responses: *not sure* responses

3. *not sure* responses: total responses

COUNTY FAIR For Exercises 4–9, use the following information to write each ratio as a fraction in simplest form.

At its annual fair, Westborough County had 27 food booths and 63 game booths. A total of 1,350 adults and 3,600 children attended. The fair made a profit of $42,000. Of this money, $12,600 came from food sales.

4. adults:children

5. game booths:food booths

6. booths:profits

7. children:people

8. children:booths

9. non-food sale profits:profits

Determine whether the ratios are equivalent. Explain.

10. 18 trucks to 4 cars, 21 trucks to 6 cars

11. $6 for every 10 people, $9 for every 15 people

12. 33 dinners to 6 packages, 14 dinners to 4 packages

13. ENGINES A four cylinder engine produces a maximum of 110 horsepower. A six cylinder engine produces a maximum of 180 horsepower. Do these engines have an equivalent horsepower-to-cylinder ratio? Justify your answer.

ANALYZE TABLES For Exercises 14 and 15, use the information in the table that shows the crop statistics for three farms.

Farm	Acres of Soybeans	Acres of Corn
A	585	225
B	2,990	1,150
C	1,120	400

14. For which two farms is the soybeans-to-corn ratio the same? Explain.

15. Which farm has the highest soybeans-to-corn ratio? Justify your answer.

NAME ________________________________ DATE ______________ PERIOD _____

6-1 Problem-Solving Practice

SCAS 7-2.5

Ratios

1. **ELECTIONS** In an election for sheriff, 210 people voted. If there were 1,260 possible voters, write a ratio to compare the number of people who voted to the number of possible voters.

2. **DENTAL CARE** Taru surveyed 60 dentists and found that 48 favored the use of fluoride toothpaste. Write a ratio to compare the number of dentists favoring the use of a flouride toothpaste to all dentists surveyed.

3. **E-MAIL** One morning, Mirna counted 15 junk e-mails out of 21 e-mails in her inbox. Write a ratio comparing the number of junk e-mails to the total number of e-mails.

4. **SURFING** One evening at his local surf spot, Jeff counted 28 surfers in the water. Among those, he counted 21 that had hoods on their wetsuits. Write a ratio comparing the number of surfers with hoods to the total number of surfers.

5. **MUSIC** A music company signed 12 new artists to its label in 2002. Out of the 12, 10 artists have hit songs. Write a ratio to compare the number of artists with hit songs to the total number of artists signed in 2002.

6. **BASEBALL** Nate had 26 hits at 50 times at bat last season. Write a ratio to compare the number of hits to the number of times at bat.

7. **BASEBALL** In baseball, David has 10 hits out of 14 at bats. Adam has 15 hits out of 21 at bats. For each player, write a ratio that represents his total number of hits out of times at bat. Are these ratios equivalent?

8. **DRIVING** Sarah can drive 198 miles on 11 gallons of gasoline. On 6 gallons of gasoline, Rachel can travel 138 miles. Write a ratio that compares miles traveled per gallon of gasoline for each car. Do the cars get the same mileage?

NAME ______________________________ DATE ____________ PERIOD _____

6-2 Explore Through Reading

SCAS 7-2.5

Rates

Get Ready for the Lesson

Do the Mini Lab at the top of page 287 in your textbook. Write your answers below.

1. Count the number of beats for each of you.

2. Write the ratio *beats to minutes* as a fraction.

Read the Lesson

3. A rate is a special kind of ratio. What makes it special?

4. Describe what makes a rate different from a unit rate. Give an example of a rate and its equivalent unit rate.

5. Write the ratios in words for each unit rate abbreviation.

Abbreviation	Ratio
m/s	
ft/s	
mi/h (mph)	
mi/gal (mpg)	

Remember What You Learned

6. Go to a food store or find several different newspaper food advertisements. Compare prices for several different sizes of the same product, or compare prices for similar sizes of different brands of the same product. Which size or which brand costs the least per unit? Report your results to the class.

NAME ______________________________________ DATE ____________ PERIOD _____

6-2 Study Guide

SCAS 7-2.5

Rates

A ratio that compares two quantities with different kinds of units is called a **rate**. When a rate is simplified so that it has a denominator of 1 unit, it is called a **unit rate**.

Example 1 DRIVING **Alita drove her car 78 miles and used 3 gallons of gas. What is the car's gas mileage in miles per gallon?**

Write the rate as a fraction. Then find an equivalent rate with a denominator of 1.

78 miles using 3 gallons $= \frac{78 \text{ mi}}{3 \text{ gal}}$ Write the rate as a fraction.

$= \frac{78 \text{ mi} \div 3}{3 \text{ gal} \div 3}$ Divide the numerator and the denominator by 3.

$= \frac{26 \text{ mi}}{1 \text{ gal}}$ Simplify.

The car's gas mileage, or unit rate, is 26 miles per gallon.

Example 2 SHOPPING **Joe has two different sizes of boxes of cereal from which to choose. The 12-ounce box costs \$2.54, and the 18-ounce box costs \$3.50. Which box costs less per ounce?**

Find the unit price, or the cost per ounce, of each box. Divide the price by the number of ounces.

12-ounce box $2.54 ÷ 12 ounces ≈ $0.21 per ounce
18-ounce box $3.50 ÷ 18 ounces ≈ $0.19 per ounce

The 18-ounce box costs less per ounce.

Exercises

Find each unit rate. Round to the nearest hundredth if necessary.

1. 18 people in 3 vans

2. $156 for 3 books

3. 115 miles in 2 hours

4. 8 hits in 22 games

5. 65 miles in 2.7 gallons

6. 2,500 Calories in 24 hours

Choose the better unit price.

7. $12.95 for 3 pounds of nuts or $21.45 for 5 pounds of nuts

8. A 32-ounce bottle of apple juice for $2.50 or a 48-ounce bottle for $3.84.

NAME ________________________________ DATE ____________ PERIOD _____

6-2 Homework Practice

SCAS 7-2.5

Rates

Find each unit rate. Round to the nearest hundredth if necessary.

1. \$11.49 for 3 packages

2. 2,550 gallons in 30 days

3. 88 students for 4 classes

4. 15.6 °F in 13 minutes

5. 175 Calories in 12 ounces

6. 258.5 miles in 5.5 hours

7. 549 vehicles on 9 acres

8. \$920 for 40 hours

9. 13 apples for 2 pies

10. **SPORTS** The results of a track meet are shown. Who ran the fastest? Explain your reasoning. Round to the nearest ten thousandth.

Name	Event	Time (min)
Theo	3K Run	9.6
Esteban	5K Run	13.5
Tetsuo	10K Run	31.9

11. **MANUFACTURING** A machinist can produce 114 parts in 6 minutes. At this rate, how many parts can the machinist produce in 15 minutes?

12. **RECIPES** A recipe that makes 8 jumbo blueberry muffins calls for $1\frac{1}{2}$ teaspoons of baking powder. How much baking powder is needed to make 3 dozen jumbo muffins?

Estimate the unit price for each item. Justify your answers.

13. \$299 for 4 tires

14. 3 yards of fabric for \$13.47

UTILITIES For Exercises 15 and 16, use the table that shows the average monthly electricity and water usage.

Family Name	Family Size	Electricity (kilowatt-hours)	Water (gal)
Melendez	4	1,560	3,500
Barton	6	2,130	6,400
Stiles	2	1,490	2,500

15. Which family uses about twice the amount of electricity per person than the other two families? Explain your reasoning.

16. Which family uses the least amount of water per person? Explain your reasoning.

NAME ______________________ DATE ____________ PERIOD _____

6-2 Problem-Solving Practice

SCAS 7-2.5

Rates

1. **TRAVEL** During Sonia's trip across the country, she traveled 2,884 miles. Her trip took 7 days. Find a unit rate to represent the average miles she traveled per day during the trip.

2. **BUDGET** Steve was offered $5,025 per year for a weekend lifeguarding job at a local pool. He wants to know how much his monthly income will be at this salary level. What is his rate of pay in dollars per month?

3. **MUSIC** Randall recorded 8 songs on his most recent CD. The total length of the CD is 49 minutes. Find a unit rate to represent the average length per song on the CD.

4. **CARPETING** Hana paid $1,200 for the carpet in her living room. The room has an area of 251.2 square feet. What was her unit cost of carpeting in dollars per square foot? Round to the nearest cent.

5. **SHOPPING** An 8-ounce can of tomatoes costs $1.14. A 12-ounce can costs $1.75. Which can of tomatoes has the better unit price?

6. **PETS** Last month, Hao's dog ate 40 cans of dog food in 31 days. How many cans should Hao buy to feed his dog for the next 6 days?

NAME ______________________________ DATE ______________ PERIOD _____

6-3 Explore Through Reading

SCAS 7-3.3, 7-1.4, 7-5.4

Rate of Change and Slope

Get Ready for the Lesson

Read the introduction at the top of page 293 in your textbook. Write your answers below.

1. What is the change in Stephanie's height from ages 9 to 12?

2. Over what number of years did the change take place?

3. Write a rate of change that compares the change in Stephanie's height to the change in age. Express your answer as a unit rate and explain its meaning.

Read the Lesson

4. Example 1 uses the unit rate to find the rate of change. Why is the rate of change usually written as a unit rate?

5. Example 2 uses ordered pairs to find the rate of change. What is an ordered pair?

6. The formula to find slope is given as $\frac{\text{change in } y}{\text{change in } x}$. Describe slope another way.

Remember What You Learned

7. The table shows the amount of money Samantha earns for babysitting based on the number of hours she babysits. Find the rate of change for Samantha's earnings.

Hours	2	4	6	8	10
Amount earned (in dollars)	10	20	30	40	50

NAME ______________________________ DATE ____________ PERIOD _____

6-3 Study Guide

SCAS **7-3.3,** 7-1.4, 7-5.4

Rate of Change and Slope

- A rate of change is a rate that describes how one quantity changes in relation to another.
- Slope tells how steep the line is.
- Slope is given by the formula $\frac{\text{change in } y}{\text{change in } x}$ or $\frac{\text{vertical change}}{\text{horizontal change}}$.

Example 1 **Find the rate of change for the table.**

Students	Number of Textbooks
5	15
10	30
15	45
20	60

The change in the number of textbooks is 15 while the change in the number of students is 5.

$$\frac{\text{change in number of textbooks}}{\text{change in number of students}} = \frac{15 \text{ textbooks}}{5 \text{ students}}$$ The number of textbooks increased by 15 for every 5 students.

$$= \frac{3 \text{ textbooks}}{1 \text{ student}}$$ Write as a unit rate.

So, the number of textbooks increases by 3 textbooks per student.

Example 2 **The band boosters are selling T-shirts at a linear rate. By 8 P.M., they had sold 25 T-shirts. By 10 P.M., they had sold 45 T-shirts. Find the slope of the line. Explain what the slope represents.**

$$\frac{\text{change in number of T-shirts}}{\text{change in time}} = \frac{45 - 25}{10 - 8}$$ Definition of slope.

$$= \frac{20}{2}$$ Simplify.

$$= 10$$

The slope is 10 and it means that the shirts are selling at a rate of 10 shirts per hour.

Exercises

Find the rate of change for each table.

1.

Side Length	Perimeter
1	4
2	8
3	12
4	16

2.

Time (in hours)	Distance (in miles)
2	120
4	240
6	360
8	480

3. The temperature at 10 A.M. was 72°F and at 2 P.M. was 88°F. Find the slope of the line. Explain what the slope represents.

NAME ______________________________ DATE ______________ PERIOD _____

6-3 Homework Practice

SCAS **7-3.3,** 7-1.4, 7-5.4

Rate of Change and Slope

Find the rate of change for each table.

1.

Baby Age	Weight
0 months	0 pounds
3 months	12 pounds
6 months	24 pounds
9 months	36 pounds

2.

Number of Hours Worked	Money Earned ($)
4	80
6	120
8	160
10	200

3.

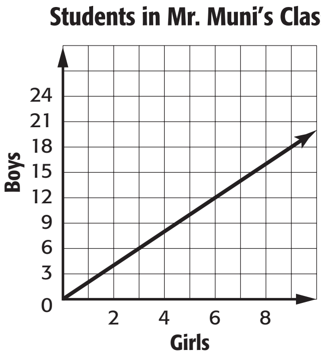
Days	Plant Height (in.)
7	4
14	11
21	18
28	25

4.

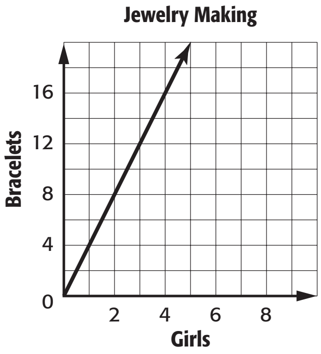
Months	Money Spent on Cable TV
2	82
4	164
6	246
8	328

Find the rate of change for each graph.

5.

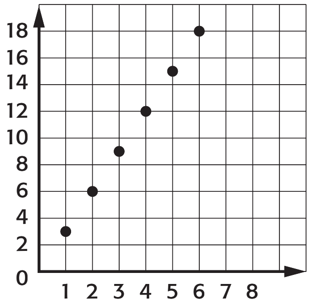


6.



7. Graph the data. Then find the slope of the line. Explain what the slope represents.

Feet	1	2	3	4	5	6
Yards	3	6	9	12	15	18



NAME ______________________________ DATE ____________ PERIOD _____

6-3 Problem-Solving Practice

SCAS 7-3.3, 7-1.4, 7-5.4

Rate of Change amd Slope

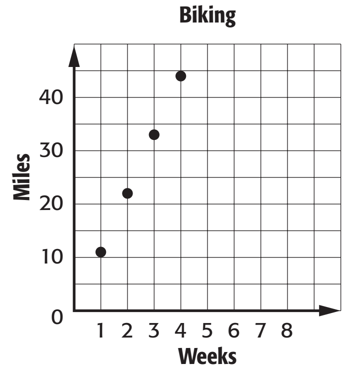
1. **WATER** At 2 P.M., the level of the water in the pool was 10 feet. At 6 P.M., the level of water was 2 feet. Find the rate of change of the water.

2. **MONEY** JoAnne is depositing money into a bank account. After 3 months there is $150 in the account. After 6 months, there is $300 in the account. Find the rate of change of the account.

3. **TEMPERATURE** The temperature at noon was 88°F. By 4 P.M., the temperature was 72°F. Find the rate of change of the temperature.

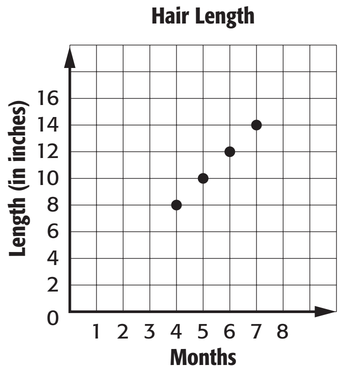
4. **GROWTH** Jaz was 43 inches tall. Eighteen months later, she was 52 inches tall. Find the rate of change for Jaz's height.

5. **BIKING** The graph represents how far Kevin biked given the number of weeks he has been biking. Find the rate of change.



6. **HAIR** Graph the data. Find the slope of the line. Describe what the slope means.

Month	4	5	6	7
Length (in inches)	8	10	12	14



NAME ______________________________ DATE ______________ PERIOD _____

6-4 Explore Through Reading

SCAS **7-5.5,** 7-5.4

Measurement: Changing Customary Units

Get Ready for the Lesson

Read the introduction at the top of page 298 in your textbook. Write your answers below.

1. Complete the ratio table. The first two ratios are done for you.

Tons	1	4	5	8
Pounds	2,000	8,000		

2. Then graph the ordered pairs (tons, pounds) from the table. Label the horizontal axis *Weight in Tons* and the vertical axis *Weight in Pounds*. Connect the points. What do you notice about the graph of these data?

Read the Lesson

3. To the right of each customary unit write its abbreviation.

inch	mile	ton	pint
foot	ounce	fluid ounce	quart
yard	pound	cup	gallon

Complete each sentence.

4. To convert from larger units to smaller units, __________.

5. To convert from smaller units to larger units, __________.

Remember What You Learned

6. Complete the table.

Customary Units of Length	Customary Units of Weight	Customary Units of Capacity
1 foot = ________ inches	1 pound = ________ ounces	1 cup = ________ fluid ounces
1 yard = ________ feet	1 ton = ________ pounds	1 pint = ________ cups
1 mile = ________ inches	1 gallon = ________ quarts	1 quart = ________ pints

NAME ______________________________ DATE ____________ PERIOD _____

6-4 Study Guide

SCAS **7-5.5,** 7-5.4

Measurement: Changing Customary Units

Customary Units		
Length	Weight	Capacity
1 foot (ft) = 12 inches (in.)	1 pound (lb) = 16 ounces (oz)	1 cup (c) = 8 fluid ounces (fl oz)
1 yard (yd) = 3 feet	1 ton (T) = 2,000 pounds	1 pint (pt) = 2 cups
1 mile (mi) = 5,280 feet		1 quart (qt) = 2 pints
		1 gallon (gal) = 4 quarts

Example 1 $5\frac{1}{2}$ **lb =** $\underline{\quad ? \quad}$ **oz**

To change from larger units to smaller units, multiply.

$5\frac{1}{2} \times 16 = 88$ Since 1 pound is 16 ounces, multiply by 16.

$5\frac{1}{2}$ pounds = 88 ounces

Example 2 **28 fl oz =** $\underline{\quad ? \quad}$ **c**

To change from smaller units to larger units, divide.

$28 \div 8 = 3\frac{1}{2}$ Since 8 fluid ounces are in 1 cup, divide by 8.

28 fluid ounces = $3\frac{1}{2}$ cups

Exercises

Complete.

1. 5 lb = ______ oz

2. 48 in. = ______ ft

3. 6 yd = ______ ft

4. 7 qt = ______ pt

5. 8,000 lb = ______ T

6. $3\frac{1}{4}$ mi = ______ ft

7. 4 c = ______ fl oz

8. 6 c = ______ pt

9. $\frac{1}{2}$ gal = ______ qt

10. 3 ft = ______ in.

11. 9 qt = ______ gal

12. 30 fl oz = ______ c

13. 6,864 ft = ______ mi

14. 40 oz = ______ lb

15. 9 pt = ______ c

16. 18 ft = ______ yd

17. 11 pt = ______ qt

18. $2\frac{3}{4}$ T = ______ lb

NAME ______________________________ DATE ____________ PERIOD _____

6-4 Homework Practice

SCAS **7-5.5,** 7-5.4

Measurement: Changing Customary Units

Complete.

1. 4 c = ____ fl oz

2. 5 c = ____ pt

3. 3 lb = ____ oz

4. 24 ft = ____ yd

5. $1\frac{1}{2}$ pt = ____ c

6. 64 oz = ____ lb

7. 4 mi = ____ ft

8. $2\frac{3}{4}$ mi = ____ ft

9. 3,000 lb = ____ T

10. 5 gal = ____ qt

11. $3\frac{1}{4}$ qt = ____ pt

12. $4\frac{5}{8}$ T = ____ lb

13. $3\frac{1}{2}$ gal = ____ qt

14. 7 c = ____ qt

15. 40 fl oz = ____ qt

16. 660 yd = ____ mi

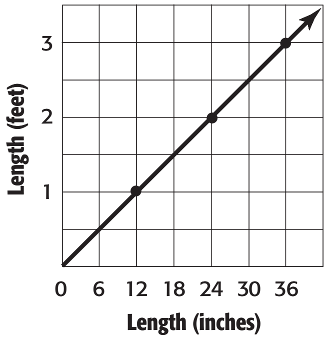
17. 1.9 yd = ____ in.

18. $2\frac{1}{4}$ T = ____ oz

19. **SPORTS** The track surrounding a football field is $\frac{1}{4}$ mile long. How many yards long is the track?

20. **STRAWBERRIES** One quart of strawberries weighs about 2 pounds. About how many quarts of strawberries would weigh $\frac{1}{4}$ ton?

ANALYZE GRAPHS For Exercises 21–23, use the graph shown.



21. What does an ordered pair from this graph represent?

22. Write two sentences that describe the graph.

23. Use the graph to find the length in inches of a 1.5 foot iguana. Explain your reasoning.

NAME ______________________________ DATE ______________ PERIOD _____

6-4 Problem-Solving Practice

SCAS 7-5.5, 7-5.4

Measurement: Changing Customary Units

1. **WEIGHT** The average weight of a baby at birth is 7 pounds. How many ounces is this?

2. **WATERFALLS** The height of Niagara Falls is 182 feet. How many yards high is it?

3. **GASOLINE** The gasoline tank of a minivan holds 18 gallons. How many quarts is this?

4. **TELEPHONES** Portable telephones can weigh as little as 8 ounces. How many pounds is this?

5. **RECIPE** A recipe for ice cream calls for 56 fluid ounces of milk. How many cups of milk is this?

6. **STATUE** The Statue of Liberty weighs 450,000 pounds. How many tons is this?

7. **TUNNEL** The Ted Williams Tunnel under Boston Harbor is 8,448 feet long. How many yards is this?

8. **COAL** The United States exports over 200 billion pounds of coal. How many tons is this?

NAME ______________________________________ DATE ______________ PERIOD _____

6-5 Explore Through Reading

SCAS 7-5.5, 7-3.6, 7-3.7

Measurement: Changing Metric Units

Get Ready for the Lesson

Complete the Mini Lab at the top of page 304 in your textbook. Write your answers below.

1. Select three other objects. Find and record the width of all five objects to the nearest millimeter and tenth of a centimeter.

2. Compare the measurements of the objects, and write a rule that describes how to convert from millimeters to centimeters.

3. Measure the length of your classroom in meters. Make a conjecture about how to convert this measure to centimeters. Explain.

Read the Lesson

Complete each sentence.

4. To convert from centimeters to kilometers, first divide by __________ to convert to meters, then divide by __________ to convert to kilometers.

5. To convert from kiloliters to milliliters, first multiply by __________ to convert to liters, then multiply by __________ to convert to milliliters.

6. To convert from __________ to centigrams, multiply by 100.

Remember What You Learned

7. Name an everyday object that you can associate with each base metric unit of measure to help you remember what each unit represents.

kilogram:

meter:

liter:

NAME ______________________________ DATE ____________ PERIOD _____

6-5 Study Guide

SCAS 7-5.5, 7-3.6, 7-3.7

Measurement: Changing Customary Units

The table below is a summary of how to convert measures in the metric system.

	Larger Units → Smaller Units	Smaller Units → Larger Units
Units of Length (meter)	km to m – multiply by 1,000 m to cm – multiply by 100 m to mm – multiply by 1,000 cm to mm – multiply by 10	mm to cm – divide by 10 mm to m – divide by 1,000 cm to m – divide by 100 m to km – divide by 1,000
Units of Mass (kilogram)	kg to g – multiply by 1,000 g to mg – multiply by 1,000	mg to g – divide by 1,000 g to kg – divide by 1,000
Units of Capacity (liter)	kL to L – multiply by 1,000 L to mL – multiply by 1,000	mL to L – divide by 1,000 L to kL – divide by 1,000

Example 1 **Complete. 62 cm = __________ m**

To convert from centimeters to meters, divide by 100.
62 ÷ 100 = 0.62
62 cm = 0.62 m

Example 2 **Complete. 2.6 kL = __________ L**

To convert from kiloliters to liters, multiply by 1,000.
2.6 × 1,000 = 2,600
2.6 kL = 2,600 L

Exercises

Complete.

1. 650 cm = ____ m

2. 57 kg = ____ g

3. 751 mg = ____ g

4. 8.2 L = ____ mL

5. 52 L = ____ kL

6. 892 mm = ____ m

7. 121.4 kL = ____ L

8. 0.72 cm = ____ mm

9. 67.3 g = ____ kg

10. 5.2 g = ____ mg

11. 0.05 m = ____ mm

12. 2,500 mg = ____ g

13. 32 mm = ____ cm

14. 96 m = ____ cm

NAME ______________________________ DATE ____________ PERIOD _____

6-5 Homework Practice

SCAS 7-5.5, 7-3.6, 7-3.7

Measurement: Changing Metric Units

Complete.

1. 570 cm = ? m

2. 356 mm = ? m

3. 4.7 m = ? cm

4. 0.4 m = ? mm

5. 0.63 cm = ? mm

6. 0.18 mm = ? cm

7. 0.42 km = ? m

8. 0.09 km = ? mm

9. 0.13 km = ? cm

10. 27 kg = ? g

11. 8.3 g = ? mg

12. 257 mg = ? g

13. 486 g = ? kg

14. 55.5 g = ? kg

15. 68,700 mg = ? kg

16. 308 mL = ? L

17. 1.7 L = ? mL

18. 88 L = ? kL

19. 0.059 kL = ? L

20. 64,000 mL = ? L

21. 30,000 mL = ? kL

Order each set of measures from least to greatest.

22. 0.06 km, 47 m, 15,800 cm

23. 891 g, 7,800 mg, 0.5 kg

24. **SPELUNKING** The survey length of an underground cave is 0.914 kilometers. How many meters in length is this cave?

25. **FOOD** A 15-ounce box of granola contains 0.425 kilograms of cereal. How many grams of cereal are in the box of granola?

NAME ______________________________ DATE ____________ PERIOD _____

6-5 Problem-Solving Practice

SCAS 7-5.5, 7-3.6, 7-3.7

Measurement: Changing Metric Units

1. **RUNNING** Each morning Carlos runs 1.5 kilometers. How many meters did he run?

2. **AVIATION** A helicopter was flying 800 meters above the ground. How many kilometers above the ground was it flying?

3. **SODA** A soda can contains 355 milliliters of liquid. How many liters of liquid does it contain?

4. **CONSTRUCTION** The ceilings of most classrooms are about 2.5 meters above the floor. How many centimeters high is the ceiling?

5. **FENCING** Gerri's garden is 1,270 centimeters around the edges. How many meters of fencing material does she need to enclose her garden?

6. **GARDENING** Mr. Chou's lawn sprinker sprays about 150 liters of water each hour. How many kiloliters of water does it spray?

7. **NUTRITION** For 11- to 14-year-olds, the Recommended Dietary Allowance (RDA) for protein is about 60 grams daily. How many milligrams do they need daily?

8. **MEASUREMENT** A measure of one pound is equivalent to about 454 grams. How many kilograms are in one pound? How many milligrams?

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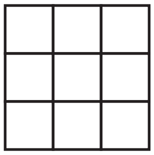
6A

Study Guide

SCAS 7-5.5

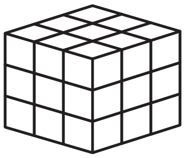
Approximating Cube Roots

A square root is just one of many kinds of roots. Another kind of root is the cube root. Just as the number 9 is a perfect square because it is a square of a whole number, the number 27 is a perfect cube because it is the cube of a whole number.



Square Root
The square root of 9 is 3 because
$3 \times 3 = 9.$
In symbols, we can write:
$\sqrt{9} = 3.$

Cube Root
The cube root of 27 is 3 because
$3 \times 3 \times 3 = 27.$
In symbols, we can write:
$\sqrt[3]{27} = 3.$



Most numbers are not cubes. You can estimate the cube roots for these numbers.

Example 1 **Estimate $\sqrt[3]{140}$ to the nearest whole number.**

- The first cube less than 140 is 125.
- The first cube greater than 140 is 216.

$125 < 140 < 216$ Write an inequality.

$5^3 < 140 < 6^3$ $125 = 5^3$ and $216 = 6^3$

$5 < \sqrt[3]{140} < 6$ Take the cube root of each number.

So, $\sqrt[3]{140}$ is between 5 and 6. Since 140 is closer to 125 than 216, the best whole number estimate for $\sqrt[3]{140}$ is 5.

Example 2 **Estimate $\sqrt[3]{58.3}$ to the nearest whole number.**

- The first cube less than 58.3 is 27.
- The first cube greater than 58 is 64.

$27 < 58.3 < 64$ Write an inequality.

$3^3 < 58.3 < 4^3$ $27 = 3^3$ and $64 = 4^3$

$3 < \sqrt[3]{58.3} < 4$ Take the cube root of each number.

So, $\sqrt[3]{58.3}$ is between 3 and 4. Since 58.3 is closer to 64 than 27, the best whole number estimate for $\sqrt[3]{58.3}$ is 4.

Exercises

Estimate to the nearest whole number.

1. $\sqrt[3]{10}$

2. $\sqrt[3]{350}$

3. $\sqrt[3]{21}$

4. $\sqrt[3]{289}$

5. $\sqrt[3]{800}$

6. $\sqrt[3]{555}$

NAME ______________________________ DATE ____________ PERIOD _____

6A Skills Practice

SCAS 7-5.5

Approximating Cube Roots

Estimate to the nearest whole number.

1. $\sqrt[3]{705}$

2. $\sqrt[3]{1200}$

3. $\sqrt[3]{2884}$

4. $\sqrt[3]{69}$

5. $\sqrt[3]{34}$

6. $\sqrt[3]{192}$

7. $\sqrt[3]{356}$

8. $\sqrt[3]{97}$

9. $\sqrt[3]{1593}$

10. $\sqrt[3]{4000}$

11. $\sqrt[3]{3}$

12. $\sqrt[3]{23}$

13. $\sqrt[3]{56}$

14. $\sqrt[3]{2081}$

15. $\sqrt[3]{169}$

16. $\sqrt[3]{227}$

17. $\sqrt[3]{3025}$

18. $\sqrt[3]{655}$

19. $\sqrt[3]{788}$

20. $\sqrt[3]{1567}$

21. $\sqrt[3]{45}$

NAME ______________________________ DATE ____________ PERIOD _____

6A Homework Practice

SCAS 7-5.5

Approximating Cube Roots

Estimate to the nearest whole number.

1. $\sqrt[3]{800}$ **2.** $\sqrt[3]{1776}$ **3.** $\sqrt[3]{77}$ **4.** $\sqrt[3]{9}$

5. $\sqrt[3]{436}$ **6.** $\sqrt[3]{24}$ **7.** $\sqrt[3]{1697}$ **8.** $\sqrt[3]{455}$

9. $\sqrt[3]{604}$ **10.** $\sqrt[3]{31}$ **11.** $\sqrt[3]{907}$ **12.** $\sqrt[3]{239}$

Order from least to greatest.

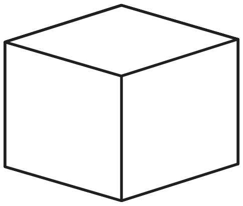
13. $\sqrt[3]{26}$, 3, 4, $\sqrt[3]{52}$ **14.** 7, 8, $\sqrt[3]{498}$, $\sqrt[3]{515}$ **15.** 11, 12, $\sqrt[3]{1332}$, $\sqrt[3]{1468}$

ALGEBRA Estimate the solution of each equation to the nearest integer.

16. $a^3 = 130$ **17.** $x^3 = 333$ **18.** $z^3 = 500$

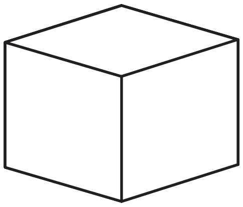
GEOMETRY The formula for the volume of a square is $A = s^3$, where s is the length of a side. Estimate the length of a side for each cube.

19.



Volume = 140 cubic inches

20.



Volume = 1725 cubic inches

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6A Problem-Solving Practice

SCAS 7-5.5

Approximating Cube Roots

1. **SPHERES** The formula for the volume of a sphere is $V = \frac{4}{3}\pi r^3$. Suppose a sphere has a volume of 258 cm^3. If you rearrange the formula so that $\frac{3}{4} \cdot \frac{V}{\pi} = r^3$, what is the approximate value of r? Use 3.14 for π.

2. **BUILDING** Jackson is building a box to hold his sports equipment. He wants the volume of his box to be 102 cubic feet. What is the approximate length of one side of the box?

3. **NUMBER THEORY** $\sqrt[3]{-1} = -1$ because $(-1)(-1)(-1) = -1$. Based on this, explain how to find $\sqrt[3]{-27}$.

4. Look at the list below to answer the question.

$\sqrt[3]{10}$ $\sqrt[3]{10{,}000}$

$\sqrt[3]{100}$ $\sqrt[3]{100{,}000}$

$\sqrt[3]{1{,}000}$ $\sqrt[3]{1{,}000{,}000}$

a. Which of the cube roots above is an integer?

b. Explain how you can determine this by looking.

NAME ______________________________ DATE ______________ PERIOD _____

6-6 Explore Through Reading

SCAS 7-2.5

Algebra: Solving Proportions

Get Ready for the Lesson

Read the introduction at the top of page 310 in your textbook. Write your answers below.

1. Write the rate $\frac{\text{calcium}}{\text{number of servings}}$ for each amount of milk.

2. Find the number of milligrams per cup for each serving size. What do you notice?

Read the Lesson

3. What symbol tells you that two ratios are equivalent?

4. What is true about the cross products of a proportion?

5. How are cross products useful in identifying a proportion?

6. How are cross products useful in solving a proportion?

Remember What You Learned

7. Explain what it means to solve a proportion. Use an example to show what you mean.

NAME ______________________________ DATE ____________ PERIOD _____

6-6 Study Guide

SCAS 7-2.5

Algebra: Solving Proportions

A **proportion** is an equation stating that two ratios are equivalent. Since rates are types of ratios, they can also form proportions. In a proportion, a **cross product** is the product of the numerator of one ratio and the denominator of the other ratio.

Example 1 **Determine whether $\frac{2}{3}$ and $\frac{10}{15}$ form a proportion.**

$\frac{2}{3} \overset{?}{=} \frac{10}{15}$ Write a proportion.

$2 \times 15 \overset{?}{=} 3 \times 10$ Find the cross products.

$30 = 30$ ✓ Multiply.

The cross products are equal, so the ratios form a proportion.

Example 2 **Solve $\frac{8}{a} = \frac{10}{15}$.**

$\frac{8}{a} = \frac{10}{15}$ Write the proportion.

$8 \times 15 = a \times 10$ Find the cross products.

$120 = 10a$ Multiply.

$\frac{120}{10} = \frac{10a}{10}$ Divide each side by 10.

$12 = a$ Simplify.

The solution is 12.

Exercises

Determine if the quantities in each pair of ratios are proportional. Explain.

1. $\frac{8}{10} = \frac{4}{5}$

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

3. $\frac{6}{14} = \frac{9}{21}$

4. $\frac{15}{12} = \frac{9}{6}$

5. $\frac{\$2.48}{4\text{ oz}} = \frac{\$3.72}{6\text{ oz}}$

6. $\frac{125\text{ mi}}{5.7\text{ gal}} = \frac{120\text{ mi}}{5.6\text{ gal}}$

Solve each proportion.

7. $\frac{y}{7} = \frac{16}{28}$

8. $\frac{5}{15} = \frac{15}{w}$

9. $\frac{20}{b} = \frac{70}{28}$

10. $\frac{52}{8} = \frac{m}{9}$

NAME ______________________________ DATE ____________ PERIOD _____

6-6 Homework Practice

SCAS 7-2.5

Algebra: Solving Proportions

Determine if the quantities in each pair of ratios are proportional. Explain your reasoning.

1. 5 pounds of grass seed for 350 square feet and 8 pounds of grass seed for 560 square feet

2. 34 students from 8 schools and 25 students from 6 schools

Solve each proportion.

3. $\frac{5}{6} = \frac{a}{36}$

4. $\frac{k}{8} = \frac{8}{16}$

5. $\frac{7}{c} = \frac{14}{38}$

6. $\frac{4}{9} = \frac{40}{x}$

7. $\frac{12}{d} = \frac{5}{7}$

8. $\frac{6}{m} = \frac{42}{7}$

9. $\frac{n}{3.2} = \frac{3}{8}$

10. $\frac{2.8}{7.7} = \frac{z}{4.4}$

11. $\frac{1.5}{3.5} = \frac{4.5}{y}$

12. **CONDIMENTS** A store sells a 9-ounce jar of mustard for \$1.53 and a 15-ounce jar for \$2.55. Is the cost of the mustard proportional to the number of ounces for each jar? Explain your reasoning.

13. **SCIENCE** There are 113.2 grams in 4 ounces of compound. How many grams are in 5 ounces of compound?

14. **FURNITURE** A furniture company has 15 trucks that make about 120 deliveries each day. The company is expanding and expects an additional 40 deliveries each day. Write and solve a proportion to find how many more trucks are needed so the truck-to-delivery ratio remains the same.

15. **CHARITY** Karthik spent \$35 of his allowance and gave \$5 to a charity. If the number of dollars he spends is proportional to the number of dollars he gives to a charity, how much of a \$100-allowance will he give to a charity?

NAME ______________________________ DATE ____________ PERIOD _____

6-6 Problem-Solving Practice

SCAS 7-2.5

Algebra: Solving Proportions

1. **COOKING** Theo wants to use a cookie recipe that makes 36 cookies but he wants to reduce the number of cookies to 24. If the recipe specifies using 2 cups of sugar, how much sugar should he use?

2. **MEDICINE** In order to determine her pulse rate, June's nurse counted 18 beats in her pulse in 15 seconds. At this rate, how many beats would she have in 60 seconds?

3. **LABOR** Ed earned $112 for 8 hours of work. At this rate, how much will he earn for 40 hours of work?

4. **TRAVEL** Rita traveled 1,250 miles in the first 3 days of her trip. At this rate, how long will it take her to travel 1,875 miles?

5. **MODELS** An architect built a model of a 220-foot tall building he is designing. The model is 25 inches tall and 10 inches wide. How wide is the actual building?

6. **TESTING** Mary is preparing for her college entrance exams. In a practice test, she answered 12 problems in 30 minutes. At this rate, how many questions can she expect to answer in 150 minutes?

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6-7 Study Guide

SCAS 7-1.1

Problem-Solving Investigation: Draw a Diagram

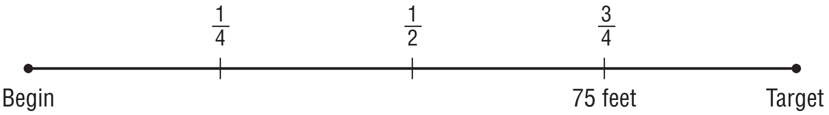
When solving problems, draw a diagram to show what you have and what you need to find.

Example **CARNIVAL Jim has to reach a target at a carnival game to win a prize. After 3 throws he has gone 75 feet, which is $\frac{3}{4}$ of the way to the target. How far away is the target?**

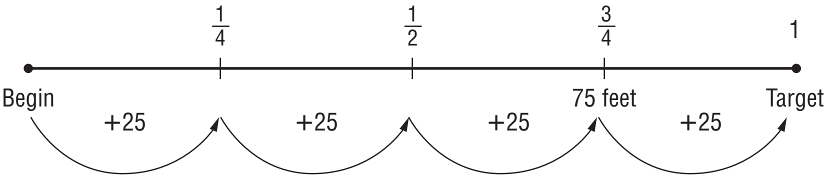
Understand We know that 75 feet is $\frac{3}{4}$ of the way to the target.

Plan Draw a diagram to show the distance already thrown and the fraction it represents.

Solve



If $\frac{3}{4}$ of the distance is 75 feet, then $\frac{1}{4}$ of the distance is 25 feet. So, the missing $\frac{1}{4}$ must be another 25 feet.



The total distance that Jim must throw to hit the target is 100 feet.

Check Since $\frac{3}{4}$ of the total distance is 75 feet, the equation $\frac{3}{4}x = 75$ represents this problem. Solving, we get $x = 100$ feet. So, the solution checks.

Exercises

1. **SALES** Sharon wants to buy a new car. She has saved up $ 1,500, which is approximately $\frac{1}{5}$ of the price of the car. How much does she need to save in order to buy the new car?

2. **TRAVEL** The Jones family has traveled 360 miles. They are $\frac{4}{5}$ of the way to their destination. How far away is their destination from where they started?

NAME ____ DATE ______________ PERIOD _____

6-7 Skills Practice

SCAS 7-1.1

Problem-Solving Investigation: Draw a Diagram

Draw a diagram to solve.

1. **HOMEWORK** Shantel is studying for her history test. After 20 minutes, she is $\frac{1}{4}$ of the way done. How much longer will she study?

2. **RECIPES** Damon is making muffins. He has added $\frac{3}{4}$ of the ingredients. If he has added 6 ingredients, how many more does he have to add to be finished?

3. **TRAVEL** The Smithsons are going to Dallas, TX on vacation. They have traveled $\frac{1}{3}$ of the total distance. If they have traveled 126 miles, how far is it from their house to Dallas?

4. **PHYSICS** A ball is dropped from 256 feet above the ground. It bounces up $\frac{1}{4}$ as high as it fell. This is true for each successive bounce. What height will the ball reach on the third bounce?

5. **SCHOOL** Mrs. Wright says that $\frac{2}{3}$ of her class has arrived for the day. If 10 students have arrived, how many students are in her class?

6. **TRAVEL** Jeremy walked $\frac{1}{4}$ of the way to school, ran $\frac{1}{4}$ of the way to school, then rode with his best friend the rest of the way. If he walked 1.5 miles, how far did he ride with his friend?

NAME ______________________________ DATE ______________ PERIOD _____

6-7 Homework Practice

SCAS 7-1.1

Problem-Solving Investigation: Draw a Diagram

Mixed Problem Solving

Use the draw a diagram strategy to solve Exercises 1 and 2.

1. **ANTS** An ant went 2 meters away from its nest searching for food. The next time, the ant went 3 meters away. Each successive time the ant leaves the nest to search for food, the ant travels the sum of the two previous times. How far will the ant travel on his fifth trip?

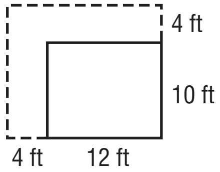
2. **NECKLACES** The center bead of a pearl necklace has a 16 millimeter diameter. Each successive bead in each direction is $\frac{3}{4}$ the diameter of the previous one. Find the diameter of the beads that are three away from the center bead.

Use any strategy to solve Exercises 3–6. Some strategies are shown below.

Problem-Solving Strategies
• Work backward. • Make an organized list. • Eliminate possibilities. • Draw a diagram.

3. **TALENT SHOW** At a talent show, 60% of the acts were singing. One-third of the remaining acts were instrumental. If 12 acts were instrumental, how many acts were in the talent show?

4. **GEOMETRY** Miss Greenwell is adding 4 feet to the length and width of her rectangular garden as shown in the diagram. How much additional area will the garden have?



A. 16 ft^2
B. 104 ft^2
C. 120 ft^2
D. 224 ft^2

5. **YARD SALE** Myron has sold $18.50 worth of items at his yard sale. A neighbor bought two items and handed Myron a $10 bill. Myron returned $7.75 in change. How much has Myron now sold?

6. **COUNTRIES** The table shows the total land area of five countries.

Country	Total Area
Brazil	8.5 million sq km
Canada	10.0 million sq km
China	9.6 million sq km
Russia	17.1 million sq km
United States	9.6 million sq km

Estimate how much more total area Russia has than China.

NAME ______________________________ DATE ____________ PERIOD _____

6-7 Problem-Solving Practice

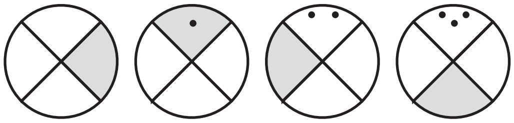
SCAS 7-1.1

Problem-Solving Investigation: Draw a Diagram

Solve each problem using any strategy you have learned.

1. MONEY Chantel has $125 left in her checking account after writing checks for $35, $22.50 and $16. What was her balance before she wrote the checks?

2. GEOMETRY Draw the next three figures in the pattern.



3. PIZZA Olivia has eaten $\frac{1}{3}$ of the pizza. If she has eaten 3 pieces, how many pieces were originally in the pizza?

4. EXERCISE Katlyn runs 2 miles after school each day and 3 miles on Saturday and 4 miles on Sunday. How many miles does she run during one week?

5. WORK Jefferson wants to work at least 25 hours this week. If he has already worked 22 hours, how many hours does he need to work on Saturday?

6. TRAVEL The bus to Washington has traveled $\frac{5}{6}$ of the way there. If it has traveled 80 miles, how much farther does it have to go?

7. MUSEUMS The Art Club is planning on attending a museum. The admission cost is $10 for adults and $7.50 for students. If they plan on having 2 adults attend as chaperones and have $150 saved from a fundraiser, what is the maximum number of students who can attend?

8. SPORTS Janean made 50 baskets during the week at practice. The table below shows when she made the baskets. How many baskets did she make on Friday?

Day	Number of Baskets
Monday	5
Tuesday	12
Wednesday	16
Thursday	7
Friday	??

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6-8 Explore Through Reading

SCAS 7-5.1

Scale Drawings

Get Ready for the Lesson

Do the Mini Lab at the top of page 320 in your textbook. Write your answers below.

1. Let 1 unit on the grid paper represent 2 feet. So, 4 units = 8 feet. Convert all your measurements to units.

2. On grid paper, make a drawing of your gymnasium like the one shown at the top of page 320.

Read the Lesson

3. Look at the map in the middle of page 320. What is the scale? What does the scale mean?

4. In Example 1, could you find the actual distance if you did not know the scale? Explain your answer.

5. Give another example of a scale drawing or scale model that is different from the examples of scale drawings and scale models given in this lesson in your textbook.

Remember What You Learned

6. How is a scale drawing similar to a scale model? How is it different?

NAME ______________________________ DATE ____________ PERIOD _____

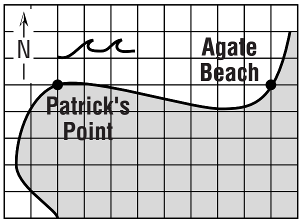
6-8 Study Guide

SCAS 7-5.1

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.**



$$\begin{array}{rcccl} & \textbf{Scale} & & \textbf{Patrick's Point to Agate Beach} & \\ \text{map} \rightarrow & \dfrac{1 \text{ unit}}{50 \text{ yards}} & = & \dfrac{8 \text{ units}}{x \text{ yards}} & \leftarrow \text{map} \\ \text{actual} \rightarrow & & & & \leftarrow \text{actual} \end{array}$$

$$1 \times x = 50 \times 8 \quad \text{Cross products}$$

$$x = 400 \quad \text{Simplify.}$$

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

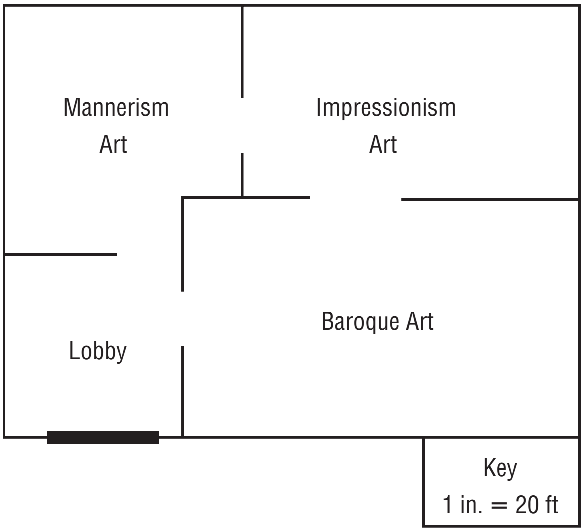
NAME ______________________________ DATE ____________ PERIOD _____

6-8 Homework Practice

SCAS 7-5.1

Scale Drawings

For Exercises 1–3, use the diagram of a section of the art museum shown. Use a ruler to measure.



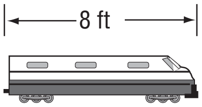
1. What is the actual length of the *Impressionism Art* room?

2. Find the actual dimensions of the *Baroque Art* room.

3. Find the scale factor for this blueprint.

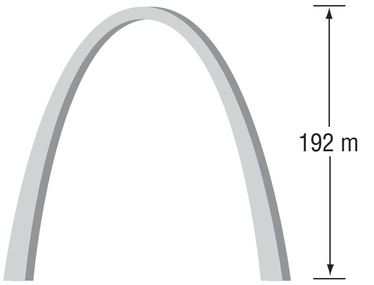
Find the length of each model on the scale drawing with the given scale.

4.



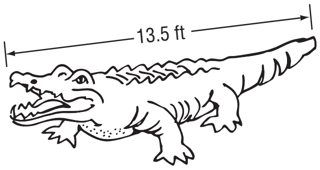
1 in. = 8 ft

5.



1 cm = 4 meters

6.



2 in = 1.5 ft

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.

NAME ______________________________ DATE ____________ PERIOD ______

Mini-Project

SCAS 7-5.1

(Use with Lesson 6-8)

Scale Drawings

The Room of Your Dreams

What if you could build a room of any size and put anything you wanted in it?

Use the grid as a blueprint. Title your drawing and choose a scale. Then sketch the things you would put in your room, such as a bed, a desk, closet, TV, windows, a door. You can make the furnishings larger or smaller than usual. Make sure you draw everything to scale. Label everything in the room.

1. List the objects in your room and their actual size.

____

____

____

2. Why did you want these things in your room? ____________________

____

3. Why did you choose these sizes? ____________________________

____

NAME ______________________________ DATE ____________ PERIOD _____

6-9 Explore Through Reading

SCAS 7-2.1

Fractions, Decimals, and Percents

Get Ready for the Lesson

Read the introduction at the top of page 328 in your textbook. Write your answers below.

1. What percent of the teens chose comedy?

2. Write this percent as a ratio in simplest form.

Read the Lesson

3. Write $6\frac{1}{2}\%$ as a fraction in simplest form.

4. **CLOTHING** A pair of jeans sells for 180% of its wholesale price. Write this percent as a fraction in simplest form.

5. How do you write 100 as a fraction?

6. If the denominator is not a factor of 100, you can write fractions as percents by using a proportion. In Examples 3 and 4, why is the ratio $\frac{n}{100}$ used as part of the proportions?

Remember What You Learned

7. Complete the following table of equivalent fractions. Look for patterns in each column. How do the percents increase? How do the fractions increase? Work with a partner. Figure out ways to remember the equivalents.

Common Fraction/Decimal/Percent Equivalents

Fraction	Decimal	Percent	Fraction	Decimal	Percent
$\frac{1}{3}$			$\frac{3}{8}$		$37\frac{1}{2}\%$
		$66\frac{2}{3}\%$	$\frac{5}{8}$	0.625	
$\frac{1}{8}$				0.875	$87\frac{1}{2}\%$

NAME ______________________________ DATE ____________ PERIOD _____

6-9 Study Guide

SCAS 7-2.1

Fractions, Decimals, and Percents

Example **Write $4\frac{3}{8}\%$ as a fraction in simplest form.**

$4\frac{3}{8}\% = \dfrac{4\frac{3}{8}}{100}$	Write a fraction.
$= \frac{43}{8} \div 100$	Divide.
$= \frac{35}{8} \div 100$	Write $4\frac{3}{8}$ as an improper fraction.
$= \frac{35}{8} \times \frac{1}{100}$	Multiply by the reciprocal of 100, which is $\frac{1}{100}$.
$= \frac{35}{800}$ or $\frac{7}{160}$	Simplify.

Example 2 **Write $\frac{5}{16}$ as a percent.**

$\frac{5}{16} = \frac{n}{100}$	Write a proportion using $\frac{n}{100}$.
$500 = 16n$	Find the cross products.
$\frac{500}{16} = \frac{16n}{16}$	Divide each side by 16.
$31\frac{1}{4} = n$	Simplify.

So, $\frac{5}{16} = 31\frac{1}{4}\%$ or 31.25%.

Exercises

Write each percent as a fraction in simplest form.

1. 60%

2. $68\frac{3}{4}\%$

3. $27\frac{1}{2}\%$

4. 37.5%

Write each fraction as a percent. Round to the nearest hundredth if necessary.

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

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

7. $\frac{9}{16}$

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

NAME ______________________ DATE ____________ PERIOD _____

6-9 Homework Practice

SCAS 7-2.1

Fractions, Decimals, and Percents

Write each percent as a fraction in simplest form.

1. 37.5%

2. 5.8%

3. 43.75%

4. 52.5%

5. $83\frac{1}{3}\%$

6. $66\frac{2}{3}\%$

7. 135%

8. 0.01%

Write each fraction as a percent. Round to the nearest hundredth if necessary.

9. $\frac{13}{20}$

10. $\frac{9}{25}$

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

12. $\frac{39}{40}$

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

14. $\frac{6}{7}$

15. $\frac{2}{1}$

16. $\frac{1}{1000}$

Replace each • with >, < or = to make a true statement.

17. $\frac{3}{16}$ • 24%

18. 0.775 • $\frac{31}{40}$

19. 16% • 0.016

Order each set of numbers from least to greatest.

20. 0.6, 23%, 0.07, $\frac{2}{3}$

21. $\frac{4}{5}\%$, 0.37, $\frac{1}{4}$, 0.4

22. **SAVINGS** Kayla has 14.5% of her salary placed into an Individual Retirement Account. What fraction is this?

23. **INTERNET** At home, 2 out of 5 people have access to broadband technology. What percent is this?

24. **SPORTS** A golfer made par on 13 of 18 holes. To the nearest tenth, on what percent of the holes did he make par?

ANALYZE TABLES For Exercises 25 and 26, use the table that shows the percent of households with the listed appliance.

Appliance	Percent of Households
Refrigerator	99.3%
Washing Machine	82.0%
Dryer	77.8%
Dishwasher	56.0%

25. What fraction of households have a clothes dryer?

26. Approximately 34 out of 67 households have a coffeemaker. Is this greater or less than the percent of households with a dishwasher? Explain.

NAME ______________________________ DATE ____________ PERIOD _____

6-9 Problem-Solving Practice

SCAS 7-2.1

Fractions, Decimals, and Percents

INTERNET For Exercises 1–4, use the table. It shows the percents of online shopping purchases made by all Internet users and the percents made by Internet users over age 55.

Most Popular Online Purchases		
	Internet Users Over 55	**All Internet Users**
computer software	43%	19%
books	43%	21%
computer hardware	24%	13%
music CDs	29%	22%
clothing	19%	8%

1. What fraction of Internet users over 55 bought clothing online?

2. What fraction of all Internet users bought clothing online?

3. What fraction of all Internet users bought music CDs online?

4. Is the fraction of Internet users over 55 who bought books online greater or less than $\frac{22}{50}$? Explain.

5. **FOOTBALL** In 2005, Indianapolis quarterback Peyton Manning completed 305 out of 453 passes. What was his pass completion percentage to the nearest tenth?

6. **COMPUTERS** In Joan's math class, there are 20 computers and 32 students. What percent of students will be able to use a computer without sharing?

7. **VEHICLES** In the town of Orick, 5 out of 13 vehicles are trucks. What percent of the vehicles are trucks? Round to the nearest tenth.

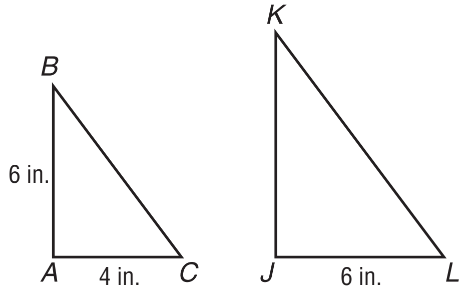
8. **DENTISTRY** Dana has fillings in 4 of her 32 teeth. What percent of her teeth have fillings?

Name Date

Chapter 6 Test

Mastering the SC Standards

1 $\triangle ABC$ is similar to $\triangle JKL$. What is the length of $\overline{JK}$?



Ⓐ 6 in.

Ⓑ 7 in.

Ⓒ 9 in.

Ⓓ 10 in.

7-2.5

2 A 12-ounce can of peaches costs $1.38. What is the cost per ounce of the can of peaches?

Ⓐ $0.10/oz

Ⓑ $0.105/oz

Ⓒ $0.11/oz

Ⓓ $0.115/oz

7-2.5

3 Laura has a piece of ribbon that measures 400 millimeters. What is the length of the ribbon expressed in centimeters?

Ⓐ 0.04 centimeters

Ⓑ 0.4 centimeters

Ⓒ 4 centimeters

Ⓓ 40 centimeters

7-5.5

4 Kenesha wants to hike the Oakridge trail at Conagree National Park. The scale on her map of the park is 1 inch = 3 miles. If the length of the trail is 2.5 inches on the map, how long is the actual trail?

Ⓐ 4.8 miles

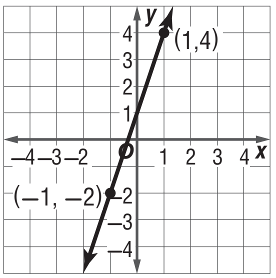
Ⓑ 5.5 miles

Ⓒ 7.5 miles

Ⓓ 9 miles

7-5.1

5 What is the slope of the line below?



Ⓐ -3

Ⓑ $\frac{1}{3}$

Ⓒ $\frac{5}{3}$

Ⓓ 3

7-3.3

Name Date

Chapter 6 Test (continued)

Mastering the SC Standards

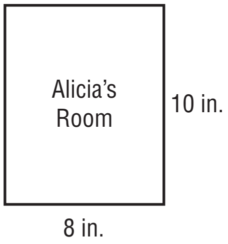
6 The palmetto tree is the state tree of South Carolina. The palmetto tree outside of Jack's house is 63 feet tall. How tall is the tree in yards?

Ⓐ 18 yards
Ⓑ 21 yards
Ⓒ 31 yards
Ⓓ 45 yards

7-5.5

---

7 Alicia makes a scale drawing of her room. If each inch represents 1.5 feet, what are the actual dimensions of Alicia's room?



Ⓐ 10 ft by 12 ft
Ⓑ 12 ft by 15 ft
Ⓒ 12 ft by 16 ft
Ⓓ 14 ft by 16 ft

7-5.1

---

8 How many ounces are there in a 3-pound bag of apples?

Ⓐ 36 oz
Ⓑ 42 oz
Ⓒ 48 oz
Ⓓ 56 oz

7-5.5

---

9 Chen plans to compete in the annual Hilton Head Island Bridge run. It is a 5 kilometer race. What is the distance of the race in meters?

Ⓐ 500 m
Ⓑ 2,500 m
Ⓒ 5,000 m
Ⓓ 50,000 m

7-5.5

---

10 Manuel buys a package of 15 pens for \$2.95. What is the unit cost of one pen rounded to the nearest cent?

Ⓐ \$0.17
Ⓑ \$0.20
Ⓒ \$0.25
Ⓓ \$1.20

7-2.5

---

11 The Garcia family plans a trip to their cousins' house. The distance on a map between the two houses is 8.5 inches. The scale of the map is 1 inch = 30 miles. Which proportion can be used to find the actual distance, d, between the two houses?

Ⓐ $\frac{30}{1} = \frac{d}{8.5}$
Ⓑ $\frac{1}{30} = \frac{d}{8.5}$
Ⓒ $\frac{8.5}{30} = \frac{d}{1}$
Ⓓ $\frac{8.5}{30} = \frac{1}{d}$

7-5.1

NAME ________________________________ DATE ______________ PERIOD _____

7 Anticipation Guide

Applying Percent

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. 65% of 123 can be found by multiplying 0.65 times 123.	
	2. The proportion $\frac{17}{22} = \frac{p}{100}$ could be used to find what percent of 22 is 17.	
	3. A good estimate of 83% of 200 is 16.	
	4. Estimating is a good way to check the reasonableness of an answer to a problem.	
	5. It is always easier to write the percent as a decimal rather than a fraction when solving a percent equation.	
	6. A 200% increase would mean the original amount doubled.	
	7. To find the total cost of an item including a $6\frac{1}{2}$% sales tax, multiply the price by 0.065 and add that amount to the price.	
	8. A $6\frac{1}{2}$% sales tax is a percent of decrease.	
	9. The formula for calculating interest, $I = prt$, can be used to find the amount of interest earned on an account or the amount of interest owed on money that is borrowed.	

STEP 2 ***After you complete Chapter 7***

- Reread each statement and complete the last column by entering an A or a D.
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a piece of paper to write an example of why you disagree.

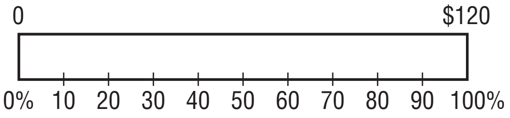
NAME ______________________________ DATE ______________ PERIOD _____

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.

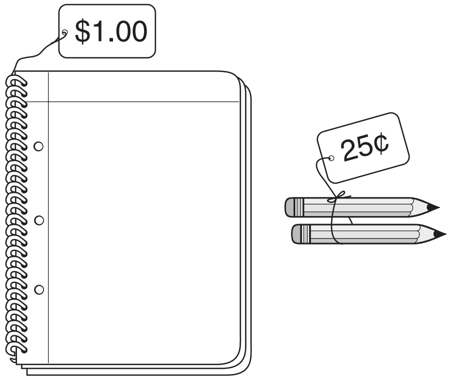
1. Benny wants to find 25% of $120. Use the graphic below to help him find the solution.



What is 25% of $120?

A $40
B $30
C $25
D $10

2. The school supplies shown below are currently on sale for 15% off the listed prices.



How much will 3 notebooks and 16 pencils cost at their sale prices?

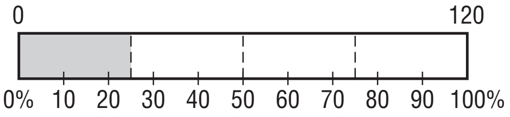
A $2.55
B $2.95
C $4.25
D $5.95

Fold here.

Solution

1. *Hint: This problem can be approached several different ways, including shading the area that you are looking for, using fractions, or using percent proportions.*

25% can also be written as $\frac{25}{100}$, which reduces to $\frac{1}{4}$, as shown below.



25% of 120 is the same as $\frac{1}{4}$ of 120, which is 120 ÷ 4, or 30.

The answer is **B**.

Solution

2. *Hint: 15% off the regular price is 85% of the regular price.*

The total cost at regular price would be 3 notebooks × $1.00 + 8 pairs of pencils × $0.25, or $5.00. In order to find the sale price, multiply 85% × 5.

$$0.85 \times 5 = \$4.25$$

The answer is **C**.

7-1 Explore Through Reading

SCAS **7-2.1,** 7-1.4

Percent of a Number

Get Ready for the Lesson

Read the introduction at the top of page 344 in your textbook. Write your answers below.

1. Sketch the model and label using decimals instead of percents.

2. Sketch the model using fractions instead of percents.

3. Use these models to write two multiplication sentences that are equivalent to 60% of 2,000 = 1,200.

Read the Lesson

4. What are two methods for finding the percent of a number?

5. When writing a percent as a fraction to solve a percent problem, what is helpful to do to the percent before solving the problem?

6. What is unusual about the answer to a percent problem where the percent taken is larger than 100?

Remember What You Learned

7. Suppose one of your friends said to you, "I want to pay for lunch and I know I'm supposed to leave a 15% tip, but I don't know how to figure out how much to leave." Write in your words what you would say to your friend to explain how to figure out the tip.

NAME ______________________________ DATE ____________ PERIOD _____

7-1 Study Guide

Percent of a Number

SCAS 7-2.1, 7-1.4

You can use a proportion or multiplication to find the percent of a number.

Example 1 **Find 25% of 80.**

$25\% = \frac{25}{100}$ or $\frac{1}{4}$ Write 25% as a fraction, and reduce to lowest terms.

$\frac{1}{4}$ of $80 = \frac{1}{4} \times 80$ or 20 Multiply.

So, 25% of 80 is 20.

Example 2 **What number is 15% of 200?**

15% of $200 = 15\% \times 200$ Write a multiplication expression.

$= 0.15 \times 200$ Write 15% as a decimal.

$= 30$ Multiply.

So, 15% of 200 is 30.

Exercises

Find each number.

1. Find 20% of 50.
2. What is 55% of $400?
3. 5% of 1,500 is what number?
4. Find 190% of 20.
5. What is 24% of $500?
6. 8% of $300 is how much?
7. What is 12.5% of 60?
8. Find 0.2% of 40.
9. Find 3% of $800.
10. What is 0.5% of 180?
11. 0.25% of 42 is what number?
12. What is 0.02% of 280?

NAME ______________________________ DATE ____________ PERIOD _____

7-1 Homework Practice

SCAS 7-2.1, 7-1.4

Percent of a Number

Find each number. Round to the nearest hundredth if necessary.

1. 55% of 140

2. 40% of 123

3. 37% of $150

4. 25% of 96

5. 11% of $333

6. 99% of 14

7. 140% of 30

8. 165% of 10

9. 150% of 150

10. 225% of 16

11. 106% of $40

12. 126% of 350

13. 4.1% of 30

14. 8.9% of 75

15. 24.2% of $120

16. 97.5% of 80

17. SALES Mr. Redding sells vehicles to 20% of the people that come to the sales lot. If 65 people came to the lot last month, how many vehicles did he sell?

Find each number. Round to the nearest hundredth if necessary.

18. $\frac{5}{6}$% of 600

19. $30\frac{1}{3}$% of 3

20. 1,000% of 87

21. 100% of 56

22. 0.25% of 150

23. 0.7% of 50

ANALYZE TABLES **For Exercises 24–26, use the table that shows the percents of blood types of 145 donors during a recent blood drive.**

Blood Type	Percent
O	45%
A	40%
B	11%
AB	4%

24. Write a proportion that can be used to find how many donors had type B blood. Then solve. Round to the nearest whole if necessary.

25. How many donors did *not* have type O blood? Round to the nearest whole if necessary.

26. Which blood type had less than 10 donors?

NAME ______________________________ DATE ______________ PERIOD _____

7-1 Problem-Solving Practice

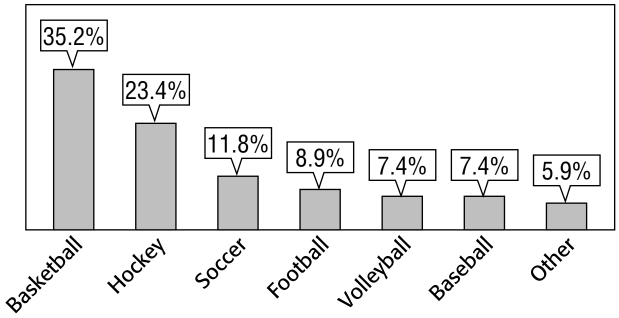
SCAS 7-2.1, 7-1.4

Percent of a Number

SPORTS For Exercises 1 and 2, use the graph below. It shows the results of a poll of 440 ninth grade students. Round answers to the nearest whole number.

PETS For Exercises 3 and 4, use the table below. It shows the pet ownership in Los Angeles, California. Assume that the same percents apply to a town of 1,650 households. Round answers to the nearest whole number.

Favorite Sports of Students



Pets in Household	Percent
at least one dog or cat	26.7
at least one dog	19.9
at least one cat	13
at least one dog and one cat	6.19

1. Write the percent as a fraction to find how many students surveyed chose hockey as their favorite sport. Solve.

2. How many students surveyed chose basketball as their favorite sport?

3. Write the percent as a decimal to find how many households have at least one dog. Solve.

4. How many households have at least one dog or cat?

5. **VOTING** Going into a recent election, only about 62% of people old enough to vote were registered. In a community of about 55,200 eligible voters, how many people are registered?

6. **COLLEGE** A local college recently reported that enrollment increased to 108% percent of last year. If enrollment last year was at 17,113, about how many students enrolled this year? Round to the nearest whole number.

NAME ______________________________ DATE ____________ PERIOD _____

7-2 Explore Through Reading

SCAS 7-2.1, 7-2.5

The Percent Proportion

Get Ready for the Lesson

Read the introduction at the top of page 350 in your textbook. Write your answers below.

1. Write the ratio of tire weight to total weight as a fraction.

2. Use a calculator to write the fraction as a decimal to the nearest hundredth.

3. What percent of the monster truck's weight are the tires?

Read the Lesson

4. What is a percent proportion?

5. Describe how the percent proportion is set up.

6. Select the information that can be found by solving each percent problem.

________ What number is 30% of 15?	**a.** Find the whole.
________ 18 is 65% of what number?	**b.** Find the percent.
________ What percent of 40 is 17?	**c.** Find the part.

Remember What You Learned

7. Write an example of each type of percent problem in the table below. (Be sure the examples are different from the ones given in the lesson and on this page.) Write the example in words and set up the correct proportion for each example.

Type	Example	Proportion
Find the Percent		
Find the Part		
Find the Whole		

NAME ______________________ DATE ____________ PERIOD _____

7-2 Study Guide

SCAS 7-2.1, 7-2.5

The Percent Proportion

A percent proportion compares part of a quantity to a whole quantity for one ratio and lists the percent as a number over 100 for the other ratio.

$$\frac{\text{part}}{\text{whole}} = \frac{\text{percent}}{100}$$

Example 1 **What percent of 24 is 18?**

$\frac{part}{whole} = \frac{percent}{100}$ Percent proportion

Let $n\%$ represent the percent.

$\frac{18}{24} = \frac{n}{100}$ Write the proportion.

$18 \times 100 = 24 \times n$ Find the cross products.

$1{,}800 = 24n$ Simplify.

$\frac{1{,}800}{24} = \frac{24n}{24}$ Divide each side by 24.

$75 = n$

So, 18 is 75% of 24.

Example 2 **What number is 60% of 150?**

$\frac{part}{whole} = \frac{percent}{100}$ Percent proportion

Let a represent the part.

$\frac{a}{150} = \frac{60}{100}$ Write the proportion.

$a \times 100 = 150 \times 60$ Find the cross products.

$100a = 9{,}000$ Simplify.

$\frac{100a}{100} = \frac{9{,}000}{100}$ Divide each side by 100.

$a = 90$

So, 90 is 60% of 150.

Exercises

Find each number. Round to the nearest tenth if necessary.

1. What number is 25% of 20?

2. What percent of 50 is 20?

3. 30 is 75% of what number?

4. 40% of what number is 36?

5. What number is 20% of 625?

6. 12 is what percent of 30?

NAME ______________________________ DATE ____________ PERIOD _____

7-2 Homework Practice

SCAS 7-2.1, 7-2.5

The Percent Proportion

Find each number. Round to the nearest tenth if necessary.

1. What percent of 65 is 13?

2. $4 is what percent of $50?

3. What number is 35% of 22?

4. 14% of 81 is what number?

5. 13 is 26% of what number?

6. 55 is 40% of what number?

7. What percent of 45 is 72?

8. 1% of what number is 7?

9. 33 is 50% of what number?

10. What number is 3% of 100?

11. What percent of 200 is 0.5?

12. What number is 0.4% of 20?

13. What number is 6.1% of 60?

14. What percent of 34 is 34?

15. 10.4% of what number is 13?

16. **ALLOWANCE** Monica has $3 in her wallet. If this is 10% of her monthly allowance, what is her monthly allowance?

17. **WEDDING** Of the 125 guests invited to a wedding, 104 attended the wedding. What percent of the invited guests attended the wedding?

18. **CAMERA** The memory card on a digital camera can hold about 430 pictures. Melcher used 18% of the memory card while taking pictures at a family reunion. About how many pictures did Melcher take at the family reunion? Round to the nearest whole number.

OCEANS For Exercises 19 and 20, use the table shown.

Ocean	Area (square miles)
Pacific	64 million
Atlantic	32 million
Indian	25 million

Source: World Atlas

19. The area of the Indian Ocean is what percent of the area of the Pacific Ocean? Round to the nearest whole percent.

20. If the area of the Arctic Ocean is 16% of the area of the Atlantic Ocean, what is the area of the Arctic Ocean? Round to the nearest whole million.

NAME ______________________________ DATE ____________ PERIOD _____

7-2 Problem-Solving Practice

SCAS 7-2.1, 7-2.5

The Percent Proportion

1. **DRIVING** David installed a device on his car that guaranteed to increase his gas mileage by 15%. He currently gets 22 miles per gallon. How much will the gas mileage increase after installing the device?

2. **POPULATION** The number of students at Marita's school decreased to 98% of last year's number. Currently, there are 1,170 students. How many students were there last year? Round to the nearest whole number.

3. **VOTING** Yolanda's club has 35 members. Its rules require that 60% of them must be present for any vote. At least how many members must be present to have a vote?

4. **GARBAGE** This month, Chun's office produced 690 pounds of garbage. Chun wants to reduce the weight of garbage produced to 85% of the weight produced this month. What is the target weight for the garbage produced next month?

5. **SALARIES** Alma just received a 6% raise in salary. Before the raise, she was making $52,000 per year. How much more will Alma earn next year?

6. **SPORTS** Sally's soccer team played 25 games and won 17 of them. What percent did the team win?

NAME ____ DATE ______________ PERIOD _____

7-3 Explore Through Reading

SCAS **7-2.1,** 7-1.1

Percent and Estimation

Get Ready for the Lesson

Read the introduction at the top of page 355 in your textbook. Write your answers below.

1. What fraction of women took lessons at school? How many of the 200 women is this?

2. Use a fraction to estimate the number of men who took lessons at school.

Read the Lesson

3. In Example 1, what does the ≈ sign mean in the sentence 62% of $520 \approx 60\%$ of 520? Why is it necessary to use this sign?

4. Describe Method 2 of Example 2 on page 356 in your textbook.

5. In Example 5, what is an easy way to find 0.5% of a number?

Remember What You Learned

6. Write fraction equivalents in simplest form for the following percents. Then work with a partner. Take turns asking each other fraction equivalents for any of the percents in the table, or think of others to quiz each other.

20%	40%	60%	80%
25%	50%	75%	100%

NAME ______________________________ DATE ____________ PERIOD _____

7-3 Study Guide

SCAS **7-2.1,** 7-1.1

Percent and Estimation

To estimate the percent of a number, you can use a fraction or a multiple of 10% or 1%.

Example 1 **Estimate 77% of 800.**

77% is about 75% or $\frac{3}{4}$.

77% of $800 \approx \frac{3}{4} \cdot 800$ Use $\frac{3}{4}$ to estimate.

≈ 600 Multiply.

So, 77% of 800 is about 600.

Example 2 **Estimate 137% of 50.**

137% is more than 100%, so 137% of 50 is greater than 50.
137% is about 140%.

140% of $50 = (100\%$ of $50) + (40\%$ of $50)$ $140\% = 100\% + 40\%$

$= (1 \cdot 50) + \left(\frac{2}{5} \cdot 50\right)$ $100\% = 1$ and $40\% = \frac{2}{5}$

$= 50 + 20$ or 70 Simplify.

So, 137% of 50 is about 70.

Example 3 **Estimate 0.5% of 692.**

0.5% is half of 1%. 692 is about 700.

1% of $700 = 0.01 \cdot 700$ To multiply by 1%, move the decimal point two places to the left.

$= 7$

One half of 7 is $\frac{1}{2} \cdot 7$ or 3.5.

So, 0.5% of 697 is about 3.5.

Exercises

Estimate. 1–12.

1. 24% of 36

2. 81% of 25

3. 11% of 67

4. 150% of 179

5. 67% of 450

6. 79% of 590

7. 0.4% of 200

8. 42% of 61

9. 19% of 41

10. 129% of 54

11. 32% of 66

12. 0.2% of 150

NAME ______________________________ DATE ____________ PERIOD _____

7-3 Homework Practice

SCAS 7-2.1, 7-1.1

Percent and Estimation

Estimate.

1. 39% of 80

2. 31% of 40

3. 28% of 110

4. 74% of 160

5. 87% of 19

6. 91% of 82

7. 34% of 59

8. 66% of 148

9. 9% of 71

10. 73% of 241

11. 126% of 80

12. 234% of 145

13. $\frac{1}{3}$% of 307

14. $\frac{1}{4}$% of 798

15. 1.1% of 62

16. 4.1% of 101

17. 67% of 11.9

18. 31% of 68.7

19. 9.8% of 359

20. 97.9% of 39

21. 52% of 57.9

22. 33% of 15.3

23. 21.1% of 151

24. 2.9% of 61.2

25. **ELEVATION** The highest point in Arizona is Humphreys Peak with an elevation of 12,633 feet. Estimate the elevation of the highest point in Florida, located in Walton County, if it is about 2.7% of the highest point in Arizona.

26. **BRAIN** The brain weight of a newborn baby is about 13% of the body weight of the newborn. If a newborn weighs 2,900 grams, about how much does the brain weigh?

27. **STOCKS** The value of a share of stock in an electronics company increased by $\frac{2}{3}$% during one week. If the value of a share of stock was $141 at the beginning of the week, estimate the increase in value of a share of stock at the end of the week.

NAME ______________________________ DATE ____________ PERIOD ______

Mini-Project

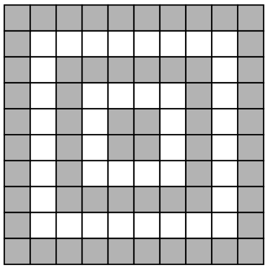
SCAS **7-2.1,** 7-1.1

(Use with Lesson 7-3)

Percent and Estimation

Estimate the percent of the shaded portion for each figure. Then count grid squares to find the actual percent shaded.

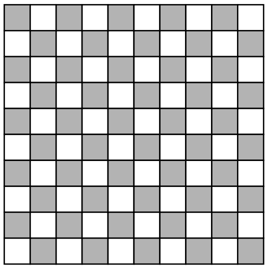
1.



Estimate: ____________

Actual: ______________

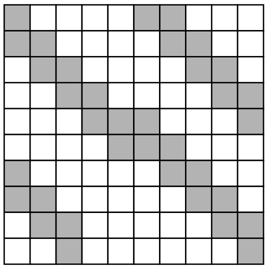
2.



Estimate: ____________

Actual: ______________

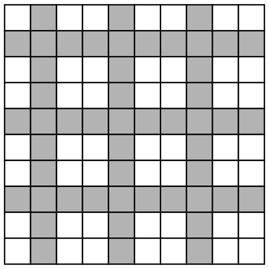
3.



Estimate: ____________

Actual: ______________

4.



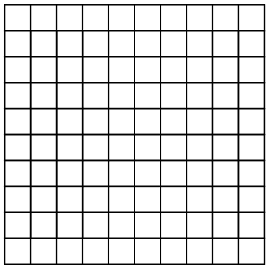
Estimate: ____________

Actual: ______________

5. How did your estimates compare with the actual percents?

____

6. Shade your own grid. Estimate the percent shaded and count to find the exact percent.



Estimate: ____________

Actual: ______________

NAME ______________________________ DATE ____________ PERIOD _____

7-4 Explore Through Reading

SCAS 7-2.1

Algebra: The Percent Equation

Get Ready for the Lesson

Read the introduction at the top of page 361 in your textbook. Write your answers below.

1. Use the percent proportion to find how many species are insects.

2. Express the percent of insects as a decimal. Then multiply the decimal by 854,000.

Read the Lesson

3. The word *percent* is used in both the percent proportion and the percent equation. There is one major difference in the way percent is represented in each. What is the difference?

4. Write the following problems as percent proportions and as percent equations.

Problem	Percent Proportion	Percent Equation
9 is 60% of what number?		
Find 50% of 6.		
40% of what number is 48?		
18 is what percent of 72?		

Remember What You Learned

5. Work with a partner. One person should ask a question like the questions given as examples in the concept summary box. The other person should name the type of percent problem and name the equation that should be used to solve the problem. Do not solve the equation. Then trade roles. Continue until each of you can name the problem type and the related equation easily.

NAME ______________________________________ DATE ______________ PERIOD _____

7-4 Study Guide

SCAS 7-2.1

Algebra: The Percent Equation

To solve any type of percent problem, you can use the **percent equation**, part = percent • base, where the percent is written as a decimal.

Example 1 **600 is what percent of 750?**

600 is the part and 750 is the whole. Let n represent the percent.

$$\underbrace{\text{part}} = \underbrace{\text{percent}} \cdot \underbrace{\text{whole}}$$

$600 = n \cdot 750$ Write an equation.

$\frac{600}{750} = \frac{750n}{100}$ Divide each side by 750.

$0.8 = n$ Simplify.

$80\% = n$ Write 0.8 as a percent.

So, 600 is 80% of 750.

Example 2 **45 is 90% of what number?**

45 is the part and 90% or 0.9 is the percent. Let n represent the whole.

$$\underbrace{\text{part}} = \underbrace{\text{percent}} \cdot \underbrace{\text{whole}}$$

$45 = 0.9 \cdot n$ Write an equation.

$\frac{45}{0.9} = \frac{0.9n}{0.9}$ Divide each side by 0.9.

$50 = n$ The whole is 50.

So, 45 is 90% of 50.

Exercises

Write an equation for each problem. Then solve. Round to the nearest tenth if necessary.

1. What percent of 56 is 14?

2. 36 is what percent of 40?

3. 80 is 40% of what number?

4. 65% of what number is 78?

5. What percent of 2,000 is 8?

6. What is 110% of 80?

7. 85 is what percent of 170?

8. Find 30% of 70.

NAME ________________________________ DATE ____________ PERIOD _____

7-4 Homework Practice

SCAS 7-2.1

Algebra: The Percent Equation

Write an equation for each problem. Then solve. Round to the nearest tenth if necessary.

1. What number is 27% of 52?

2. Find 41% of 48.

3. What percent of 88 is 33?

4. 8 is what percent of 18?

5. What number is 33% of 360?

6. What percent of 62 is 58?

7. 55 is what percent of 100?

8. 22% of what number is 24.2?

9. 19 is 50% of what number?

10. 25 is 32% of what number?

11. 40% of what number is 28?

12. 30 is what percent of 60?

13. What percent of 5 is 2?

14. 44% of 10 is what number?

15. Find 110% of 88.

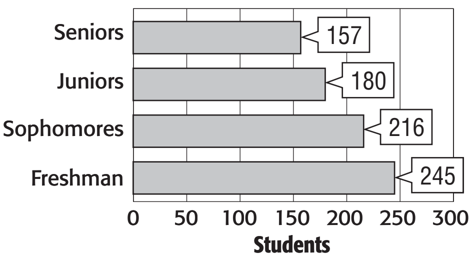
16. What number is 60% of 21.8?

17. What percent of 180 is 210?

18. 220 is 95.3% of what number?

19. BASEBALL A baseball player was at bat 473 times during the regular season. If he made a hit 31.5% of the times he was at bat, how many hits did he make during the regular season? Round to the nearest whole number if necessary.

ANALYZE GRAPHS **For Exercises 20 and 21, use the graph shown. The total enrollment at Central High School is 798 students.**



20. About what percent of the students at Central High are freshmen? Round to the nearest tenth if necessary.

21. About what percent of the students at Central High are seniors? Round to the nearest tenth if necessary.

7-4 Problem-Solving Practice

SCAS 7-2.1

Algebra: The Percent Equation

1. **DINING** Jonas and Linda's restaurant bill comes to $23.40. They are planning to tip the waiter 15% of their bill. How much money should they leave for a tip?

2. **CHESS** The Briarwood Middle School chess club has 55 members. 22 of the members are in seventh grade. What percent of the members of the chess club are in seventh grade?

3. **TENNIS** In the city of Springfield, 75% of the parks have tennis courts. If 15 parks have tennis courts, how many parks does Springfield have altogether?

4. **COLLEGE** There are 225 students in eighth grade at Jefferson Middle School. A survey shows that 64% of them are planning to attend college. How many Jefferson eighth grade students are planning to attend college?

5. **BASEBALL** In a recent season, the Chicago White Sox won 99 out of 162 games. What percent of games did the White Sox win? Round to the nearest tenth if necessary.

6. **HOUSING** In the Stoneridge apartment complex, 35% of the apartments have one bedroom. If there are 49 one-bedroom apartments, what is the total number of apartments at Stoneridge?

7. **SPACE** On Mars, an object weighs 38% as much as on Earth. How much would a person who weighs 165 pounds on Earth weigh on Mars?

8. **FOOTBALL** In a recent season, quarterback Jake Plummer of the Denver Broncos had 7 passes intercepted out of 456 attempts. What percent of Jake Plummer's passes were intercepted? Round to the nearest tenth if necessary.

NAME ________________________ DATE ____________ PERIOD _____

7-5 Study Guide

SCAS 7-2.1, 7-1.7

Problem-Solving Investigation: Determine Reasonable Answers

When solving problems, often times it is helpful to determine reasonable answers by using rounding and estimation. Checking answers with a calculator is always helpful in determining if the answer found is in fact reasonable.

Example **SALES TAX There is 4.8% sales tax on all clothing items purchased. Danielle wants to buy a shirt, which costs \$18.95. Danielle figures that if she has \$20 she will have enough to buy the shirt. After adding in sales tax, is \$20 a reasonable amount for Danielle to bring?**

Understand The cost of the shirt is \$18.95. Sales tax is 4.8%. Danielle has \$20.

Plan Round \$18.95 to \$19.00 and 4.8% to 5%. Then use mental math to find 5% of \$19.00.

Solve Round \$18.95 to \$19.00

Round 4.8% to 5%

10% of \$19.00 = 0.1 × 19 or \$1.90 Use mental math. 10% = 0.1

Round \$1.90 to \$2.00

5% is $\frac{1}{2}$ of 10%

So $\frac{1}{2}$ of \$2.00 is \$1.00 \$1.00 is the amount of sales tax.

\$19.00 + \$1.00 = \$20.00 Add \$1.00 to \$19.00.

So \$20 is a reasonable amount of money for Danielle to bring to pay for the shirt.

Check Use a calculator to check.

0.048 × 18.95 = 0.9096

Since 0.9096 is close to 1, the answer is reasonable.

Exercises

1. TIP The total bill at a restaurant for a family of 5 is \$64.72. They want to leave a 20% tip. They decide to leave \$10.00. Is this estimate reasonable? Explain your reasoning.

2. TELEVISION A recent survey shows that 67% of students watch 3 or more hours of television a night. Suppose there are 892 students in your school. What would be a reasonable estimate of the number of students in your school who watch 3 or more hours of television a night? Explain your reasoning.

NAME ______________________________________ DATE _____________ PERIOD _____

7-5 Skills Practice

SCAS **7-2.1,** 7-1.7

Problem-Solving Investigation: Determine Reasonable Answers

Determine reasonable answers for each.

1. **MONEY** Gillian and Roger have lunch at a restaurant and Gillian needs to determine how much tip to leave based on their bill. If their bill was \$21.87 and Gillian wants to leave a 15% tip, what is a reasonable estimate for how much she should leave?

2. **SPORTS** Of the 82,000 fans that attended a bowl game between Ohio State and Notre Dame, 60% were Ohio State fans. About how many fans at the game were for Notre Dame?

3. **ICE CREAM** A survey of 1,950 people found that 39% preferred chocolate ice cream to vanilla. About how many people preferred chocolate ice cream according to the survey?

4. **EARTH** The surface area of Earth is approximately 70% water. If the surface area is about 510,000,000 square kilometers, about how many square kilometers are water?

5. **COLLEGE** Of 7,450 first-year college students interviewed, 72% had changed their major area of study since the beginning of the academic year. About how many students had kept the same major?

6. **MONEY** While shopping, Hilary spent \$149. If the amount she spent was 20% of her savings, how much savings did she have before she shopped?

NAME ________________________________ DATE ______________ PERIOD _____

7-5 Homework Practice

Problem-Solving Investigation: Determine Reasonable Answers

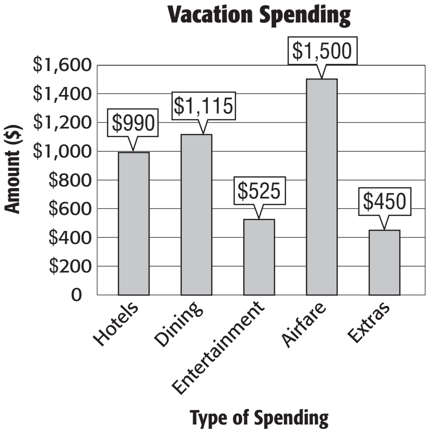
SCAS 7-2.1, 7-1.7

Mixed Problem Solving

For Exercises 1 and 2, determine a reasonable answer.

1. **HOMES** In a retirement village, 86% of the residents own their home. If the village has 540 homes, how many homes are owned by the residents, about 250, 350, or 450?

2. **ANALYZE GRAPHS** The graph shows how the Forenzo family spent their money on their summer vacation. Is 25% a reasonable estimate of how much money they spent on dining? Justify your answer.

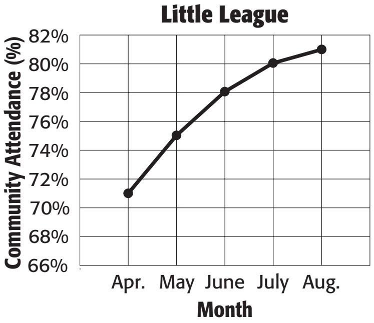


Use any strategy to solve Exercises 3–6. Some strategies are shown below.

Problem-Solving Strategies
• Guess and check. • Make an organized list. • Determine reasonable answers.

3. **NUMBER SENSE** 12 is added to 25% of a number. The result is 30. What is the number?

4. **ANALYZE GRAPHS** The graph shows the percent of community attendance during a little league season. Is 90% a reasonable estimate for the percent of community attendance for September? Explain.



5. **TRAVEL** Cecil averages 31 miles per gallon when driving his car on the highway to visit friends 461 miles away. If he filled the 16-gallon gasoline tank before leaving and did not buy any gasoline along the way, about how many gallons of gasoline are left in the tank when he arrives?

6. **FABRIC** Mrs. Tillman is making identical dresses for her three granddaughters. She needs $2\frac{1}{8}$ yards of fabric for each dress. If she purchased $8\frac{1}{2}$ yards of fabric, how much fabric will be leftover?

NAME ______________________________ DATE ____________ PERIOD _____

7-5 Problem-Solving Practice

Problem-Solving Investigation: Determine Reasonable Answers

SCAS 7-2.1, 7-1.7

Solve using any method.

1. **GYM** The 6^{th} graders are running the mile in physical education. Jared finishes the mile 2 minutes before Stacey who finished 1 minute 26 seconds behind Kareem. If Joanna completes the mile 1 minute and 42 seconds after Kareem, and her time is 8 minutes 34 seconds, what is Jared's time?

2. **POLITICS** A candidate receives 62% of the vote in an election and there are 1,603 votes recorded. How many votes did the candidate receive?

3. **POPULATION** The population of the United States is about 296,000,000. Spanish is the primary language for 10.7% of the population, about how many people speak Spanish as their primary language?

4. **BAKING** Bea has prepared a basic cookie dough to which she will add ingredients to make several types of cookies. She has chocolate chips, raisins, and peanut butter chips. She also has peanuts, pecans, and walnuts. If she wants to put one ingredient from the first group with one type of nut into the dough, how many different types of cookies can she make?

5. **COINS** Zachary has four different coins that total 41 cents. What coins does he have?

6. **DECORATING** Mr. Chen is planning to wallpaper his family room and dining room. The dining room is 11 feet by 13 feet, while the family room is 20 feet by 10 feet. All of the walls are 8 feet high. How many square feet of wallpaper does he need to wallpaper the two rooms?

7. **MOVIES** Charis is going to the movies with a friend. The price of admission is \$5.50, a small popcorn is \$2.39, and a small drink is \$2.65. If Charis has a ten dollar bill, does she have enough money for admission, popcorn, and a drink? If not, how much more money would she need?

8. **TRAVELING** Shawn is packing his suitcase for vacation. If he has 2 pairs of shorts, and 5 shirts, how many different outfits can he make?

NAME ________________________________ DATE ______________ PERIOD _____

7-6 Explore Through Reading

SCAS 7-2.1, 7-2.5

Percent of Change

Get Ready for the Lesson

Complete the Mini Lab at the top of page 369 in your textbook. Write your answers below.

Model each percent of change.

1. 25% increase

2. 75% increase

3. 30% increase

4. Describe a model that represents a 100% increase, a 200% increase, and a 300% increase.

5. Describe how this process would change to show percent of decrease.

Read the Lesson

6. In a percent of change, what are the two numbers that are being compared?

7. How can you tell if a percent of change is a percent of increase or a percent of decrease?

8. Tell how to find the amount of increase and the amount of decrease.

Remember What You Learned

9. Find an example of something in your life that has increased or decreased, such as your height in the past year. Calculate the percent of change and share your results with your class.

NAME ______________________________ DATE ____________ PERIOD _____

7-6 Study Guide

SCAS 7-2.1, 7-2.5

Percent of Change

A **percent of change** is a ratio that compares the change in quantity to the original amount. If the original quantity is increased, it is a **percent of increase**. If the original quantity is decreased, it is a **percent of decrease.**

Example 1 **Last year, 2,376 people attended the rodeo. This year, attendance was 2,950. What was the percent of change in attendance to the nearest whole percent?**

Since this year's attendance is greater than last year's attendance, this is a percent of increase.

The amount of increase is 2,950 – 2,376 or 574.

$$\text{percent of increase} = \frac{\text{amount of increase}}{\text{original amount}} \longleftarrow \boxed{\begin{array}{l}\text{new amount} -\\ \text{original amount}\end{array}}$$

$$= \frac{574}{2,376} \qquad \text{Substitution}$$

$$\approx 0.24 \text{ or } 24\% \qquad \text{Simplify.}$$

Rodeo attendance increased by about 24%.

Example 2 **John's grade on the first math exam was 94. His grade on the second math exam was 86. What was the percent of change in John's grade to the nearest whole percent?**

Since the second grade is less than the first grade, this is a percent of decrease. The amount of decrease is 94 − 86 or 8.

$$\text{percent of decrease} = \frac{\text{amount of decrease}}{\text{original amount}} \longleftarrow \boxed{\begin{array}{l}\text{original amount} -\\ \text{new amount}\end{array}}$$

$$= \frac{8}{94} \qquad \text{Substitution}$$

$$\approx 0.09 \text{ or } 9\% \qquad \text{Simplify.}$$

John's math grade decreased by about 9%.

Exercises

Find each percent of change. Round to the nearest whole percent if necessary. State whether the percent of change is an *increase* or *decrease*.

1. original: 4
new: 5

2. original: 1.0
new: 1.3

3. original: 15
new: 12

4. original: $30
new: $18

5. original: 60
new: 63

6. original: 160
new: 136

7. original: 7.7
new: 10.5

8. original: 9.6
new: 5.9

NAME ______________________________ DATE ____________ PERIOD _____

7-6 Homework Practice

SCAS 7-2.1, 7-2.5

Percent of Change

Find each percent of change. Round to the nearest whole percent if necessary. State whether the percent of change is an *increase* or *decrease*.

1. 8 feet to 10 feet

2. 136 days to 85 days

3. \$0.32 to \$0.37

4. 62 trees to 31 trees

5. 51 meters to 68 meters

6. 16.5 grams to 24.8 grams

7. 0.55 minutes to 0.1 minutes

8. \$180 to \$210

9. 2.9 months to 4.9 months

10. $\frac{1}{4}$ to $\frac{3}{8}$

11. $\frac{1}{6}$ to $\frac{1}{3}$

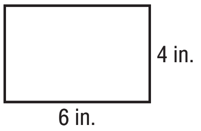
12. $\frac{4}{3}$ to $\frac{1}{3}$

13. **SURGERY** Recent developments in surgical procedures change the average healing time for some operations from 8 weeks to 3 weeks.

14. **ROADS** The city added an extra lane in each direction to the 5-lane road.

GEOMETRY For Exercises 15 and 16, refer to the rectangle shown. Suppose the width is decreased by 3 inches.

15. Find the percent change in the perimeter.



16. Find the percent change in the area.

ANALYZE TABLES For Exercises 17 and 18, refer to the table that shows the average monthly rainfall during the first six months of the year for Singapore.

17. Between which two consecutive months is the percent of decrease the greatest? What is the percent change? Round to the nearest whole percent.

18. Between which two consecutive months is the percent of increase the least? What is the percent change? Round to the nearest whole percent.

Month	Average Rainfall (inches/month)
January	9.4
February	6.5
March	6.8
April	6.6
May	6.7
June	6.4

NAME ______________________________ DATE ____________ PERIOD _____

7-6 Problem-Solving Practice

SCAS 7-2.1, 7-2.5

Percent of Change

1. SHOES A popular brand of running shoes costs a local store \$68 for each pair. If the store sells the shoes for \$119, what is the percent of increase in the price?	**2. CLUBS** Last year the backgammon club had 30 members. This year the club has 24 members. Find the percent of decrease in the number of members.
3. READING In the seventh grade, Rachel read 15 books. In the eighth grade, she read 18 books. Find the percent of increase in the number of books Rachel read.	**4. VOTES** Last year 762 students voted in the student council election at San Bruno Middle School. This year 721 students voted. To the nearest tenth, what was the percent of change in the number of students that voted?
5. HEIGHT When Hugo was 9 years old he was 56 inches tall. Hugo is now 12 years old and he is 62 inches tall. Find the percent of increase in Hugo's height to the nearest tenth.	**6. PLANTS** Alicia planted 45 tulip bulbs last year. This year she plans to plant 65 bulbs. Find the percent of increase in the number of tulip bulbs to the nearest tenth.
7. PICTURES The 2008 yearbook at Middleton Middle School had 236 candid pictures of students. The 2007 yearbook had 214 candid pictures of students. To the nearest tenth, what was the percent of change in the number of candid student pictures from 2007 to 2008?	**8. POPULATION** In 1990, there were 4,298,000 Mexican immigrants living in the United States. In 2000, this number had increased to 7,858,000. Find the percent of increase to the nearest tenth.

NAME ______________________________ DATE ____________ PERIOD _____

7-7

Explore Through Reading

SCAS 7-2.1, 7-2.5

Sales Tax and Discount

Get Ready for the Lesson

Read the introduction at the top of page 375 in your textbook. Write your answers below.

1. Calculate the sales tax by finding 4.25% of $1,849. Round to the nearest cent.

2. What will be the total cost including the sales tax?

3. Multiply 1.0425 and 1,849. How does the result compare to your answer in Exercise 2?

Read the Lesson

4. In Example 1, the ≈ is used when the sales tax is found. Why is the value of 0.0575 times 140 rounded?

5. In Method 2 of Example 1, why is the sales tax added to 100%?

6. In Examples 2 and 3, the percent equation is used to find discount price and to find the original price. When using the percent equation, how do you represent the percent?

Remember What You Learned

7. Use the Internet to find the state sales tax in your state, including tax on food, prescription drugs, and nonprescription drugs, if applicable. Then suppose you have a cold and you go to a local pharmacy. You purchase a box of crackers for $2.99 and a bottle of over-the-counter pain reliever for $8.49. Your doctor ordered a prescription for you for your cold and you pay $10 for this prescription. Using the sales tax for your state, what is your total cost at the pharmacy, including taxes?

7-7 Study Guide

SCAS 7-2.1, 7-2.5

Sales Tax and Discount

Sales tax is a percent of the purchase price and is an amount paid in addition to the purchase price.
Discount is the amount by which the regular price of an item is reduced.

Example 1 SOCCER **Find the total price of a $17.75 soccer ball if the sales tax is 6%.**

Method 1

First, find the sales tax.

6% of $\$17.75 = 0.06 \cdot 17.75$

≈ 1.07

The sales tax is $1.07.

Next, add the sales tax to the regular price.

$1.07 + 17.75 = 18.82$

The total cost of the soccer ball is $18.82.

Method 2

$100\% + 6\ \% = 106\%$ Add the percent of tax to 100%.

The total cost is 106% of the regular price.

106% of $\$17.75 = 1.06 \cdot 17.75$

≈ 18.82

Example 2 TENNIS **Find the price of a $69.50 tennis racket that is on sale for 20% off.**

First, find the amount of the discount d.

$\underbrace{\text{part}} = \underbrace{\text{percent}} \cdot \underbrace{\text{whole}}$

$d = 0.2 \cdot 69.50$ Use the percent equation.

$d = 13.90$ The discount is $13.90.

So, the sale price of the tennis racket is $69.50 – $13.90 or $55.60.

Exercises

Find the total cost or sale price to the nearest cent.

1. $22.95 shirt; 7% sales tax

2. $39.00 jeans; 25% discount

3. $35 belt; 40% discount

4. $115.48 watch; 6% sales tax

5. $16.99 book; 5% off

6. $349 television; 6.5% sales tax

NAME ______________________________ DATE ____________ PERIOD _____

7-7 Homework Practice

SCAS 7-2.1, 7-2.5

Sales Tax and Discount

Find the total cost or sale price to the nearest cent.

1. \$18 haircut; 10% discount

2. \$299 lawn mower; 5% tax

3. \$9.99 meal; 25% discount

4. \$149 guitar; 20% discount

5. \$15.75 music CD; 4% tax

6. \$24 gym bag; 8% tax

7. \$32.88 jacket; 50% discount

8. \$3.45 coffee; 33% discount

9. \$9.99 chair; $8\frac{1}{2}$% tax

Find the original price to the nearest cent.

10. bracelet: discount, 40%
sale price, \$13.80

11. bicycle: discount, 35%
sale price, \$79

12. TICKETS State residents get discounts at various theme parks throughout the state. One theme park charges a state resident \$51.70. If this price represents a 15% discount from the regular adult admission, find the cost of a regular adult admission to the nearest cent.

13. TRUCKS What is the sales tax on a \$17,500 truck if the tax rate is 6%?

COMPUTERS **For Exercises 14–16, use the following information.**

Lionel is buying a computer that normally sells for \$890. The state sales tax is 6%.

14. What is the total cost of the computer including tax?

15. If the computer is on sale with a 10% discount, what is the sale price of the computer before adding the sales tax?

16. What is the sales tax on the discounted price?

NAME ______________________________ DATE ____________ PERIOD _____

7-7 Problem-Solving Practice

SCAS 7-2.1, 7-2.5

Sales Tax and Discount

1. **SKATEBOARDS** Ines wants to buy a skateboard but she does not know if she has enough money. The price of the skateboard is \$85 and the sales tax is 6%. What will be the total cost of the skateboard?

2. **PRETZELS** The Spanish club sold hot pretzels as a fund-raiser. The pretzels normally sold for \$1.50, but near the end of the sale they wanted to sell as many as possible, so they reduced the price by 30%. What was the new price for a hot pretzel?

3. **COMPUTERS** Andrea ordered a computer on the Internet. The computer cost \$1,499 plus $7\frac{1}{2}\%$ sales tax. What was the total amount Andrea paid for her computer?

4. **BOOKS** Nate went shopping at a bookstore. The price of the book he selected was \$14.95, but it had a sale sticker on it. When he paid for the book, he was charged \$12.71 before sales tax was added. What was the percent of discount to the nearest percent?

5. **CELL PHONES** Justin is buying a cell phone that has a regular price of \$149. The cell phone is on sale for 15% off the regular price. What will be the sale price?

6. **MAGAZINES** Ivan bought two magazines for \$4.95 each. If the sales tax was 6.75%, what was the total amount that he paid for the magazines?

7. **MOVIES** A video store is having a sale in which DVDs are on sale for 20% off. During this sale, what is the cost of three DVDs that regularly cost \$16.99?

8. **MODELS** The original price of a collectible model airplane is \$115. The discounted price is \$99. What is the percent of discount to the nearest percent?

NAME ______________________________ DATE ____________ PERIOD _____

7-8 Explore Through Reading

SCAS 7-2.1, 7-2.5

Simple Interest

Get Ready for the Lesson

Read the introduction at the top of page 379 in your textbook. Write your answers below.

1. Calculate 2.50% of $200 to find the amount of money that Suni can earn in one year at Federal Credit Bank.

2. Calculate 2.75% of $200 to find the amount of money Suni can earn in one year at First Bank.

Read the Lesson

3. In Example 4, why is *t* replaced with $\frac{1}{12}$?

4. Complete the following table that gives the conversion of months to years.

Number of months	2	3	4	6	8	9	10
Ratio of number of months to 12 months							
Simplified ratio							

Remember What You Learned

5. Write the formula for simple interest and explain what each of the letters in the formula stands for.

6. Look up the word *interest* in a dictionary. Write the meaning that matches the way the word is used in this lesson.

7. When do you earn interest? When do you have to pay interest?

NAME ______________________________ DATE ____________ PERIOD _____

7-8 Study Guide

SCAS 7-2.1, 7-2.5

Simple Interest

Simple interest is the amount of money paid or earned for the use of money. To find simple interest I, use the formula $I = prt$. Principal p is the amount of money deposited or invested. Rate r is the annual interest rate written as a decimal. Time t is the amount of time the money is invested in years.

Example 1 **Find the simple interest earned in a savings account where $136 is deposited for 2 years if the interest rate is 7.5% per year.**

$I = prt$	Formula for simple interest
$I = 136 \cdot 0.075 \cdot 2$	Replace p with \$136, r with 0.075, and t with 2.
$I = 20.40$	Simplify.

The simple interest earned is $20.40.

Example 2 **Find the simple interest for $600 invested at 8.5% for 6 months.**

6 months $= \frac{6}{12}$ or 0.5 year	Write the time as years.
$I = prt$	Formula for simple interest
$I = 600 \cdot 0.085 \cdot 0.5$	$p = \$600$, $r = 0.085$, $t = 0.5$
$I = 25.50$	Simplify.

The simple interest is $25.50.

Exercises

Find the interest earned to the nearest cent for each principal, interest rate, and time.

1. $300, 5%, 2 years

2. $650, 8%, 3 years

3. $575, 4.5%, 4 years

4. $735, 7%, $2\frac{1}{2}$ years

5. $1,665, 6.75%, 3 years

6. $2,105, 11%, $1\frac{3}{4}$ years

7. $903, 8.75%, 18 months

8. $4,275, 19%, 3 months

NAME ________________________________ DATE ____________ PERIOD _____

7-8 Homework Practice

SCAS 7-2.1, 7-2.5

Simple Interest

Find the simple interest earned to the nearest cent for each principal, interest rate, and time.

1. \$750, 7%, 3 years

2. \$1,200, 3.5%, 2 years

3. \$450, 5%, 4 months

4. \$1,000, 2%, 9 months

5. \$530, 6%, 1 year

6. \$600, 8%, 1 month

Find the simple interest paid to the nearest cent for each loan, interest rate, and time.

7. \$668, 5%, 2 years

8. \$720, 4.25%, 3 months

9. \$2,500, 6.9%, 6 months

10. \$500, 12%, 18 months

11. \$300, 9%, 3 years

12. \$2,000, 20%, 1 year

13. **ELECTRONICS** Rita charged \$126 for a DVD player at an interest rate of 15.9%. How much will Rita have to pay after 2 months if she makes no payments?

14. **VACATION** The average cost for a vacation is \$1,050. If a family borrows money for the vacation at an interest rate of 11.9% for 6 months, what is the total cost of the vacation including the interest on the loan?

For Exercises 15–17, use the following information.

Robin has \$2,500 to invest in a CD (certificate of deposit).

15. If Robin invests the \$2,500 in the CD that yields 4% interest, what will the CD be worth after 2 years?

16. Robin would like to have \$3,000 altogether. If the interest rate is 5%, in how many years will she have \$3,000?

17. Suppose Robin invests the \$2,500 for 3 years and earns \$255. What was the rate of interest?

NAME ______________________________ DATE ____________ PERIOD _____

7-8 Problem-Solving Practice

SCAS 7-2.1, 7-2.5

Simple Interest

1. **SAVINGS ACCOUNT** How much interest will Hannah earn in 4 years if she deposits $630 in a savings account at 6.5% simple interest?

2. **INVESTMENTS** Terry invested $2,200 in the stock market for 2 years. If the investment earned 12% simple interest, how much money did Terry earn in interest in 2 years?

3. **SAVINGS ACCOUNT** Malik deposited $1,050 in a savings account, and it earned $241.50 in simple interest after four years. Find the interest rate on Malik's savings account.

4. **INHERITANCE** Kelli Rae's inheritance from her great-grandmother was $220,000 after taxes. If Kelli Rae invests this money in a savings account that earns $18,260 in simple interest every year, what is the interest rate on her account?

5. **RETIREMENT** Mr. Pham has $410,000 in a retirement account that earns 3.85% simple interest each year. Find the amount earned each year by this investment.

6. **COLLEGE FUND** When Melissa was born, her parents put $8,000 into a college fund account that earned 9% simple interest. Find the total amount in the account after 18 years.

7. **LOTTERY** Raj won $900,000 in a regional lottery. After paying $350,000 in taxes, he invested the remaining money in a savings account at 4.25% simple interest. How much money is in the account if Raj makes no deposits or withdrawals for two years?

8. **SAVINGS** Mona opened a savings account with a $500 deposit and a simple interest rate of 5.6%. If there were no deposits or withdrawals, how much money is in the account after $8\frac{1}{2}$ years?

Name Date

Chapter 7 Test

Mastering the SC Standards

1 Which number is the best estimate for $\frac{1}{2}\%$ of 204?

Ⓐ 0.5
Ⓑ 1
Ⓒ 2
Ⓓ 4

7-2.1

2 What is 120% of 50?

Ⓐ 60
Ⓑ 70
Ⓒ 85
Ⓓ 170

7-2.1

3 Which of these situations represents the greatest percent of change?

Ⓐ A pair of shoes that was originally priced at $50 is on sale for $35.
Ⓑ A child grew from 43 inches to 46 inches in one year.
Ⓒ A car that was driving 40 miles per hour is now driving 65 miles per hour.
Ⓓ A person who was working 40 hours a week is now working 24 hours a week.

7-2.1

4 Elizabeth and her dad caught 6 trout and 9 striped bass on their fishing trip. Which equation can be used to find s, the percent of striped bass they caught?

Ⓐ $\frac{6}{9} = \frac{s}{100}$
Ⓑ $\frac{9}{6} = \frac{100}{s}$
Ⓒ $\frac{9}{15} = \frac{100}{s}$
Ⓓ $\frac{9}{15} = \frac{s}{100}$

7-2.1

5 At a restaurant, Marco spent $6.95 for his main course, $1.20 for a drink, and $2.25 for a dessert. The tax on the bill was 10%. If he left a 20% tip on the total bill, what is a good estimate of the tip he left?

Ⓐ $0.50
Ⓑ $2.00
Ⓒ $4.00
Ⓓ $8.00

7-2.5

6 What is 110% of 75?

Ⓐ 80
Ⓑ 82.5
Ⓒ 85
Ⓓ 825

7-2.1

Name Date

Chapter 7 Test (continued)

Mastering the SC Standards

7 Jerome invests $1,500 in a CD for 3 years at a simple interest rate of 4.5%. How much will the CD be worth after 3 years?

Ⓐ $1,680.25
Ⓑ $1,702.50
Ⓒ $1,715.90
Ⓓ $1,742.75

7-2.5

8 Ella makes a checkerboard. She leaves half of the squares white and colors the other half. Of the squares she colors, she colors one quarter of them dark blue. What percent of the squares on the board are colored dark blue?

Ⓐ 12.5%
Ⓑ 15%
Ⓒ 18.5%
Ⓓ 25%

7-2.1

9 Nicole and her family visited the Fort Sumter National Monument, which is located on an island in the Charleston harbor. At the visitor center, she bought a souvenir. Its original price was $12.75, but it was on sale for 20% off. How much did Nicole save?

Ⓐ $1.28
Ⓑ $2.55
Ⓒ $3.63
Ⓓ $10.20

7-2.5

10 A barbecue grill originally priced at $180 is on sale for $135. What percent of the original cost is the sale price?

Ⓐ 25%
Ⓑ 30%
Ⓒ 70%
Ⓓ 75%

7-2.5

11 Chung mixes 2 pints of red paint with 5 pints of blue paint to make a shade of purple. Which equation can be used to find *x*, the percent of blue paint in the paint mixture?

Ⓐ $\frac{5}{7} = \frac{x}{100}$
Ⓑ $\frac{2}{5} = \frac{x}{100}$
Ⓒ $\frac{5}{2} = \frac{100}{x}$
Ⓓ $\frac{5}{7} = \frac{100}{x}$

7-2.1

12 Which number is the best estimate for $\frac{3}{4}$% of 682?

Ⓐ 0.75
Ⓑ 3
Ⓒ 4
Ⓓ 5

7-2.1

NAME ______________________________ DATE ____________ PERIOD _____

8

Anticipation Guide

Statistics: Analyzing Data

STEP 1 ***Before you begin Chapter 8***

- 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. When drawing a number line for a line plot you must always start the number line at 0.	
	2. The mean of a set of data is the sum of the data divided by the number of items in the data set.	
	3. The mode of a set of data is the middle number of the ordered data.	
	4. In a stem-and-leaf plot of the data 12, 15, 22, 10, 26, 37, 14, and 36, the leaves would be formed by the digits 0, 2, 4, 5, 6, and 7.	
	5. The bars of a bar graph must have equal widths but the bars of a histogram can have different widths.	
	6. The same conclusions can be drawn about a data set just as easily from either a chart or a graph.	
	7. Line graphs are better to predict future events than scatter plots.	
	8. Since all graphs are useful to help draw conclusions about a set of data, any graph may be chosen to represent that set.	
	9. Using a scale of uneven intervals on a graph can result in misleading information.	

STEP 2 ***After you complete Chapter 8***

- Reread each statement and complete the last column by entering an A or a D.
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a piece of paper to write an example of why you disagree.

NAME ______________________________ DATE ____________ PERIOD _____

8 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 median of the set of numbers on the stem-and-leaf plot below.

Stem	Leaf
0	1 4 7
1	8 9
2	3 5 6 6
3	0 0 0 1
4	2 3
5	4 6 *1 | 8 = 18*

What number is the median?

A 25 **C** 30

B 26 **D** 31

2. Constance found the mean and median of her first five quiz scores, 87, 89, 89, 92, and 95. If she receives an 85 on her next quiz, then

A the mean would increase.

B the mean would decrease.

C the median would increase.

D the median would decrease.

Fold here.

Solution

1. *Hint: The key indicates that the number on the left of the stem-and-leaf plot is the tens place and the numbers on the right of the line are the ones place. For example, the first line represents the numbers 1, 4, and 7. The median is the number in the middle of a set when the set is listed in ascending or descending order.*

The median is the middle number in the set. There are 17 numbers in the set, so the middle is the 9th number (there are eight numbers on either side of it in the set). The top left leaf represents the least number. Count each leaf in order to find the 9th number. The median of this set is 26.

The answer is **B.**

Solution

2. *Hint: Find the mean and median of the original five scores first. The mean of a set of data is the sum of the data divided by the number of items in the data set. The median of a set of data is the middle number of the ordered date, or the mean of the middle two numbers.*

The mean of the original data set is $\frac{87 + 89 + 89 + 82 + 95}{5}$ or 90.4. The median is 89. If 85 is added to the original data set, the median remains the same, 89, and the mean becomes 89.5. So, if 85 is added to the data set, the mean would decrease.

The answer is **B.**

8A Study Guide

SCAS 7-6.2, 7-6.3, 7-6.4

Box-and-Whisker Plots

A **box-and-whisker plot** uses a number line to show the distribution of a set of data. The *box* is drawn around the quartile values, and the *whiskers* extend from each quartile to the extreme data points that are not outliers.

Example **Use the data below to construct a box-and-whisker plot.**
12, 14, 8, 10, 1, 16, 10, 11, 10

Step 1 Put the data in order from least to greatest and find the median, lower quartile, upper quartile, and the least and greatest values that are not outliers.
Ordered data: 1, 8, 10, 10, 10, 11, 12, 14, 16

Least value: 1; Median: 10; Greatest value: 16;

Lower quartile: $\frac{8 + 10}{2}$ or 9; Upper quartile: $\frac{12 + 14}{2}$ or 13;

Interquartile range: $13 - 9$ or 4;

Lower limit for outliers: $9 - 6$ or 3;

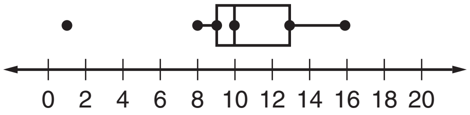
Upper limit for outliers: $13 + 6$ or 19;

Outliers: 1

Step 2 Draw a number line that includes the least and greatest numbers in the data.

Step 3 Mark the extremes, the median, and the upper and lower quartile above the number line. Since the data have an outlier, mark the least value that is not an outlier.

Step 4 Draw the box and the whiskers.



Box-and-whisker plots separate data into four parts. Even though the parts may differ in length, each part contains $\frac{1}{4}$ of the data.

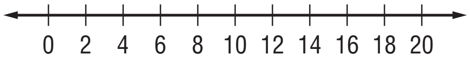
Exercises

Construct a box-and-whisker plot for each set of data.

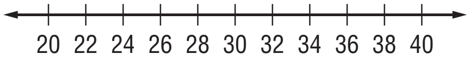
1. 4, 7, 5, 3, 9, 6, 4

0
1
2
3
4
5
6
7
8
9
10

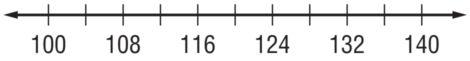
2. 13, 12, 17, 10, 6, 11, 14



3. 23, 36, 22, 34, 30, 29, 26, 27, 33



4. 108, 126, 110, 104, 106, 123, 140, 122, 114, 109



NAME ______________________________ DATE ______________ PERIOD _____

8A

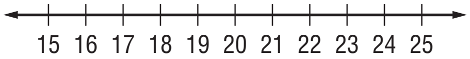
Skills Practice

SCAS 7-6.2, 7-6.3, 7-6.4

Box-and-Whisker Plots

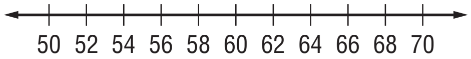
Construct a box-and-whisker plot for each set of data.

1. 23, 21, 20, 22, 24, 17, 15



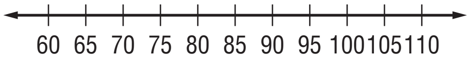
15
16
17
18
19
20
21
22
23
24
25

2. 54, 61, 64, 68, 60, 53, 66



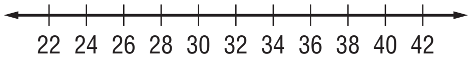
50
52
54
56
58
60
62
64
66
68
70

3. 61, 96, 97, 87, 84, 91, 98, 86



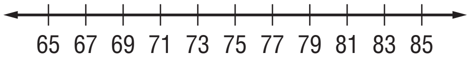
60
65
70
75
80
85
90
95
100
105
110

4. 27, 35, 35, 32, 26, 34, 36, 27, 38



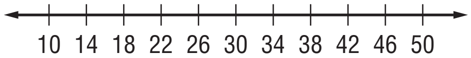
22
24
26
28
30
32
34
36
38
40
42

5. 67, 74, 78, 69, 78, 70, 67, 72, 69



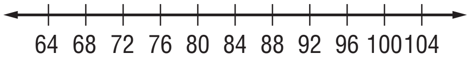
65
67
69
71
73
75
77
79
81
83
85

6. 39, 41, 30, 14, 44, 40, 48, 39, 40, 36



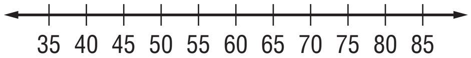
10
14
18
22
26
30
34
38
42
46
50

7. 86, 83, 98, 99, 81, 86, 95, 84, 79, 90



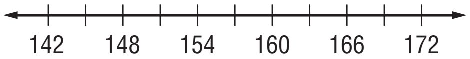
64
68
72
76
80
84
88
92
96
100
104

8. 45, 58, 78, 57, 58, 55, 61, 47, 52, 40, 46



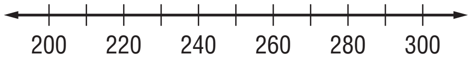
35
40
45
50
55
60
65
70
75
80
85

9. 169, 163, 153, 166, 149, 148, 146, 145, 152, 163, 152



142
148
154
160
166
172

10. 245, 250, 205, 240, 250, 275, 260, 295, 255, 225, 250



200
220
240
260
280
300

NAME ______________________________ DATE ____________ PERIOD _____

8A Homework Practice

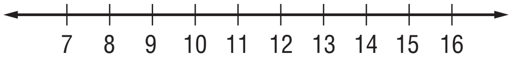
SCAS 7-6.2, 7-6.3, 7-6.4

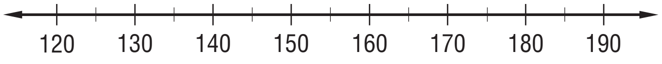
Box-and-Whisker Plots

Construct a box-and-whisker plot for each set of data.

1. Ages of children already signed up for swimming classes:
10, 12, 9, 7, 10, 12, 14, 14, 10, 16

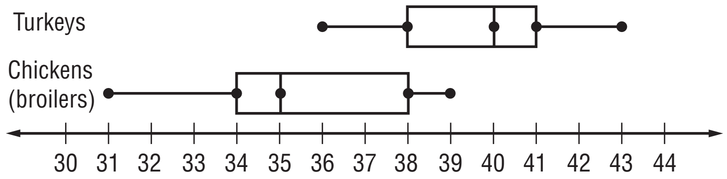
2. Prices, in dollars, of bicycles on sale:
150, 134, 132, 120, 145, 170, 125, 130, 145, 185, 140





POULTRY For Exercises 3–7, use the box-and-whisker plot below.

Average Prices (cents per pound) Received by Farmers



Source: *The World Almanac*

3. How many outliers are in the data?

4. How do the range in chicken prices and the range in turkey prices compare?

5. In the chicken prices, which quartiles show the greatest spread of data?

6. What percent of the data for the turkey prices is above the upper quartile for the chicken prices?

7. In general, do farmers get higher prices for chickens or for turkeys? Justify your reasoning.

NAME ______________________________ DATE ____________ PERIOD _____

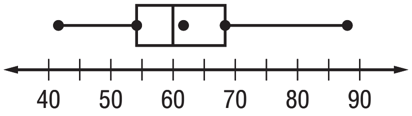
8A Problem-Solving Practice

SCAS 7-6.2, 7-6.3, 7-6.4

Box-and-Whisker Plots

U.S. SENATE For Exercises 1–4, use the box-and-whisker plot at the right.

Ages of U.S. Senators



1. Explain how to determine from the box-and-whisker plot whether there are any outliers in the data. Then identify any outliers.

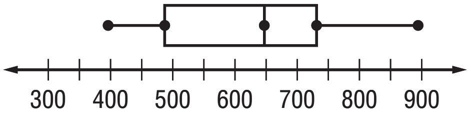
2. Describe the distribution of the data. What can you say about the ages of U.S. senators?

3. What percent of U.S. senators are at least 54 years old? Explain how you found your answer.

4. Can you determine from the box-and-whisker plot whether there are any U.S. Senators exactly 65 years old? Explain.

HOCKEY For Exercises 5 and 6, use the box-and-whisker plot at the right.

Goals Made by the Top 10 All-Time NHL Scorers



5. Identify any outliers in the data.

6. Describe the distribution of the data. What can you say about the number of goals made by the top 10 all-time leading NHL scorers?

NAME ______________________________ DATE ______________ PERIOD _____

8B Study Guide

SCAS 7-6.3, 7-6.4

Interquartile Ranges

The **lower quartile** or LQ is the median of the lower half of a set of data. The **upper quartile** or UQ is the median of the upper half of a set of data. The **interquartile range** is the difference between the upper quartile and the lower quartile.

Example 1 **Find the range, median, upper and lower quartiles, and interquartile range for the following set of data.**
13, 20, 18, 12, 21, 2, 18, 17, 15, 10, 14

The greatest number in the data set is 21. The least number is 2. The range is 21 − 2 or 19.

To find the quartiles, arrange the numbers in order from least to greatest.
2 10 12 13 14 15 17 18 18 20 21

The median is 15. The numbers below 15 are 2, 10, 12, 13, and 14. The median of the numbers below 15 is 12, so the lower quartile is 12. The numbers above 15 are 17, 18, 18, 20, and 21. The median of the numbers above 15 is 18, so the upper quartile is 18. The interquartile range is 18 − 12 or 6.

In some data sets, a few of the values are much greater than or less than the rest of the data. Data that are more than 1.5 times the value of the interquartile range beyond the quartiles are called **outliers**.

Example 2 **Find any outliers for the set of data given in Example 1.**

The interquartile range is 18 − 12 or 6.
Multiply the interquartile range by 1.5. $6 \times 1.5 = 9$

Any data more than 9 above the upper quartile or below the lower quartile are outliers. Find the limits of the outliers.

Subtract 9 from the lower quartile. $12 - 9 = 3$
Add 9 to the upper quartile. $18 + 9 = 27$

The limits of the outliers are 3 and 27. The only data point outside this range is 2, so the only outlier is 2.

Exercises

Find the range, median, upper and lower quartiles, interquartile range, and any outliers for each set of data.

1. 14, 16, 18, 24, 19, 15, 13

2. 29, 27, 24, 28, 30, 51, 28

3. 57, 60, 43, 55, 46, 43, 62, 31

4. 91, 92, 88, 89, 93, 95, 65, 85, 91

5. 104, 116, 111, 108, 113, 127, 109, 122, 115, 105

NAME ______________________________ DATE ____________ PERIOD _____

8B Skills Practice

SCAS 7-6.3, 7-6.4

Interquartile Ranges

Find the range, median, upper and lower quartiles, interquartile range, and any outliers for each set of data.

1. 15, 17, 10, 12, 19, 20, 16

2. 52, 72, 89, 21, 58, 42, 75

3. 20, 23, 18, 21, 4, 17, 15

4. 24, 37, 32, 39, 35, 42, 44, 28

5. 48, 56, 72, 47, 43, 36, 47, 14

6. 116, 107, 105, 113, 112, 123, 115, 108

7. 2.2, 2.6, 2.5, 3.6, 2.9, 2.8, 2.2, 2.4

8. 59, 72, 57, 51, 62, 77, 73, 64, 54

9. 81, 79, 88, 67, 89, 87, 85, 83, 83

10. 132, 116, 108, 113, 126, 120, 131, 112, 126

11. 6.3, 6.7, 6.2, 4.9, 6.7, 6.6, 5.3, 6.3, 6.4

12. 22, 27, 25, 11, 29, 28, 41, 26, 28, 23

13. 90, 88, 72, 85, 92, 95, 93, 86, 92, 91

14. 107, 114, 124, 108, 117, 106, 107, 109, 117, 115

15. 8.3, 8.5, 9.5, 8.7, 8.9, 8.3, 8.6, 8.8, 8.9, 8.7

16. 42, 36, 58, 47, 34, 43, 54, 49, 48, 41, 38

17. 8.3, 9.0, 8.1, 9.5, 8.2, 8.9, 9.4, 7.9, 8.3, 8.4, 8.0

18. 15, 16, 18, 9, 18, 17, 19, 19, 10, 12, 15, 13, 16

NAME ______________________________ DATE ____________ PERIOD _____

8B Homework Practice

SCAS 7-6.3, 7-6.4

Interquartile Ranges

WILD CATS For Exercises 1–4, use the data in the table.

Average Birth Weights of Wild Cats

Cat	Weight (oz)	Cat	Weight (oz)
Cheetah	7.5	Lion	48
Eurasian Wildcat	1.4	Puma	12
Jaguar	28	Serval	8.5
Leopard	17.5	Tiger	40

Source: *Facts on File: Animal Fact File*

1. What is the range of the data?

2. Find the median, the upper and lower quartiles, and the interquartile range of the data.

3. Identify any outliers.

4. Use the measures of variation to describe the data in the table.

WORD For Exercises 5–8, use the data in the table.

5. What is the range of the data?

6. Find the median, the upper and lower quartiles, and the interquartile range of the data.

Death Valley Average Monthly Precipitations

0.19	0.13	0.35	0.12
0.12	0.05	0.42	0.18
0.11	0.42	0.14	0.10

Source: *weather.com*

7. Identify any outliers.

8. Use the measures of variation to describe the data in the stem-and-leaf plot.

NAME ______________________________ DATE ______________ PERIOD _____

8B Problem-Solving Practice

SCAS 7-6.3, 7-6.4

Interquartile Ranges

FOOTBALL For Exercises 1–4, use the table below that shows the winning scores in the Super Bowl from 1995 through 2006.

Winning Super Bowl Scores, 1995–2006

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
49	27	35	31	34	23	34	20	48	32	24	21

1. Explain how to find the range of the data. Then find the range.

2. Find the median, the upper and lower quartiles, and the interquartile range of the winning scores.

3. Describe how to find the limits for outliers. Then find the limits.

4. Are there any outliers among the winning Super Bowl scores? If so, what are they? Explain your reasoning.

GRADES For Exercises 5 and 6, use the table at the right showing the scores on the midterm exam in English.

84	86	77	97	88
89	94	89	81	90
80	75	91	83	85

5. Find the range, median, upper and lower quartiles, and the interquartile range of the exam scores.

6. Are there any outliers in this data? Explain your reasoning.

NAME ______________________________ DATE ____________ PERIOD _____

8-5 Study Guide

SCAS 7-6.1

Problem-Solving Investigation: Use a Graph

When solving problems, a **graph** can show a visual representation of the situation and help you make conclusions about the particular set of data.

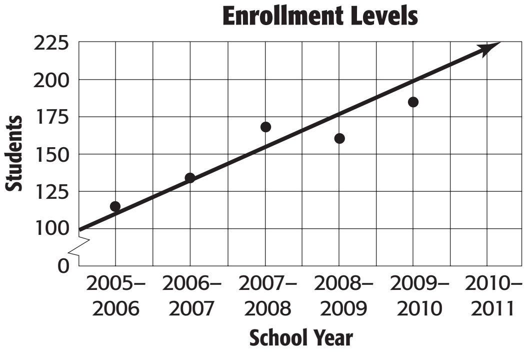
Example **POPULATION The table shows the enrollment of Mill High School students over five years. Estimate the enrollment was for the 2010–2011 school year.**

Mill High School Enrollment				
’05–’06	**’06–’07**	**’07–’08**	**’08–’09**	**’09–’10**
115	134	168	160	185

Understand You know the enrollment of students for five years. You need to estimate the enrollment for the 2010–2011 school year.

Plan Organize the data in a graph so that you can see a trend in the enrollment levels.

Solve



The graph shows that the enrollment increases over the years. By using the graph you can conclude that Mill High School had about 225 students enrolled for the 2010–2011 school year.

Check Draw a line through as close to as many points as possible. The estimate is close to the line so the answer is reasonable.

Exercises

1. **TEMPERATURE** The chart to the right shows the average December temperatures in Fahrenheit over four years. Predict the average temperature for the next year.

December Temperatures (F°)			
2002	**2003**	**2004**	**2005**
22°	17°	18°	16°

2. **POPULATION** Every five years the population of your neighborhood is recorded. What do you predict the population will be in 2010?

Neighborhood Population		
1995	**2000**	**2005**
2,072	2,250	2,376

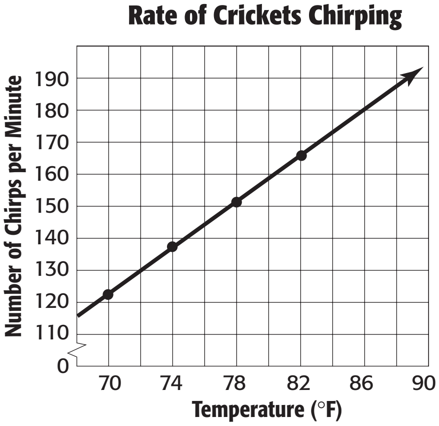
NAME ______________________________________ DATE ______________ PERIOD _____

8-5 Skills Practice

SCAS 7-6.1

Problem-Solving Investigation: Use A Graph

Use a graph to solve the problem. For Exercises 1–3, refer to the graph.

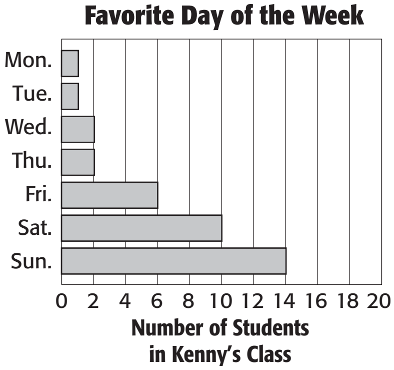


1. Estimate the temperature at which the rate of chirping is 130 per minute.

2. Predict the number of cricket chirps per minute at 86 degrees.

3. Predict the number of chirps per minute at 90 degrees.

For Exercises 4–6, refer to the graph.



4. How many students consider Friday their favorite day of the week?

5. How many students prefer the weekend days?

6. How many students are in Kenny's class?

NAME ______________________________ DATE ______________ PERIOD _____

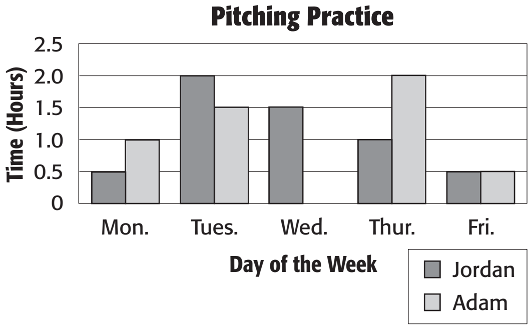
8-5 Homework Practice

SCAS 7-6.1

Problem-Solving Investigation: Use a Graph

Mixed Problem Solving

PITCHING For Exercises 1 and 2, use the graph that shows the amount of pitching practice time for Adam and Jordan during a particular week.



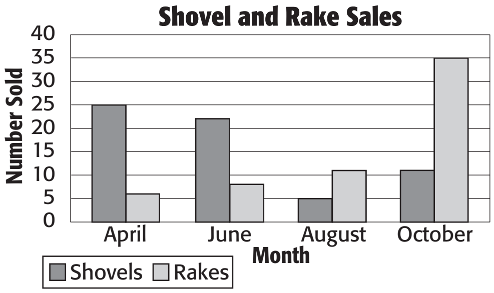
1. Who practiced more during the week and by how much time?

2. What was Adam's average practice time per day for the five days?

Use any strategy to solve Exercises 3–6. Some strategies are shown below.

Problem-Solving Strategies
• Guess and check. • Look for a pattern. • Make a graph.

3. **LAWN TOOLS** The bar graph shows the number of shovels and rakes sold during particular months at a hardware store. During which month was the number of rakes sold about twice the number of shovels sold?



4. **NUMBER THEORY** 42 is subtracted from 42% of a number. The result is 42. What is the number?

5. **MONEY** The value of the number of dimes is equal to the value of the number of quarters. If the total value of the quarters and dimes is $6.00, find the total number of coins.

6. **SKIING** Mrs. Roget is taking her family of 2 adults and 4 children skiing for the day. They need to rent ski equipment. What will it cost to ski for the day including equipment rental and lift tickets?

Daily Ski Costs		
Item	**Adults**	**Children**
Lift Ticket	$10.00	$8.00
Skis	$7.00	$4.25
Boots	$6.25	$4.25
Poles	$2.25	$1.75

NAME ______________________________ DATE ______________ PERIOD _____

8-5 Problem-Solving Practice

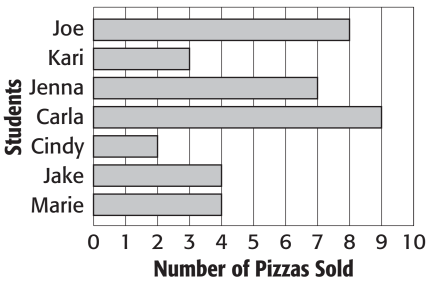
SCAS 7-6.1

Problem-Solving Investigation: Use a Graph

Solve. Use any strategy.

For Exercises 1–3, use the graph below. Maria's class is selling pizzas as a fundraiser for their upcoming fieldtrip to the zoo.

Pizza Fundraiser



1. Which student sold the most pizzas?

2. Did the girls sell more pizzas than the boys?

3. How many pizzas total did the class sell?

4. **EXERCISE** Robert wants to begin a new exercise program. His goal is to begin by exercising for 20 minutes. He goes to the gym two times a week, increasing his workout by five minutes each time. How long will it take him to work up to an hour?

For Exercises 5 and 6 use the following information.

MONEY Brianna made a $13.82 purchase at the grocery store. She received two bills and five coins in change.

5. What denomination of bill did she pay with?

6. What bills and coins did she receive as change?

7. **NUMBER THEORY** A number is multiplied by 32 then divided by 14. The square root of the result is 4. What is the number?

8. **PIZZA** Joelle has her choice of five pizza toppings: onions, sausage, mushrooms, pepperoni, and green pepper. In order to get a special price, she can only choose two toppings. How many combinations of toppings could she choose?

NAME ______________________________________ DATE ______________ PERIOD _____

8-6 Explore Through Reading

SCAS 7-6.1, 7-1.7

Using Graphs to Predict

Get Ready for the Lesson

Complete the Mini-Lab at the top of page 426 in your textbook. Write your answers below.

1. By how much did the water's height change after each addition of marbles?

2. Predict the height of the water when 30 marbles are in the drinking glass. Explain how you made your prediction.

3. Test your prediction by placing 10 more marbles in the glass.

4. Draw a graph of the data that you recorded in the table.

Read the Lesson

5. In Example 1, what do the dotted lines help in finding?

6. What are the benefits of a scatter plot?

7. How would you know if two sets of data are related when looking at their scatter plot?

Remember What You Learned

8. Discuss line graphs and scatter plots in terms of their benefits for making predictions.

NAME ______________________________ DATE ____________ PERIOD _____

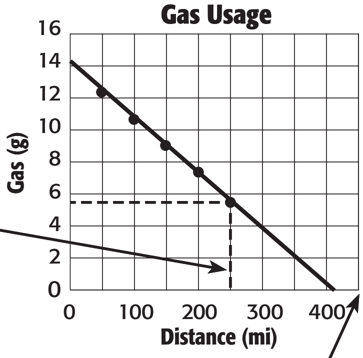
8-6 Study Guide

SCAS 7-6.1, 7-1.7

Using Graphs to Predict

A **line graph** shows trends over time and can be useful for predicting future events. A **scatter plot** displays two sets of data on a graph and can be useful for predictions by showing trends in the data.

Example **Use the line graph of the Moralez family car trip shown below to answer the following questions.**



1. After 250 miles, how much gas did the Moralez family have left?

Draw a dotted line up from 250 m until it reaches the graph and then find the corresponding gas measure.

They will have about 5.5 g left.

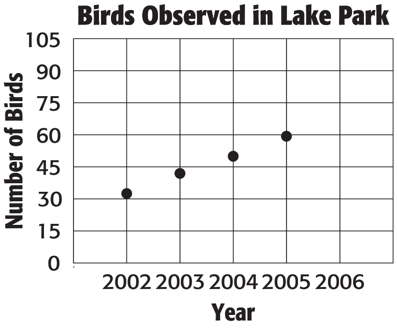
2. How far can the Moralez family travel before they run out of gas?

When they run out of gas, the tank will be at 0 so find where the line reaches 0.

They can travel about 410 miles.

Exercises

Use the scatter plot to answer the questions.



1. How many birds were there in 2004?

2. What relationship do you see between the number of birds and year?

3. Predict the number of birds there were in the year 2001?

4. Predict the number of birds there will be in the year 2006?

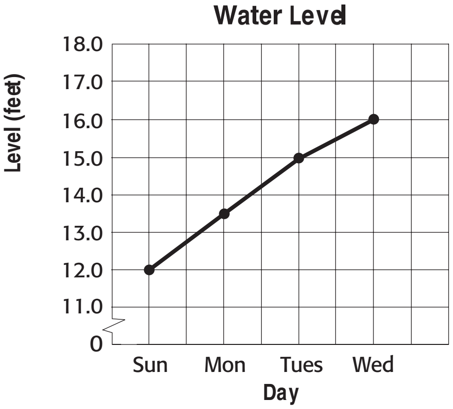
5. In what year do you think the bird population will reach 100?

8-6 Homework Practice

SCAS 7-6.1, 7-1.7

Using Graphs to Predict

WATER LEVEL For Exercises 1 and 2, use the graph that shows the level of rising water of a lake after several days of rainy weather.



1. If the water continues to rise, predict the day when the water level will be above flood stage of 20.5 feet.

2. How many days did it take for the water level to rise 4 feet?

PROPERTY For Exercises 3–5, use the table that shows the property value per acre for five years.

Property Value (per acre)	
Time	**Value**
2005	$14,000
2006	$16,000
2007	$18,000
2008	$21,000
2009	$24,000

3. Make a scatter plot of the data. Use the time on the horizontal axis and the property value on the vertical axis.

4. Describe the relationship, if any, between the two sets of data.

5. Predict the property value per acre in 2010.

Mini-Project

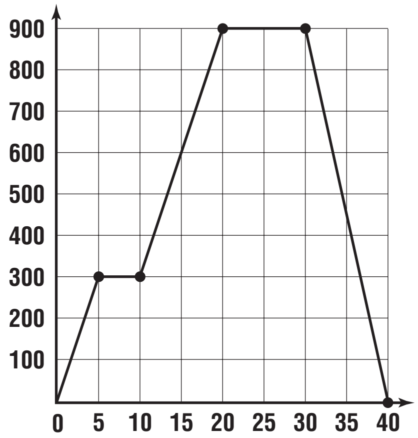
SCAS 7-6.1, 7-1.7

(Use with Lesson 8-6)

Story Graph

Make up a story to fit this graph. The graph describes the distance you are from your house with respect to time. The story should include where you begin, end, and stop along the way. Make sure you also mention how long it takes you to travel from place to place and how long you stay at each place.

To help you understand what is happening, you may want to act out the graph. Use seconds instead of minutes and ignore the distance scale.



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NAME ______________________________ DATE ____________ PERIOD _____

8-7 Explore Through Reading

SCAS **7-6.1,** 7-1.7

Using Data to Predict

Get Ready for the Lesson

Read the introduction at the top of page 434 in your textbook. Write your answers below.

1. Can you tell how many were surveyed? Explain.

2. Describe how you could use the graph to predict how many students in your school have a television in their bedrooms.

Read the Lesson

3. Look up the word *random* in a dictionary. Write the meaning of the word as it is used in this lesson.

4. In order to make predictions about a group of people, what do you need to know, according to this lesson?

5. What are two methods for calculating a prediction about a population?

Helping You Remember

6. Take a survey of your class, such as how many people are wearing blue today. Be sure to gather results from your whole class. Based on your results, make a prediction about all of the students in your grade level at your school. Find out the total number of students in your grade from your teacher or school office.

NAME ______________________________ DATE ____________ PERIOD _____

8-7 Study Guide

SCAS 7-6.1, 7-1.7

Using Data to Predict

Data gathered by surveying a random sample of the population may be used to make predictions about the entire population.

Example 1 **In a survey, 200 people from a town were asked if they thought the town needed more bicycle paths. The results are shown in the table. Predict how many of the 28,000 people in the town think more bicycle paths are needed.**

More Bicycle Paths Needed?	
Response	**Percent**
yes	39%
no	42%
undecided	19%

Use the percent proportion.

$\frac{part}{whole} = \frac{percent}{100}$ Percent proportion

part of the population → $\frac{n}{28{,}000} = \frac{39}{100}$ Let n represent the number.

→ Survey results: 39% = $\frac{39}{100}$

Whole population $100n = 38{,}000(39)$ Cross products

$n = 10{,}920$ Simplify.

So, about 10,920 people in the town think more bicycle paths are needed.

Exercises

1. **VOTES** In a survey of voters in Binghamton, 55% of those surveyed said they would vote for Armas for city council. If 24,000 people vote in the election, about how many will vote for Armas?

2. **LUNCH** A survey shows that 43% of high school and middle school students buy school lunches. If a school district has 2,900 high school and middle school students, about how many buy school lunches?

3. **CLASS TRIP** Students of a seventh grade class were surveyed to find out how much they would be willing to pay to go on a class trip. 24% of the students surveyed said they would pay \$21 to \$30. If there are 360 students in the seventh grade class, about how many would be willing to pay for a trip that cost \$21 to \$30?

NAME ______________________________ DATE ____________ PERIOD _____

8-7 Homework Practice

SCAS **7-6.1,** 7-1.7

Using Data to Predict

Match each situation with the appropriate equation or proportion.

a. $n = 0.85 \cdot 750$

b. $\frac{85}{750} = \frac{n}{100}$

c. $7.5 \cdot 85 = n$

1. 85% of commuters use the expressway. Predict how many commuters out of 750 commuters will use the expressway.

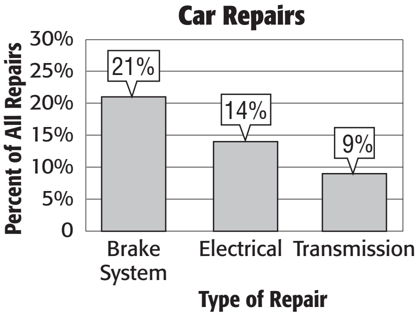
2. 750% of 85 is what number?

3. 85 commuters is what percent of 750 commuters?

4. **ESKIMOS** In the year 2000, the population of Alaska was about 627 thousand. Predict the number of Eskimos in Alaska if the Eskimo population was about 7.5% of the population of Alaska. Round to the nearest thousand.

5. **DOGS** A survey showed that about 40% of American households own at least one dog. Based on that survey, how many households in a community of 800 households own at least one dog?

CAR REPAIRS For Exercises 6–8, use the graph that shows the percent of all repairs for 3 car repair problems at a car repair shop.



6. Suppose a mechanic repairs 478 cars. Predict how many repairs will be made on transmissions.

7. For every 100 repairs, predict how many more repairs will be made on a brake system problem than on an electrical problem.

8. Predict the percent of repairs that will be one of the three problems in the graph.

NAME ______________________________ DATE ______________ PERIOD _____

8-7 Problem-Solving Practice

SCAS 7-6.1, 7-1.7

Using Data to Predict

1. **SHOES** The table shows the results of a survey in which seventh graders were asked how many pairs of shoes they own. Predict how many of the 632 seventh graders at Seneca West Middle School own more than 7 pairs of shoes.

Shoes	Percent
3 or less	10%
4	20%
5	21%
6	22%
7	19%
more than 7	8%

2. **ACTIVITIES** Of the students listed as members of a high school academic team, 75% were involved in sports, speech, music or debate. If 111 students were listed as part of the teams, how many were involved in sports, speech, music, or debate?

3. **MOVIEGOERS** A research study found that about 63% of people 18 or older who go to the movies at least once a month own a personal computer. Out of 500 people 18 and older who go to the movies once or more a month, how many of them would you expect to own a personal computer?

4. **HAIR** A survey showed that 37% of people 12 to 17 years old use hair gel. Predict how many of the 30 students in Mr. Avalon's ninth grade class use hair gel.

5. **GRADUATION** A survey of first-year students at North Carolina State University showed that about 73% expect to complete their degree in 4 years. If there are 3,333 first-year students, how many of them expect to complete their degree in 4 years?

6. **INTERNET** A recent survey conducted by the Millard school district showed that 87% of households of students have Internet access at home. If there are 19,000 Millard households, how many have Internet access?

NAME ______________________________________ DATE ______________ PERIOD _____

8-8 Explore Through Reading

SCAS **7-6.1,** 7-1.7

Using Sampling to Predict

Get Ready for the Lesson

Read the introduction at the top of page 438 in your textbook. Write your answers below.

1. Suppose she decides to survey the listeners of a rock radio station. Do you think the results would represent the entire population? Explain.

2. Suppose she decides to survey a group of people standing in line for a symphony. Do you think the results would represent the entire population? Explain.

3. Suppose she decides to mail a survey to every 100th household in the area. Do you think the results would represent the entire population? Explain.

Read the Lesson

4. Match the type of sample with its example(s). Put the correct letter on the line.

simple random sample	__________	**a.** One or more parts of the population are favored over others.
biased sample	__________	**b.** Only those who volunteer take a survey.
unbiased sample	__________	**c.** Names are picked randomly out of a hat.
convenience sample	__________	**d.** A store manager surveys his first 20 customers.
voluntary response sample	__________	**e.** A sample that is representative of the entire population.

Remember What You Learned

5. If you are conducting a survey, explain why it is important to have an unbiased sample.

NAME ______________________________ DATE ______________ PERIOD _____

8-8 Study Guide

SCAS **7-6.1,** 7-1.7

Using Sampling to Predict

In an **unbiased sample** the whole population is represented. In a **biased sample** one or more parts of the population are favored over the others.

Example 1 **Look at the following table to determine the favorite sport of middle school students.**

Favorite Sports of Middle School Students			
Basketball	Baseball	Football	Soccer
10	5	17	52

Based on the table, it would appear that soccer is the favorite sport of middle school students. However, suppose the data collected for this survey was taken at a World Cup soccer match. It can then be concluded that our sample is **biased** because students who are at a soccer match may be more likely to choose soccer as their favorite sport.

To receive an **unbiased** sample of middle school students, the sports survey could be completed at randomly selected middle schools throughout the country.

Exercises **Determine whether the given situations represent a *biased* or *unbiased* sample. Then tell the type of sample.**

1. Writers of a popular teen magazine want to write a story about which movies their readers like. The writers decide to interview the first 50 people that walk out of a movie theater.

2. The student council wanted to raise money for their school by selling homemade cookies during lunch time. To find out the favorite kind of cookie for the majority of their school, they conducted a survey. They gave the survey to 20 randomly selected students from each grade level.

3. To determine the most frequently used gas station, a researcher randomly selected every 10th person from a drive-through fast food restaurant and asked them where they last filled up with gas.

NAME ______________________________ DATE ____________ PERIOD _____

8-8 Homework Practice

SCAS **7-6.1,** 7-1.7

Using Sampling to Predict

Determine if the sample method is valid (unbiased) and if so, use the results to make predictions. If the sample is not valid (biased), write *not valid* on the line and explain why.

1. A representative from the cable company randomly calls 100 households to determine the number of customers who receive movie channels. Of these, 15% do have movie channel access. If there are 2,300 customers total, how many can be expected to have the movie channels?

2. An electronics store just received a huge shipment of video games. Kenny has been put in charge of making sure the goods are not damaged. There are 350 boxes and 50 games in each box. Kenny decides to take the nearest 5 boxes and check for damages. He finds only 2 damaged games, so what can he predict for the total number of damaged games in the boxes?

3. Taylor was given the following problem:

A researcher, who was trying to link after-school students from 20 different schools around the country, surveyed 50 children from each school. He found that 74% of students were involved in after-school sports. How many students surveyed were involved in sports?

This is how Taylor solved the problem:

$$\begin{array}{r} 50 \\ \times\ 20 \\ \hline 1{,}000 \end{array} \qquad \begin{array}{r} 1000 \\ \times\ \ 74 \\ \hline 74{,}000 \end{array}$$

It's valid because it
is a simple random
sample and there were
74,000 students.

Explain what Taylor did wrong.

NAME ________________________________ DATE ______________ PERIOD _____

8-8 Problem-Solving Practice

SCAS 7-6.1, 7-1.7

Using Sampling to Predict

Use the word problem and table to answer the questions below.

Miguel is the manager of a clothing store. He wants to find out what are the most popular styles of men's pants and how many of each to order. He decides to survey every 10th man that walks in over a two-week period. Here are his results.

Pant style	Number of People
Jeans	52
Khakis	31
Slacks	17

1. What type of sample does Miguel use for his survey?	**2.** What percentage of the customers surveyed prefer khakis?
3. What percentage of the customers surveyed prefer jeans?	**4.** If Miguel has 1,000 male customers over a two week period, how many pairs of jeans will he predict to sell?
5. If he has 1,300 customers in a two week period, how many pairs of slacks will he predict to sell?	**6.** Why would Miguel's sample not have been valid if he had decided to survey only the first ten people to walk in?

NAME ______________________________ DATE ____________ PERIOD _____

8-9 Explore Through Reading

SCAS 7-1.2

Misleading Statistics

Get Ready for the Lesson

**Read the introduction at the top of page 444 in your textbook.
Write your answers below.**

1. According to the size of the hockey players, how many times more points does Mark Messier appear to have than Jari Kurri? Explain.

2. Do you think this graph is representative of the players' number of points?

Read the Lesson

3. Give an example of a data set you could represent with a graph and how you could represent it in a misleading way.

4. Study Example 1. If you were trying to show the PTA that the price of the tickets has increased by a lot, which graph would you use?

Remember What You Learned

5. Missing labels on graphs and uneven intervals on a scale are two ways a set of statistics can be misleading. Listen for a statistic used on the radio or in a newspaper. Is it a reasonable statement? What other information might you like to have before you consider a statistic to be reasonable?

NAME ______________________________ DATE ____________ PERIOD _____

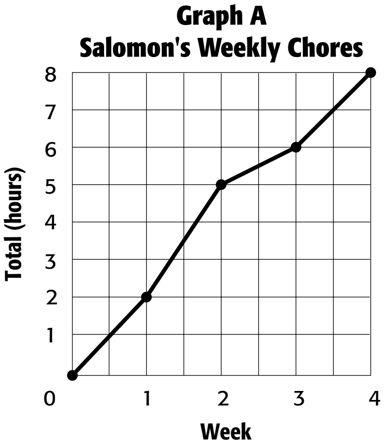
8-9 Study Guide

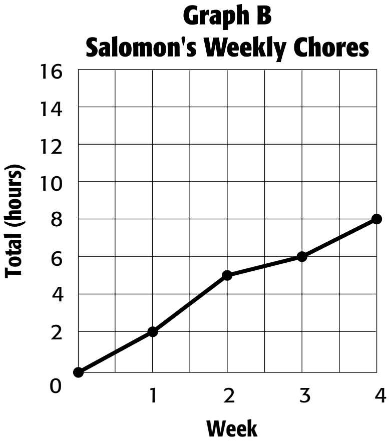
SCAS 7-1.2

Misleading Statistics

Graphs can be misleading for many reasons: there is no title, the scale does not include 0; there are no labels on either axis; the intervals on a scale are not equal; or the size of the graphics misrepresents the data.

Example WEEKLY CHORES **The line graphs below show the total hours Salomon spent doing his chores one month. Which graph would be best to use to convince his parents he deserves a raise in his allowance? Explain.**

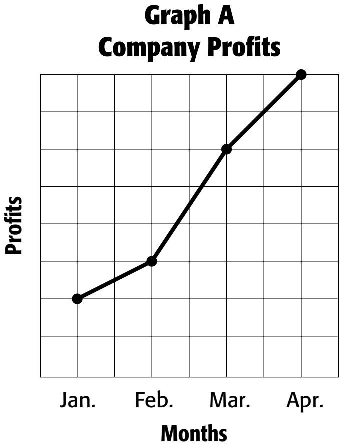


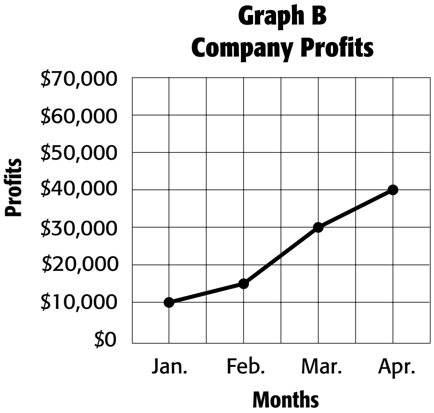


He should use graph A because it makes the total hours seem much larger.

Exercises

PROFITS **For Exercises 1 and 2, use the graphs below. It shows a company's profits over a four-month period.**





1. Which graph would be best to use to convince potential investors to invest in this company?

2. Why might the graph be misleading?

NAME ______________________________ DATE ____________ PERIOD _____

8-9 Homework Practice

SCAS 7-1.2

Misleading Statistics

ANTIQUES For Exercises 1–3, use the table.

Antiques	
Item	**Value**
Desk	$150
Table	$850
Painting	$850
Dishes	$750
Sewing Machine	$200

1. Find the mean, median, and mode of the data.

2. Which measure might be misleading in describing the value of each item? Explain.

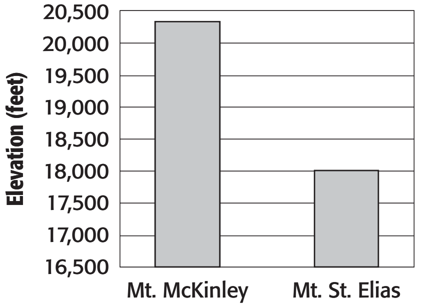
3. Which measure would best describe the value of each item? Explain.

MOUNTAINS For Exercises 4 and 5, use the graph that shows the elevation of the two highest mountain peaks in Alaska.

4. Based on the size of the bars compare the elevations of the mountains.

5. Explain how this graph may be misleading.

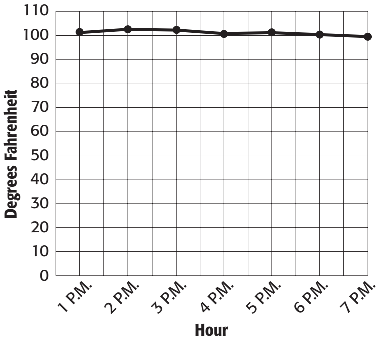
Elevation of Mountains



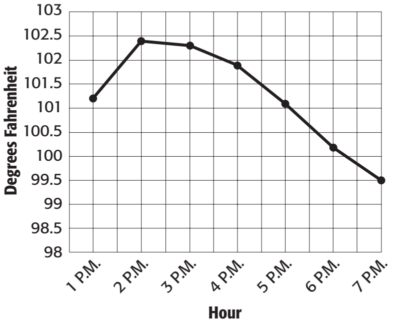
Source: infoplease.com

6. **BODY TEMPERATURE** The graphs below show the hourly body temperature for a hospital patient. Which graph would be more helpful to the doctor in showing the change in body temperature? Explain.

Graph A
Hourly Temperatures



Graph B
Hourly Temperatures



NAME ______________________________ DATE ____________ PERIOD _____

8-9 Problem-Solving Practice

SCAS 7-1.2

Misleading Statistics

QUIZ SCORES For Exercises 1 and 2, use the data shown in the table below. The table shows the quiz grades for Ms. Andrey's and Mr. Luna's classes.

Quiz Scores	
Ms. Andrey's Class	**Mr. Luna's Class**
10	20
15	20
25	25
25	29
12	26

BOOK SALES For Exercises 3 and 4, use the table below. It shows the number of books sold each day for 20 days.

Book Sales Per Day			
23	18	23	15
24	16	0	11
19	10	13	17
12	23	11	16
36	24	12	27

1. Ms. Andrey claims the average score on a quiz in her class was 25. Mr. Luna claims the average score on a quiz in his class is 25. Explain how they arrived at these figures.

2. What additional information could be useful in analyzing the data?

3. Find the mean, median, and mode of the data. Which measure of central tendency would be misleading in describing the book sales? Explain.

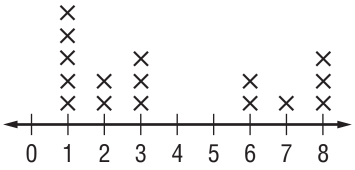
4. Which value would most accurately describe the data? Explain.

Name Date

Chapter 8 Test

Mastering the SC Standards

1 The line plot shows the number of absent students during different weeks of the school year. Which of the following measures best represents the number of absent students per week?



Absent Students

Ⓐ mean
Ⓑ median
Ⓒ mode
Ⓓ range

Review of 6-6.3

2 The table below shows the number of movies in each category that were rented from a local video store in one week.

Film Category	Number of Films Rented
Action	266
Comedy	451
Drama	202
Family	56

Based on the information in the table, which of the following is a reasonable assumption?

Ⓐ About 4 times more drama films were rented than family films.
Ⓑ Comedy films were more than twice as popular as action films.
Ⓒ Drama films were the most popular type of film rented.
Ⓓ Only half as many drama films as action films were rented.

7-6.1

3 A technical support department conducted a survey that revealed that 68 out of 70 customers who had contacted the support department last month were satisfied with the service they received. What is a valid claim based on this data?

Ⓐ Most of our customers are satisfied with the service they receive.
Ⓑ All of our customers are satisfied with the service they receive.
Ⓒ Our customers are never dissatisfied with the service they receive.
Ⓓ Most of our customers are satisfied with the amount they pay for their technical service plans.

7-6.1

4 The table below shows the number of students at Midvale Middle School who are taking different foreign language classes.

Foreign Language	Number of Students
French	55
German	38
Spanish	62
Russian	17

Which of the following statements is supported by the data in the table?

Ⓐ German is the least popular language choice.
Ⓑ Russian is the most popular language choice.
Ⓒ Spanish is the most popular language choice.
Ⓓ French is the most popular language choice.

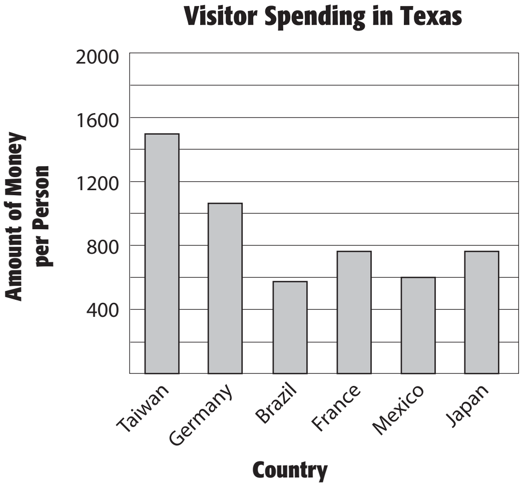
7-6.1

Name Date

Chapter 8 Test (continued)

Mastering the SC Standards

5 The graph below shows the average amount of money visitors from other countries spend per person when visiting the state of Texas.



Which statement is best supported by the data?

Ⓐ People from Taiwan spend more money per trip than people from other countries.

Ⓑ People from Germany and Japan spend about the same amount of money per trip.

Ⓒ People from Mexico spend about three times as much money as people from Brazil.

Ⓓ People from France spend about half as much money as people from Germany.

7-6.1

Use the information below to answer questions 6 and 7.

In a science experiment, Jada collects the following data.

Trial	Distance (cm)
1	33
2	29
3	27
4	35
5	25
6	22

6 Which measure of data is represented by 28 cm?

Ⓐ mean

Ⓑ median

Ⓒ mode

Ⓓ range

Review of 6-6.3

7 Which measure of data is represented by 13?

Ⓐ mean

Ⓑ median

Ⓒ mode

Ⓓ range

Review of 6-6.3

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9 Anticipation Guide

Probability

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 probability of an event happening is a ratio that compares the number of favorable outcomes to the number of unfavorable outcomes.	
	2. If the probability of an event happening is $\frac{3}{5}$ then it is more likely for the event to happen than to not happen.	
	3. In a probability experiment, a tree diagram can be used to show all the possible outcomes.	
	4. The Fundamental Counting Principle states that the number of possible outcomes can also be found by division.	
	5. To find the value of 4!, add $4 + 3 + 2 + 1$.	
	6. In a combination, choosing event A then event B would be the same as choosing event B then event A.	
	7. The experimental probability of an event happening will always be close to the theoretical probability of that event happening.	
	8. The act it out strategy is a good way to solve problems because the results will be the same every time the experiment is repeated.	
	9. A compound event consists of two or more simple events.	
	10. The probability of two independent events is found the same way as the probability of two dependent events.	

STEP 2 *After you complete Chapter 9*

- Reread each statement and complete the last column by entering an A or a D.
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a piece of paper to write an example of why you disagree.

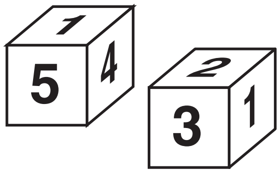
NAME ______________________________ DATE ____________ PERIOD _____

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. Joshua is playing a game with his friends. The object of the game is to get a sum of 9 when two standard number cubes are rolled.



How many possible ways are there for rolling two number cubes? How many of these ways have a sum of 9?

A 36 ways; 4 with a sum of 9

B 36 ways; 8 with a sum of 9

C 16 ways; 4 with a sum of 9

D 16 ways; 8 with a sum of 9

2. Justine is designing a probability experiment in which she can simulate finding the probability of getting snow overnight if the weatherman said that there is a 25% chance that the precipitation overnight will be rain, a 50% chance that the precipitation will be snow, and a 25% chance that there will be no precipitation at all.

Which of the following would best simulate what might happen overnight?

A toss a coin

B spin a spinner with four equal sections

C roll a standard number cube

D pick from 25 marbles in a bag

Fold here.

Solution

1. Since there are 6 possible outcomes for each number cube, there are 6 × 6 or 36 possible rolls.

In order for the sum of the number cubes to be 9, we can have the following combinations:

Cube 1	Cube 2
3	6
6	3
4	5
5	4

There are 4 possible combinations that will result in a sum of 9.

The answer is **A.**

Solution

2. *Hint: Consider the number of outcomes possible and consider their probabilities as fractions of a whole.*

The probabilities can all be expressed in terms of $\frac{1}{4}$. Choice B is the only option that represents fourths.

The answer is **B.**

9-1 Explore Through Reading

SCAS 7-6.5, 7-6.6

Simple Events

Get Ready for the Lesson

Read the introduction at the top of page 460 in your textbook. Write your answers below.

1. What fraction of the cheesecake is chocolate? Write in simplest form.

2. Suppose your friend gives you the first piece of cheesecake without asking which type you prefer. Are your chances of getting original the same as getting raspberry?

Read the Lesson

Use the information from the introduction to answer Exercises 3–5.

3. How do you read P(raspberry)?

4. $P(\text{raspberry}) = \frac{4}{16}$; where does the 4 come from? Where does the 16 come from?

5. Probability can be written as a fraction, a decimal, or a percent. Write P(raspberry) as a decimal.

6. If three pieces of strawberry cheesecake were added to the pie, how would P(raspberry) change?

Remember What You Learned

7. Write the equation $P(A) + P(\text{not } A) = 1$ in words. What does it mean with respect to event A?

9-1 Study Guide

SCAS 7-6.5, 7-6.6

Simple Events

The **probability** of a simple event is a ratio that compares the number of favorable outcomes to the number of possible outcomes. Outcomes occur at **random** if each outcome occurs by chance.

Two events that are the only ones that can possibly happen are **complementary events.** The sum of the probabilities of complementary events is 1.

Example 1 **What is the probability of rolling a multiple of 3 on a number cube marked with 1, 2, 3, 4, 5, and 6 on its faces.**

$$P(\text{multiple of 3}) = \frac{\text{multiples of 3 possible}}{\text{total numbers possible}}$$

$= \frac{2}{6}$ Two numbers are multiples of 3: 3 and 6.

$= \frac{1}{3}$ Simplify.

The probability of rolling a multiple of 3 is $\frac{1}{3}$ or about 33.3%.

Example 2 **What is the probability of *not* rolling a multiple of 3 on a number cube marked with 1, 2, 3, 4, 5, and 6 on its faces?**

$P(A) + P(\text{not } A) = 1$

$\frac{1}{3} + P(\text{not } A) = 1$ Substitute $\frac{1}{3}$ for $P(A)$.

$-\frac{1}{3} \qquad -\frac{1}{3}$ Subtract $\frac{1}{3}$ from each side

$P(\text{not } A) = \frac{2}{3}$ Simplify.

The probability of *not* rolling a multiple of 3 is $\frac{2}{3}$ or about 66.7%.

Exercises

A set of 30 cards is numbered 1, 2, 3, ..., 30. Suppose you pick a card at random without looking. Find the probability of each event. Write as a fraction in simplest form.

1. $P(12)$

2. $P(2 \text{ or } 3)$

3. $P(\text{odd number})$

4. $P(\text{a multiple of } 5)$

5. $P(\text{not a multiple of } 5)$

6. $P(\text{less than or equal to } 10)$

NAME ____ DATE ______________ PERIOD _____

9-1 Homework Practice

SCAS 7-6.5, 7-6.6

Simple Events

A set of cards is numbered 1, 2, 3, ... 24. Suppose you pick a card at random without looking. Find the probability of each event. Write as a fraction in simplest form.

1. *P*(5)

2. *P*(multiple of 4)

3. *P*(6 or 17)

4. *P*(not equal to 15)

5. *P*(not a factor of 6)

6. *P*(odd number)

COMMUNITY SERVICE **The table shows the students involved in community service. Suppose one student is randomly selected to represent the school at a state-wide awards ceremony. Find the probability of each event. Write as a fraction in simplest form.**

7. *P*(boy)

8. *P*(not 6th grader)

9. *P*(girl)

10. *P*(8th grader)

11. *P*(boy or girl)

12. *P*(6th or 7th grader)

13. *P*(7th grader)

14. *P*(not a 9th grader)

Community Service	
girls	15
boys	25
6th graders	20
7th graders	8
8th graders	12

MENU **A delicatessen serves different menu items, of which 2 are soups, 6 are sandwiches, and 4 are salads. How likely is it for each event to happen if you choose one item at random from the menu? Explain your reasoning.**

15. *P*(sandwich)

16. *P*(not a soup)

17. *P*(salad)

18. NUMBER CUBE What is the probability of rolling an even number or a prime number on a number cube? Write as a fraction in simplest form.

19. CLOSING TIME At a convenience store there is a 25% chance a customer enters the store within one minute of closing time. Describe the complementary event and find its probability.

NAME ______________________________ DATE ____________ PERIOD _____

9-1 Problem-Solving Practice

SCAS 7-6.5, 7-6.6

Simple Events

COINS Susan opened her piggy bank and counted the number of each coin. The table at the right shows the results. For Exercises 1–3, assume that the coins are put in a bag and one is chosen at random.

Coin	Number
quarters	15
dimes	21
nickels	22
pennies	32

1. What is the probability that a quarter is chosen?

2. What is the probability that a nickel or a dime is chosen?

3. What is the probability that the chosen coin is worth more than 5 cents?

4. **NUMBER CUBES** Juan has two number cubes, each with faces numbered 1, 2, …6. What is the probability that he can roll the cubes so that the sum of the faces showing equals 11?

5. **SKATEBOARDS** Carlotta bought a new skateboard for which the probability of having a defective wheel is 0.015. What is the probability of not having a defective wheel?

6. **CALCULATORS** Jake's teacher had 6 calculators for 28 students to use. If the first students to use the calculators are chosen at random, what is the probability that Jake will get one?

7. **VEHICLES** The rental car company had 14 sedans and 8 minivans available to rent. If the next customer picks a vehicle at random, what is the probability that a minivan is chosen?

8. **MUSIC** Tina has 16 pop CDs, 6 classical, and 2 rock. Tina chooses a CD at random. What is the probability she does not choose a classical CD?

9-2 Explore Through Reading

SCAS 7-6.6, 7-6.8

Sample Spaces

Get Ready for the Lesson

Complete the Mini Lab at the top of page 465 in your textbook. Write your answers below.

1. Make a conjecture. Do you think this is a fair game? Explain.

2. Now, play the game. Who won? What was the final score?

Read the Lesson

3. How does a tree diagram resemble a tree?

4. How can you use a table to find the number of possible outcomes of an event?

5. How do you know the game played in Example 3 is fair?

Remember What You Learned

6. Draw a tree diagram that shows a fair game that is different from the examples in your textbook. Can you think of a way to draw a tree diagram that shows a game that is *not* fair? Make sure you include a description if the game is not clear from your diagram.

NAME ______________________________ DATE ____________ PERIOD _____

9-2 Study Guide

SCAS **7-6.6,** 7-6.8

Sample Spaces

A game in which players of equal skill have an equal chance of winning is a **fair game**. A **tree diagram** or table is used to show all of the possible outcomes, or **sample space**, in a probability experiment.

Example 1 WATCHES **A certain type of watch comes in brown or black and in a small or large size. Find the number of color-size combinations that are possible.**

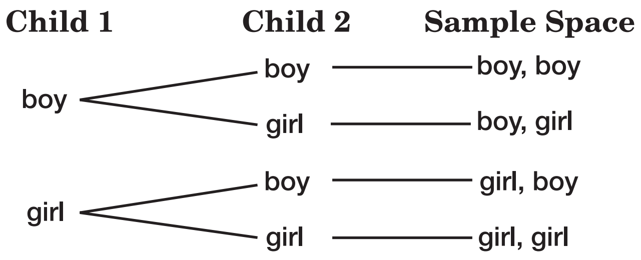
Make a table to show the sample space. Then give the total number of outcomes.

Color	Size
Brown	Small
Brown	Large
Black	Small
Black	Large

There are four different color and size combinations.

Example 2 CHILDREN **The chance of having either a boy or a girl is 50%. What is the probability of the Smiths having two girls?**

Make a tree diagram to show the sample space. Then find the probability of having two girls.



The sample space contains 4 possible outcomes. Only 1 outcome has both children being girls. So, the probability of having two girls is $\frac{1}{4}$.

Exercises

For each situation, make a tree diagram or table to show the sample space. Then give the total number of outcomes.

1. choosing an outfit from a green shirt, blue shirt, or a red shirt, and black pants or blue pants

2. choosing a vowel from the word COUNTING and a consonant from the word PRIME

NAME ______________________________ DATE ____________ PERIOD _____

9-2 Homework Practice

SCAS **7-6.6,** 7-6.8

Sample Spaces

For each situation, find the sample space using a table or tree diagram.

1. choosing blue, green, or yellow wall paint with white, beige, or gray curtains

2. choosing a lunch consisting of a soup, salad, and sandwich from the menu shown in the table.

Soup	Salad	Sandwich
Tortellini	Caesar	Roast Beef
Lentil	Macaroni	Ham
		Turkey

3. **GAME** Kimiko and Miko are playing a game in which each girl rolls a number cube. If the sum of the numbers is a prime number, then Miko wins. Otherwise Kimiko wins. Find the sample space. Then determine whether the game is fair.

Sum = 2	Sum = 3	Sum = 4	Sum = 5	Sum = 6	Sum = 7	Sum = 8	Sum = 9	Sum = 10	Sum = 11	Sum = 12
$1 + 1 = 2$	$2 + 1 = 3$ $1 + 2 = 3$	$1 + 3 = 4$ $2 + 2 = 4$ $3 + 1 = 4$	$1 + 4 = 5$ $2 + 3 = 5$ $3 + 2 = 5$ $4 + 1 = 5$	$1 + 5 = 6$ $2 + 4 = 6$ $3 + 3 = 6$ $4 + 2 = 6$ $5 + 1 = 6$	$1 + 6 = 7$ $2 + 5 = 7$ $3 + 4 = 7$ $4 + 3 = 7$ $5 + 2 = 7$ $6 + 1 = 7$	$2 + 6 = 8$ $3 + 5 = 8$ $4 + 4 = 8$ $5 + 3 = 8$ $6 + 2 = 8$	$3 + 6 = 9$ $4 + 5 = 9$ $5 + 4 = 9$ $6 + 3 = 9$	$4 + 6 = 10$ $5 + 5 = 10$ $6 + 4 = 10$	$5 + 6 = 11$ $6 + 5 = 11$	$6 + 6 = 12$

NAME ______________________________ DATE ____________ PERIOD _____

9-2 Problem-Solving Practice

SCAS 7-6.6, 7-6.8

Sample Spaces

1. **GASOLINE** Craig stops at a gas station to fill his gas tank. He must choose between full-service or self-service and between regular, midgrade, and premium gasoline. Draw a tree diagram or table showing the possible combinations of service and gasoline type. How many possible combinations are there?

2. **COINS** Judy tosses a coin 4 times. Draw a tree diagram or table showing the possible outcomes. What is the probability of getting at least 2 tails?

3. **COINS** In Exercise 2, what is the probability of getting 2 heads, then 2 tails?

4. **EQUIPMENT** The computer accessory that Joanne is considering selling at her store comes in white, beige, gray, or black and has an optical mouse, mechanical mouse, or trackball. How many combinations of color and model must she stock in order to have at least one of every possible combination?

NAME ______________________________ DATE ____________ PERIOD _____

9-3 Explore Through Reading

SCAS 7-6.8

The Fundamental Counting Principle

Get Ready for the Lesson

Read the introduction at the top of page 471 in your textbook. Write your answers below.

1. According to the table, how many colors of sandals are available?

2. How many styles are available?

3. Find the product of the two numbers you found in Exercises 1 and 2.

4. Draw a tree diagram to find the number of different color and style combinations. How does the number of outcomes compare to the product you found above?

Read the Lesson

5. What operation is used in the Fundamental Counting Principle?

6. How is the information in a tree diagram or table different from the information provided by counting?

Remember What You Learned

7. Write the Fundamental Counting Principle in your own words.

NAME ______________________________ DATE ____________ PERIOD _____

9-3 Study Guide

SCAS 7-6.8

The Fundamental Counting Principle

If event *M* can occur in *m* ways and is followed by event *N* that can occur in *n* ways, then the event *M* followed by *N* can occur in $m \times n$ ways. This is called the **Fundamental Counting Principle.**

Example 1 CLOTHING **Andy has 5 shirts, 3 pairs of pants, and 6 pairs of socks. How many different outfits can Andy choose with a shirt, pair of pants, and pair of socks?**

$$\overbrace{5}^{\text{number of shirts}} \cdot \overbrace{3}^{\text{number of pants}} \cdot \overbrace{6}^{\text{number of socks}} = \overbrace{90}^{\text{total number of outfits}}$$

Andy can choose 90 different outfits.

Exercises

Use the Fundamental Counting Principle to find the total number of outcomes in each situation.

1. rolling two number cubes

2. tossing 3 coins

3. picking one consonant and one vowel

4. choosing one of 3 processor speeds, 2 sizes of memory, and 4 sizes of hard drive

5. choosing a 4-, 6-, or 8-cylinder engine and 2- or 4-wheel drive

6. rolling 2 number cubes and tossing 2 coins

7. choosing a color from 4 colors and a number from 4 to 10

NAME ______________________________ DATE ____________ PERIOD _____

9-3 Homework Practice

SCAS 7-6.8

The Fundamental Counting Principle

Use the Fundamental Counting Principle to find the total number of outcomes in each situation.

1. choosing from 8 car models, 5 exterior paint colors, and 2 interior colors

2. selecting a year in the last decade and a month of the year

3. picking from 3 theme parks and 1-day, 2-day, 3-day, and 5-day passes

4. choosing a meat and cheese sandwich from the list shown in the table

Cheese	Meat
Provolone	Salami
Swiss	Turkey
American	Tuna
Cheddar	Ham

5. tossing a coin and rolling 2 number cubes

6. selecting coffee in regular or decaf, with or without cream, and with or without sweeteners

7. **COINS** Find the number of possible outcomes if 2 quarters, 4 dimes, and 1 nickel are tossed.

8. **SOCIAL SECURITY** Find the number of possible 9-digit social security numbers if the digits may be repeated.

9. **AIRPORTS** Jolon will be staying with his grandparents for a week. There are four flights that leave the airport near Jolon's home that connect to an airport that has two different flights to his grandparents' hometown. Find the number of possible flights. Then find the probability of taking the earliest flight from each airport if the flight is selected at random.

10. **ANALYZE TABLES** The table shows the kinds of homes offered by a residential builder. If the builder offers a discount on one home at random, find the probability it will be a 4-bedroom home with an open porch. Explain your reasoning.

Number of Bedrooms	Style of Kitchen	Type of Porch
5-bedroom	Mediterranean	Open
4-bedroom	Contemporary	Screen
3-bedroom	Southwestern	
	Colonial	

NAME ______________________________ DATE ____________ PERIOD _____

9-3 Problem-Solving Practice

SCAS 7-6.8

The Fundamental Counting Principle

1. **SURFBOARD** Jay owns 3 surfboards and 2 wetsuits. If he takes one surfboard and one wetsuit to the beach, how many different combinations can he choose?

2. **SHOPPING** John is trying to decide which bag of dog food to buy. The brand he wants comes in 4 flavors and 3 sizes. How many choices are there?

3. **LOTTERY** To purchase a lottery ticket, you must select 4 numbers from 0 to 9. How many possible lottery tickets can be chosen?

4. **RESTAURANTS** Miriam's favorite restaurant has 3 specials every day. Each special has 2 choices of vegetable and 3 choices of dessert. How many different meals could Miriam have?

5. **ROUTES** When Sunil goes to the building where he works, he can go through 4 different doors into the lobby. Then he can go to the seventh floor by taking 2 different elevators or 2 different stairways. How many different ways can Sunil get from outside the building to the seventh floor?

6. **STEREOS** Jailin went to her local stereo store. Given her budget and the available selection, she can choose between 2 CD players, 5 amplifiers, and 3 pairs of speakers. How many different stereos can Jailin purchase?

7. **DESSERT** For dessert you can choose apple, cherry, blueberry, or peach pie to eat, and milk or juice to drink. How many different combinations can you choose from?

8. **TESTS** John is taking a true or false quiz. There are six questions on the quiz. How many ways can the quiz be answered?

NAME ______________________________ DATE ____________ PERIOD _____

9-4 Explore Through Reading

SCAS 7-6.5, 7-6.6, 7-6.8

Permutations

Get Ready for the Lesson

Complete the Mini Lab at the top of page 475 in your textbook. Write your answers below.

1. When you first started to make your list, how many choices did you have for your first class?

2. Once your first class was selected, how many choices did you have for the second class? then, the third class?

Read the Lesson

3. How do you write *five factorial* using symbols?

4. What are the factors of five factorial?

5. What is the value of five factorial?

6. In Example 2 on page 476, why are there only 7 choices for second place?

Remember What You Learned

7. Look up the word *permute* in a dictionary. How does the meaning of this word relate to the concepts in this lesson, especially the concepts of permutations and factorials?

NAME ______________________________ DATE ____________ PERIOD _____

9-4 Study Guide

SCAS 7-6.5, 7-6.6, 7-6.8

Permutations

The expression *n* **factorial** (*n*!) is the product of all counting numbers beginning with *n* and counting backward to 1. A **permutation** is an arrangement, or listing, of objects in which order is important. You can use the Fundamental Counting Principle to find the number of possible arrangements.

Example 1 **Find the value of 5!.**

$5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$ Definition of factorial

$\quad = 120$ Simplify.

Example 2 **Find the value of 4! · 2!.**

$4! \cdot 2! = 4 \cdot 3 \cdot 2 \cdot 1 \cdot 2 \cdot 1$ Definition of factorial

$\quad = 48$ Simplify.

Example 3 BOOKS **How many ways can 4 different books be arranged on a bookshelf?**

This is a permutation that can be written as 4!. Suppose the books are placed on the shelf from left to right.

There are **4** choices for the first book.
There are **3** choices that remain for the second book.
There are **2** choices that remain for the third book.
There is **1** choice that remains for the fourth book.

$4! = 4 \cdot 3 \cdot 2 \cdot 1$ Definition of factorial

$\quad = 24$ Simplify.

So, there are 24 ways to arrange 4 different books on a bookshelf.

Exercises

Find the value of each expression.

1. 3!

2. seven factorial

3. 6! · 3!

4. 9 · 8 · 7

5. How many ways can you arrange the letters in the word GROUP?

6. How many different 4-digit numbers can be created if no digit can be repeated? Remember, a number cannot begin with 0.

NAME ______________________________ DATE ____________ PERIOD _____

9-4 Homework Practice

SCAS 7-6.5, 7-6.6, 7-6.8

Permutations

Solve each problem.

1. **NUMBERS** How many different 2-digit numbers can be formed from the digits 4, 6, and 8? Assume no number can be used more than once.

2. **LETTERS** How many permutations are possible of the letters in the word NUMBERS?

3. **PASSENGERS** There are 5 passengers in a car. In how many ways can the passengers sit in the 5 passenger seats of the car?

4. **PAINTINGS** Mr. Bernstein owns 14 paintings, but has only enough wall space in his home to display three of them at any one time: one in the hallway, one in the den, and one in the parlor. How many ways can Mr. Bernstein display three paintings in his home?

5. **DOG SHOW** Mateo is one of the six dog owners in the terrier category. If the owners are selected in a random order to show their dogs, how many ways can the owners show their dogs?

6. **TIME** Michel, Jonathan, and two of their friends each ride their bikes to school. If they have an equally-likely chance of arriving first, what is the probability that Jonathan will arrive first and Michel will arrive second?

7. **BIRTHDAY** Glen received 6 birthday cards. If he is equally likely to read the cards in any order, what is the probability he reads the card from his parents and the card from his sister before the other cards?

CODES For Exercises 8–10, use the following information. A bank gives each new customer a 4-digit code number which allows the new customer to create their own password. The code number is assigned randomly from the digits 1, 3, 5, and 7, and no digit is repeated.

8. What is the probability that the code number for a new customer will begin or end with a 7?

9. What is the probability that the code number will *not* contain a 5?

10. What is the probability that the code number will start with 371?

9-4 Problem-Solving Practice

Permutations

SCAS 7-6.5, 7-6.6, 7-6.8

1. AREA CODES How many different 3-digit area codes can be created if no digit can be repeated?

2. CARDS Jason is dealt five playing cards. In how many different orders could Jason have been dealt the same hand?

3. PASSWORDS How many different 3-letter passwords are possible if no letter may be repeated?

4. RACING All 22 students in Amy's class are going to run the 100-meter dash. In how many ways can the students finish in first, second, and third place?

5. LETTERS How many ways can you arrange the letters in the word HISTORY?

6. PARKING The parking lot for a company has three parking spaces for compact cars. The company has 8 employees with compact cars. How many ways can the compact parking spaces be filled?

7. SERIAL NUMBERS How many different 6-digit serial numbers are available if no digit can be repeated?

8. WINNERS There are 156 ways for 2 cars to win first and second place in a race. How many cars are in the race?

NAME ______________________________ DATE ____________ PERIOD _____

9-5 Explore Through Reading

SCAS 7-6.5, 7-6.6, 7-6.8

Combinations

Get Ready for the Lesson

Read the introduction at the top of page 480 in your textbook. Write your answers below.

1. Use the first letter of each vegetable to list all of the permutations of the ingredients added to the lettuce.

2. Cross out any arrangement that contains the same letters as another one in the list. How many are there now?

3. Explain the difference between the two lists.

Read the Lesson

4. How can you find the number of combinations of objects in a set?

5. Why might it be easier to calculate the number of combinations of a set of objects using a permutation rather than making a list?

For Exercises 6 and 7, refer to Example 2 on page 481 in your textbook.

6. In the diagram, how many points are there? How many line segments connect to any one point?

7. How does your answer to Exercise 6 above correspond to Example 2 in your book?

Remember What You Learned

8. Work with a partner. Take turns thinking of situations in which a selection from a group must be made, where order is or is not important. Tell each other which situations are permutations and which are combinations. Solve each problem and show your work.

NAME ______________________________ DATE ____________ PERIOD _____

9-5 Study Guide

SCAS 7-6.5, 7-6.6, 7-6.8

Combinations

An arrangement, or listing, of objects in which order is not important is called a **combination**. You can find the number of combinations of objects by dividing the number of permutations of the entire set by the number of ways each smaller set can be arranged.

Example 1 **Jill was asked by her teacher to choose 3 topics from the 8 topics given to her. How many different three-topic groups could she choose?**

There are 8 • 7 • 6 permutations of three-topic groups chosen from eight. There are 3 • 2 • 1 ways to arrange the groups.

$$\frac{8 \cdot 7 \cdot 6}{3 \cdot 2 \cdot 1} = \frac{336}{6} = 56$$

So, there are 56 different three-topic groups.

Tell whether each situation represents a *permutation* or *combination*. Then solve the problem.

Example 2 **On a quiz, you are allowed to answer any 4 out of the 6 questions. How many ways can you choose the questions?**

This is a combination because the order of the 4 questions is not important. So, there are 6 • 5 • 4 • 3 permutations of four questions chosen from six. There are 4 • 3 • 2 • 1 orders in which these questions can be chosen.

$$\frac{6 \cdot 5 \cdot 4 \cdot 3}{4 \cdot 3 \cdot 2 \cdot 1} = \frac{360}{24} = 15$$

So, there are 15 ways to choose the questions.

Example 3 **Five different cars enter a parking lot with only 3 empty spaces. How many ways can these spaces be filled?**

This is a permutation because each arrangement of the same 3 cars counts as a distinct arrrangement. So, there are 5 • 4 • 3 or 60 ways the spaces can be filled.

Exercises

Tell whether each situation represents a *permutation* or *combination*. Then solve the problem.

1. How many ways can 4 people be chosen from a group of 11?

2. How many ways can 3 people sit in 4 chairs?

3. How many ways can 2 goldfish be chosen from a tank containing 15 goldfish?

NAME ____ DATE ______________ PERIOD _____

9-5 Homework Practice

Combinations

SCAS 7-6.5, 7-6.6, 7-6.8

Solve each problem.

1. **BASKETBALL** In how many ways can a coach select 5 players from a team of 10 players?

2. **BOOKS** In how many ways can 3 books be selected from a shelf of 25 books?

3. **CAFETERIA** In how many ways can you choose 2 side dishes from 15 items?

4. **CHORES** Of 8 household chores, in how many ways can you do three-fourths of them?

5. **ELDERLY** Latanya volunteers to bake and deliver pastries to elderly people in her neighborhood. In how many different ways can Latanya deliver to 2 of the 6 elderly people in her neighborhood?

6. **DELI** A deli makes potato, macaroni, three bean, Caesar, 7-layer, and Greek salads. The deli randomly makes only four salads each day. What is the probability that the four salads made one day are 7-layer, macaroni, Greek, and potato?

7. **AUTOGRAPHS** A sports memorabilia enthusiast collected autographed baseballs from the players in the table. The enthusiast is giving one autographed baseball to each of his three grandchildren. If the baseballs are selected at random, what is the probability that the Hank Aaron, Alex Rodriquez, and Mickey Mantle autographed baseballs are given to his grandchildren?

Player
Cal Ripkin
Hank Aaron
Barry Bonds
Alex Rodriquez
Mickey Mantle

For Exercises 8–10, tell whether each problem represents a *permutation* or a *combination*. Then solve the problem.

8. **LOCKS** In how many ways can three different numbers be selected from 10 numbers to open a keypad lock?

9. **MOVIES** How many ways can 10 DVDs be placed on a shelf?

10. **TRANSPORTATION** Eight people need transportation to the concert. How many different groups of 6 people can ride with Mrs. Johnson?

NAME ______________________________ DATE ____________ PERIOD _____

9-5 Problem-Solving Practice

SCAS 7-6.5, 7-6.6, 7-6.8

Combinations

1. **SNACKS** A vending machine can display six snacks. If there are eight different kinds of snacks available, how many 2 groups of six different snacks can be purchased?

2. **MUSIC** Each month, Jose purchases two CDs from a selection of 20 bestselling CDs. How many different pairs of CDs can Jose choose if he chooses two different CDs?

3. **TESTS** On a math test, you can choose any 20 out of 23 questions. How many different groups of 20 questions can you choose?

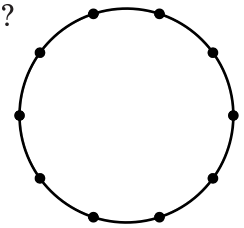
4. **RESTAURANTS** The dinner special at a local pizza parlor gives you the choice of two toppings from a selection of six toppings. How many different choices are possible if two different toppings are chosen?

5. **TESTING** In a science fair experiment, two units are selected for testing from every 500 units produced. How many ways can these two units be selected?

6. **MEETINGS** Linda's teacher divided the class into groups of five and required each member of a group to meet with every other member of that group. How many meetings will each group have?

7. **BASEBALL** A baseball coach has 13 players to fill nine positions. How many different teams could he put together?

8. **GEOMETRY** Ten points are marked on a circle. How many different triangles can be drawn between any three points?



NAME ______________________ DATE ____________ PERIOD _____

9-6 Study Guide

SCAS 7-6.5, 7-1.1

Problem-Solving Investigation: Act It Out

By acting out a problem, you are able to see all possible solutions to the problem being posed.

Example CLOTHING **Ricardo has two shirts and three pairs of pants to choose from for his outfit to wear on the first day of school. How many different outfits can he make by wearing one shirt and one pair of pants?**

Understand We know that he has two shirts and three pairs of pants to choose from. We can use a coin for the shirts and an equally divided spinner labeled for the pants.

Plan Let's make a list showing all possible outcomes of tossing a coin and then spinning a spinner.

Solve

H = Heads
T = Tails
Spinner = 1, 2, 3

Flip a Coin	Spin a Spinner
H	1
H	2
H	3
T	1
T	2
T	3

There are six possible outcomes of tossing a coin and spinning a spinner. So, there are 6 different possible outfits that Ricardo can wear for the first day of school.

Check Tossing a coin has two outcomes and there are two shirts. Spinning a three-section spinner has three outcomes and there are three pairs of pants. Therefore, the solution of 6 different outcomes with a coin and spinner represent the 6 possible outfit outcomes for Ricardo.

Exercises

1. SCIENCE FAIR There are 4 students with projects to present at the school science fair. How many different ways can these 4 projects be displayed on four tables in a row?

2. GENDER Determine whether tossing a coin is a good way to predict the gender of the next 5 babies born at General Hospital. Justify your answer.

3. OLYMPICS Four runners are entered in the first hurdles heat of twelve heats at the Olympics. The first two move on to the next round. Assuming no ties, how many different ways can the four runners come in first and second place?

NAME ______________________________ DATE ____________ PERIOD _____

9-6 Skills Practice

SCAS 7-6.5, 7-1.1

Problem-Solving Investigation: Act it Out

Use the act it out strategy to solve.

1. **SCHOOL** Determine whether rolling a 6-sided number cube is a good way to answer a 20-question multiple-choice test if there are six choices for each question. Justify your answer.

2. **GYMNASTICS** Five gymnasts are entered in a competition. Assuming that there are no ties, how many ways can first, second, and third places be awarded?

3. **LUNCH** How many ways can 3 friends sit together in three seats at lunch?

4. **SCHEDULE** How many different schedules can Sheila create if she has to take English, math, science, social studies, and art next semester. Assume that there is only one lunch period available.

5. **BAND CONCERTS** The band is having a holiday concert. In the first row, the first trumpet is always furthest to the right and the first trombone is always the furthest to the left. How many ways are there to arrange the other 4 people who need to sit in the front?

6. **TEAMS** Mr. D is picking teams for volleyball is gym by having the students count off by 2's. The 1's will be on one team and the 2's on the other. Would flipping a coin would work just as well to pick the teams? Justify your answer.

NAME ______________________________ DATE ______________ PERIOD _____

9-6 Homework Practice

SCAS 7-6.5, 7-1.1

Problem-Solving Investigation: Act It Out

Mixed Problem Solving

For Exercises 1 and 2, use the act it out strategy.

1. **POP QUIZ** Use the information in the table to determine whether tossing a nickel and a dime is a good way to answer a 5-question multiple-choice quiz if each question has answer choices A, B, C, and D. Justify your answer.

Nickel	Dime	Answer Choice
H	H	A
H	T	B
T	H	C
T	T	D

2. **BOWLING** Bill, Lucas, Carmen, and Dena go bowling every week. When ordered from highest to lowest, how many ways can their scores be arranged if Lucas is never first and Carmen always beats Bill?

Use any strategy to solve Exercises 3–6. Some strategies are shown below.

PROBLEM-SOLVING STRATEGIES
• Draw a diagram. • Use reasonable answers. • Act it out.

3. **BOOKS** What is the probability of five books being placed in alphabetical order of their titles if randomly put on a book shelf?

4. **NUMBER THEORY** The sum of a 2-digit number and the 2-digit number when the digits are reversed is 77. If the difference of the same two numbers is 45, what are the two 2-digit numbers?

5. **BASEBALL** In one game, Rafael was up to bat 3 times and made 2 hits. In another game, he was up to bat 5 times with no hits. What percent of the times at bat did Rafael make a hit?

6. **RESTAURANT** A restaurant offers the possibility of 168 three-course dinners. Each dinner has an appetizer, an entrée, and a dessert. If the number of appetizers decreases from 7 to 5, find how many fewer possible three-course dinners the restaurant offers.

NAME ______________________________ DATE ____________ PERIOD _____

9-6 Problem-Solving Practice

SCAS **7-6.5,** 7-1.1

Problem-Solving Investigation: Act It Out

Solve each problem using any strategy you have learned.

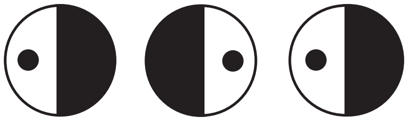
1. **POLLS** Out of 200 people, 32% said that their favorite animal was a cat and 44% said that their favorite animal was a dog. How many more people chose dog than cat?

2. **PEACHES** Roi is picking peaches; he needs a total of $3\frac{1}{2}$ bushels of peaches. If he has already picked 3 bushels, how many more does he need to pick?

   A 2 bushels
   B $\frac{1}{2}$ bushel
   C $3\frac{1}{2}$ bushels
   D 3 bushels

3. **BASEBALL** Thirty-two teams are playing in the championship. If a team is eliminated once it loses, how many total games will be played in the championship?

4. **GEOMETRY** Find the next two terms is the sequence.



5. **POOL RENTAL** The table below shows how much Ford Middle School was charged to rent the pool for a party based on the number of hours it was rented. Predict the cost for 5 hours.

# of hours	Cost
1	$120
1.5	$180
2	$240
2.5	$300

6. **GEOMETRY** Use the formula $D = rt$ where D is the distance, r is the rate, and t is the time to determine how far Alyssa drove if she drove 55 miles per hour for 4 hours.

7. **SCHOOL ELECTIONS** How many ways can a president, vice president, secretary and treasurer be elected from a choice of 6 students?

8. **SHOPPING** Morty bought skis. The skis cost $215 and he got $35 in change. How much did Morty pay with?

NAME ______________________________ DATE ____________ PERIOD _____

9-7 Explore Through Reading

SCAS 7-6.7, 7-1.7, 7-6.5

Theoretical and Experimental Probability

Get Ready for the Lesson

Complete the Mini Lab at the top of page 486 in your textbook. Write your answers below.

1. Compare the number of times you *expected* to roll doubles with the number of times you *actually* rolled doubles.

2. Write the probability of rolling doubles out of 36 rolls using the number of times you *expected* to roll doubles from Step 1. Then write the probability of rolling doubles out of 36 rolls using the number of times you *actually* rolled doubles from Step 2.

Read the Lesson

3. Look up the word *experimental* in a dictionary. Write the meaning for the word as used in the lesson.

4. How does theoretical probability differ from experimental probability?

5. Complete the sentence: Experimental probability can be based on ____________________ and can be used to make predictions about future events.

Remember What You Learned

6. Work with a partner. Design an experiment that you can use to express the experimental probability of an event. Compare your findings with those of others in your class.

NAME ______________________________ DATE ____________ PERIOD _____

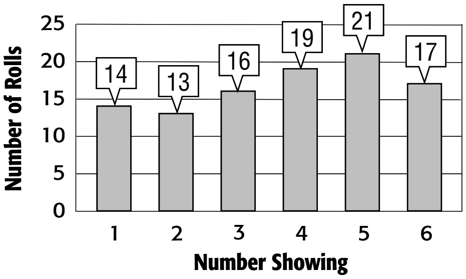
9-7 Study Guide

SCAS **7-6.7,** 7-1.7, 7-6.5

Theoretical and Experimental Probability

Experimental probability is found using frequencies obtained in an experiment or game. **Theoretical probability** is the expected probability of an event occurring.

Example 1 **The graph shows the results of an experiment in which a number cube was rolled 100 times. Find the experimental probability of rolling a 3 for this experiment.**



$$P(3) = \frac{\text{number of times 3 occurs}}{\text{number of possible outcomes}}$$

$$= \frac{16}{100} \text{ or } \frac{4}{25}$$

The experimental probability of rolling a 3 is $\frac{4}{25}$, which is close to its theoretical probability of $\frac{1}{6}$.

Example 2 **In a telephone poll, 225 people were asked for whom they planned to vote in the race for mayor. What is the experimental probability of Juarez being elected?**

Candidate	Number of People
Juarez	75
Davis	67
Abramson	83

Of the 225 people polled, 75 planned to vote for Juarez.

So, the experimental probability is $\frac{75}{225}$ or $\frac{1}{3}$.

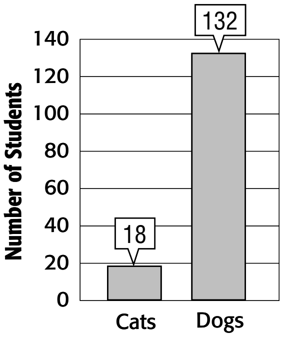
Example 3 **Suppose 5,700 people vote in the election. How many can be expected to vote for Juarez?**

$\frac{1}{3} \cdot 5{,}700 = 1{,}900$

About 1,900 will vote for Juarez.

Exercises

For Exercises 1–3, use the graph of a survey of 150 students asked whether they prefer cats or dogs.



1. What is the probability of a student preferring dogs?

2. Suppose 100 students were surveyed. How many can be expected to prefer dogs?

3. Suppose 300 students were surveyed. How many can be expected to prefer cats?

NAME ______________________________ DATE ______________ PERIOD _____

9-7 Homework Practice

SCAS **7-6.7,** 7-1.7, 7-6.5

Theoretical and Experimental Probability

For Exercises 1–4, a number cube is rolled 24 times and lands on 2 four times and on 6 three times.

1. Find the experimental probability of landing on a 2.

2. Find the experimental probability of *not* landing on a 6.

3. Compare the experimental probability you found in Exercise 1 to its theoretical probability.

4. Compare the experimental probability you found in Exercise 2 to its theoretical probability.

ENTERTAINMENT **For Exercises 5–7, use the results of the survey in the table shown.**

5. What is the probability that someone in the survey considered reading books or surfing the Internet as the best entertainment value? Write the probability as a fraction.

6. Out of 500 people surveyed, how many would you expect considered reading books or surfing the Internet as the best entertainment value?

7. Out of 300 people surveyed, is it reasonable to expect that 30 considered watching television as the best entertainment value? Why or why not?

Best Entertainment Value	
Type of Entertainment	**Percent**
Playing Interactive Games	48%
Reading Books	22%
Renting Movies	10%
Going to Movie Theaters	10%
Surfing the Internet	9%
Watching Television	1%

For Exercises 8–10, a spinner marked with four sections blue, green, yellow, and red was spun 100 times. The results are shown in the table.

8. Find the experimental probability of landing on green.

9. Find the experimental probability of landing on red.

10. If the spinner is spun 50 more times, how many of these times would you expect the pointer to land on blue?

Section	Frequency
Blue	14
Green	10
Yellow	8
Red	68

NAME ______________________ DATE ________ PERIOD ____

Mini-Project

SCAS **7-6.7,** 7-1.7, 7-6.5

(Use with Lesson 9-7)

Theoretical and Experimental Probability

Toss a coin ten times. Record the results of each toss in the table.

Toss	1	2	3	4	5	6	7	8	9	10
Result										

1. How many times did the coin land with the tail side up? ____________

2. Compute the experimental probability of the coin landing tail side up.

____

3. What is the theoretical probability of the coin landing tail side up? ________

4. Is the experimental probability the same as the theoretical probability? ______

____

Toss a coin 40 more times. Count the number of times the coin lands tail side up.

5. Including your first 10 tosses, how many times did the coin land tail side up? ______________________________

6. How many times did you expect the coin to land tail side up? ____________

Why did you choose this number? ______________________

____

7. What is the experimental probability for 50 tosses? ____________

8. What is the theoretical probability for 50 tosses? ____________

How does this compare to the theoretical probability for 10 tosses?

____

9. Is the experimental probability for 50 tosses the same as the theoretical probability for 50 tosses? ______________________________

____

10. Write a summary statement. Describe any connections you notice. Mention the number of trials, the experimental probability, and the theoretical probability. ______________________

____

____

____

____

____

NAME ______________________________ DATE ____________ PERIOD _____

9-8 Explore Through Reading

SCAS 7-6.5, 7-6.6, 7-6.7

Compound Events

Get Ready for the Lesson

Read the introduction at the top of page 492 in your textbook. Write your answers below.

1. If Reginald picks one quarter without looking, what is the probability it is from Colorado?
2. Suppose he tosses the coin. What is the probability it lands heads up?
3. Make a tree diagram to find the probability of choosing a Colorado quarter that lands heads up.
4. How are the answers to Exercises 1, 2, and 3 related?

Read the Lesson

Use the introduction to the lesson to answer Exercises 5–8.

5. What does a compound event consist of?
6. Define independent events.
7. Write the probability of independent events in symbols.
8. How can you find the probability of two independent events?

Remember What You Learned

9. List several independent compound events. Explain why you consider the events to be independent.

NAME ______________________________ DATE ____________ PERIOD _____

9-8 Study Guide

SCAS 7-6.5, 7-6.6, 7-6.7

Compound Events

A **compound event** consists of two or more simple events. If the outcome of one event does not affect the outcome of a second event, the events are called **independent events**. The probability of two independent events can be found by multiplying the probability of the first event by the probability of the second event.

Example 1 **A coin is tossed and a number cube is rolled. Find the probability of tossing tails and rolling a 5.**

$P(\text{tails}) = \frac{1}{2}$ $\qquad P(5) = \frac{1}{6}$

$P(\text{tails and } 5) = \frac{1}{2} \cdot \frac{1}{6}$ or $\frac{1}{12}$

So, the probability of tossing tails and rolling a 5 is $\frac{1}{12}$.

Example 2 MARBLES **A bag contains 7 blue, 3 green, and 3 red marbles. If Agnes randomly draws two marbles from the bag, replacing the first before drawing the second, what is the probability of drawing a green and then a blue marble?**

$P(\text{green}) = \frac{3}{13}$ 13 marbles, 3 are green

$P(\text{blue}) = \frac{7}{13}$ 13 marbles, 7 are blue

$P(\text{green, then blue}) = \frac{3}{13} \cdot \frac{7}{13} = \frac{21}{169}$

So, the probability that Agnes will draw a green, then a blue marble is $\frac{21}{169}$.

Exercises

1. Find the probability of rolling a 2 and then an even number on two consecutive rolls of a number cube.

2. A penny and a dime are tossed. What is the probability that the penny lands on heads and the dime lands on tails?

3. Lazlo's sock drawer contains 8 blue and 5 black socks. If he randomly pulls out one sock, what is the probability that he picks a blue sock?

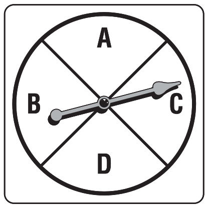
NAME ______________________________ DATE ____________ PERIOD _____

9-8 Homework Practice

SCAS 7-6.5, 7-6.6, 7-6.7

Compound Events

A number cube is rolled and a spinner like the one shown is spun. Find each probability.



1. *P*(6 and *D*) **2.** *P*(multiple of 2 and *B*) **3.** *P*(not 6 and not *A*)

A set of 7 cards is labeled 1–7. A second set of 12 cards contains the following colors: 3 green, 6 red, 2 blue, and 1 white. One card from each set is selected. Find each probability.

4. *P*(6 and green) **5.** *P*(prime and blue) **6.** *P*(odd and red)

7. *P*(7 and white) **8.** *P*(multiple of 3 and red) **9.** *P*(even and white)

A coin is tossed, a number cube is rolled, and a letter is picked from the word *framer*.

10. *P*(tails, 5, *m*) **11.** *P*(heads, odd, *r*) **12.** *P*(heads, 6, vowel)

13. *P*(tails, prime, consonant) **14.** *P*(not tails, multiple of 3, *a*) **15.** *P*(not heads, 2, *f*)

16. **TOLL ROAD** Mr. Espinoza randomly chooses one of five toll booths when entering a toll road when driving to work. What is the probability he will select the middle toll booth on Monday and Tuesday?

MARBLES For Exercises 17–20, use the information in the table shown to find each probability. After a marble is randomly picked from a bag containing marbles of four different colors, the color of the marble is observed and then it is returned to the bag.

Marbles	
Color	**Number**
White	6
Green	2
Red	1
Blue	3

17. *P*(red) **18.** *P*(green, blue)

19. *P*(red, white, blue) **20.** *P*(blue, blue, blue)

NAME ______________________________ DATE ______________ PERIOD _____

9-8 Problem-Solving Practice

SCAS 7-6.5, 7-6.6, 7-6.7

Compound Events

1. **SAFETY** Eighty percent of all California drivers wear seat belts. If three drivers are pulled over, what is the probability that all would be wearing their seat belts? Write as a percent to the nearest tenth.

2. **VEGETABLES** A nationwide survey showed that 65% of all children in the United States dislike eating vegetables. If three children are chosen at random, what is the probability that all three dislike eating vegetables? Write as a percent to the nearest tenth.

3. **QUALITY** In a shipment of 50 calculators, 4 are defective. One calculator is randomly selected and tested. What is the probability that it is defective?

4. **MARBLES** A bag contains 6 green marbles, 2 blue marbles, and 3 white marbles. Gwen draws one marble from the jar and replaces it. Jeff then draws one marble from the jar. What is the probability that Gwen draws a blue marble and Jeff draws a white marble?

5. **DEMONSTRATION** Ms. Morris needs a student to help her with a demonstration for her class of 12 girls and 14 boys. She randomly chooses a student. What is the probability that she chooses a girl?

6. **SURVEY** Ruben surveyed his class and found that 4 out of 22 students walk to school. If one of the 22 students is selected at random, what is the probability that the chosen student DOES NOT walk to school?

Name Date

Chapter 9 Test

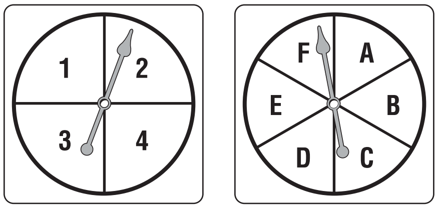
Mastering the SC Standards

1 A group of scientists is studying South Carolina's state butterfly, the Eastern tiger swallowtail. One day, 3 out of every 5 butterflies they saw were Eastern tiger swallowtails. What is the probability that the next butterfly they see will be an Eastern tiger swallowtail?

- Ⓐ 0.40
- Ⓑ 0.50
- Ⓒ 0.60
- Ⓓ 0.75

7-6.6

2 Ramon needs to find the probability of spinning a 1 and either an A or a B.



How can he find the probability?

- Ⓐ $\frac{1}{4} \times \left(\frac{1}{6} + \frac{1}{6}\right)$
- Ⓑ $\left(\frac{1}{4} \times \frac{1}{6}\right) + \frac{1}{6}$
- Ⓒ $\frac{1}{4} \times \frac{1}{6} \times \frac{1}{6}$
- Ⓓ $\frac{1}{4} + \frac{1}{6} + \frac{1}{6}$

7-6.5

3 Luz conducted an experiment. She tossed two coins at the same time and recorded the results. The table below shows her results.

Toss	Outcome
1	HH
2	HT
3	HT
4	TT
5	TT
6	TT
7	HT
8	HH
9	HT
10	HH

What is the experimental probability of the coins both landing heads up?

- Ⓐ $\frac{1}{5}$
- Ⓑ $\frac{3}{10}$
- Ⓒ $\frac{2}{5}$
- Ⓓ $\frac{7}{10}$

7-6.7

4 If Christy chooses a vowel and tosses a coin, how many possible outcomes are there in the sample space?

- Ⓐ 5
- Ⓑ 7
- Ⓒ 10
- Ⓓ 20

7-6.6

Name Date

Chapter 9 Test (continued)

Mastering the SC Standards

5 Nathan has several choices for what he takes to school for lunch. He can choose either a turkey sandwich or a ham sandwich. He can also choose to take an orange, an apple, or grapes. How many different lunch choices does Nathan have?

Ⓐ 5
Ⓑ 6
Ⓒ 8
Ⓓ 16

7-6.8

6 Anthony has a number cube numbered 1–6. What is the theoretical probability that he will roll a 3 or a 6?

Ⓐ $\frac{1}{6}$
Ⓑ $\frac{1}{4}$
Ⓒ $\frac{1}{3}$
Ⓓ $\frac{5}{6}$

7-6.7

7 Cara needs to choose between brown, blue, or white socks with either boots, gym shoes, dress shoes, or loafers. How many different outcomes are possible?

Ⓐ 9
Ⓑ 10
Ⓒ 12
Ⓓ 15

7-6.8

8 Maria chooses 2 marbles from a bag containing 10 blue, 10 green, and 10 red marbles. Which list shows all of the possible color combinations if Maria chooses two marbles?

Ⓐ blue and green
blue and red
red and blue
green and red
red and green
green and blue

Ⓑ red and blue
blue and green
green and red

Ⓒ red and blue
green and red
orange and green
green and green
red and red
blue and blue

Ⓓ blue and blue
blue and red
blue and green
red and red
red and green
green and green

7-6.6

9 Jason is going to flip a coin three times. How can he find the probability of getting heads all three times?

Ⓐ $\frac{1}{2} \times \frac{1}{2}$
Ⓑ $\frac{1}{2} \times 3$
Ⓒ $\frac{1}{2} + \frac{1}{2} + \frac{1}{2}$
Ⓓ $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$

7-6.5

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10 Anticipation Guide

Geometry: Polygons

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).

STEP 1 A, D, or NS	Statement	STEP 2 A or D
	1. The point where the sides of an angle meet is called the vertex.	
	2. An obtuse angle has a measure less than 90°.	
	3. Two angles are complementary if the sum of their measures is 180°.	
	4. The percents in a circle graph total 100% and the angle measures will total 360°.	
	5. The sum of the measures of the angles in a triangle is 360°.	
	6. A triangle is classified as obtuse if one angle in the triangle is obtuse.	
	7. All rectangles are quadrilaterals, but not all quadrilaterals are rectangles.	
	8. Figures that are the same shape and size are called similar figures.	
	9. If two figures are similar, then the corresponding angles are congruent.	
	10. A polygon is a two-dimensional figure with five sides.	
	11. After a figure translated, the resulting figure is the same size and shape as the original.	
	12. Only figures with at least one line of symmetry can be transformed by a reflection.	

STEP 2 ***After you complete Chapter 10***

- Reread each statement and complete the last column by entering an A or a D.
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a piece of paper to write an example of why you disagree.

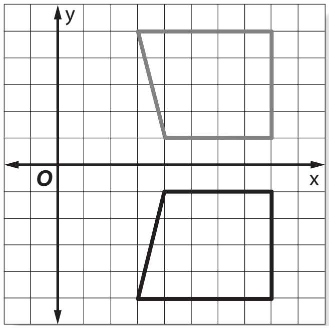
NAME ______________________________ DATE ____________ PERIOD _____

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.

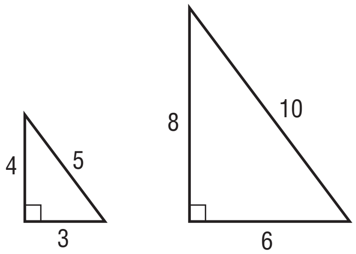
1. On the coordinate axis shown below, the geometric shape has been transformed in some way.



What word best describes the transformation that has taken place?

A rotation
B translation
C reflection
D dilation

2. The following triangles are similar.



Which of the following is *not* true about similar figures?

A Similar figures have equal corresponding angles.
B Similar figures have proportional corresponding side lengths.
C Similar figures do not have to have proportional corresponding side lengths.
D Similar figures are the same shape but may be a different size.

Fold here.

Solution

1. *Hint: An object that has been rotated has been turned around a point. An object that has been translated has been moved in its current form to different coordinates in the plane. An object that has been reflected will be a mirror image of the original object over a line of reflection. A dilation results in a change in size from the original object.*

The object has not been turned, so it is not a rotation. The object is oriented differently than originally, so it cannot be a translation. The object's size did not change, so it cannot be a dilation.

The object is a mirror image of itself on the other side of the x-axis, so the transformation is a reflection.

The answer is **C**.

Solution

2. *Hint: Similar triangles have the same shape and their sizes are proportional.*

When two figures are similar, they are the same shape, their corresponding sides are proportional, and corresponding angles are equal. Based on the definition of similar figures, choices A, B, and D are also true.

Choice C directly contradicts the definition of similar figures and is not true.

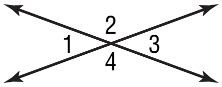
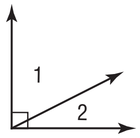
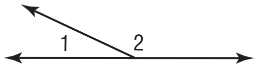
The answer is **C**.

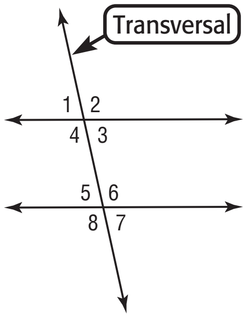
NAME ______________________________ DATE ______________ PERIOD _____

10A Study Guide

SCAS 7-4.5

Parallel Lines and Transversals

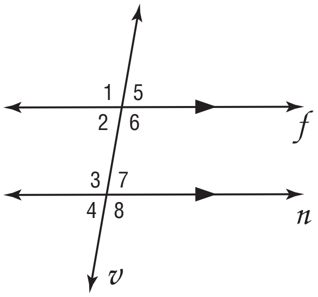
Angle Relationships		
Vertical Angles	**Complementary Angles**	**Supplementary Angles**
 $m\angle 1 = m\angle 3$ $m\angle 2 = m\angle 4$	 $m\angle 1 + m\angle 2 = 90°$	 $m\angle 1 + m\angle 2 = 180°$

Names of Special Angles		
Interior angles lie inside the parallel lines.	∠3, ∠4, ∠5, ∠6	
Exterior angles lie outside the parallel lines.	∠1, ∠2, ∠7, ∠8	
Alternate interior angles are on opposite sides of the transversal and inside the parallel lines.	∠3 and ∠5, ∠4 and ∠6	
Alternate exterior angles are on opposite sides of the transversal and outside the parallel lines.	∠1 and ∠7, ∠2 and ∠8	
Corresponding angles are in the same position on the parallel lines in relation to the transversal.	∠1 and ∠5, ∠2 and ∠6, ∠3 and ∠7, ∠4 and ∠8	

When a transversal intersects two parallel lines, pairs of alternate exterior angles, alternate interior angles, and corresponding angles are congruent.

Example **In the figure, $f \parallel n$ and v is a transversal.**

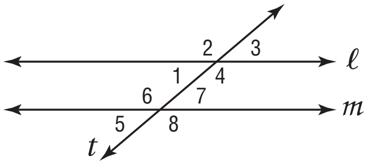
If $m\angle 3 = 100°$, find $m\angle 1$ and $m\angle 6$.



Since ∠1 and ∠3 are corresponding angles, they are congruent. So, $m\angle 1 = 100°$. Since ∠3 and ∠6 are alternate interior angles, they are congruent. So, $m\angle 6 = 100°$.

Exercises

In the figure at the right, $\ell \parallel m$ and t is a transversal. If $m\angle 1 = 61.2°$ and the $m\angle 6 = 118.8°$, find the measure of each angle.



1. ∠7 **2.** ∠3 **3.** ∠4

4. ∠8 **5.** ∠5 **6.** ∠2

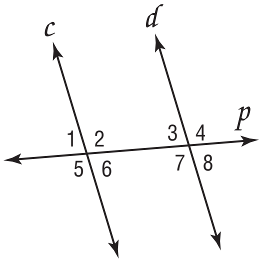
NAME ______________________________ DATE ____________ PERIOD _____

10A Skills Practice

SCAS 7-4.5

Parallel Lines and Transversals

In the figure at the right, $c \parallel d$ and p is a transversal. If $m\angle 5 = 110°$, find the measure of each angle.



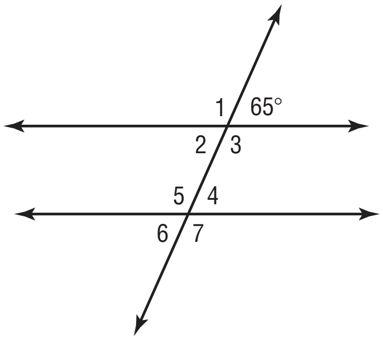
1. $\angle 6$

2. $\angle 8$

3. $\angle 2$

4. $\angle 4$

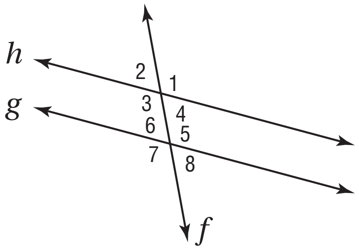
For Questions 5 and 6, use the figure at the right.



5. Find the measure of angle 2. Explain your reasoning.

6. Find the measure of angle 4. Explain your reasoning.

In the figure at the right, $g \parallel h$ and f is a transversal. If $m\angle 1 = 125°$ and the $m\angle 6 = 55°$, find the measure of each angle.



7. $\angle 2$

8. $\angle 4$

9. $\angle 5$

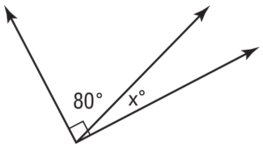
10. $\angle 3$

11. $\angle 8$

12. $\angle 7$

Classify the pairs of angles shown. Then find the value of x in each figure.

13.



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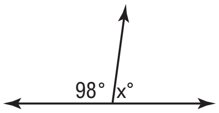

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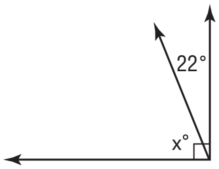

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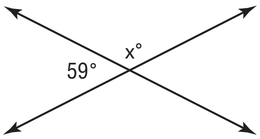

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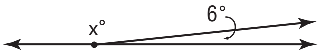
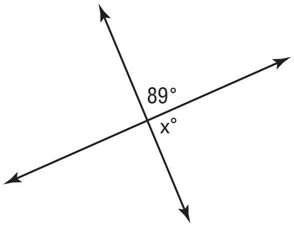


18.



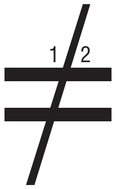
NAME ______________________________ DATE ____________ PERIOD _____

10A Problem-Solving Practice

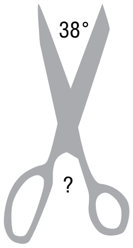
SCAS 7-4.5

Parallel Lines and Transversals

1. **SYMBOLS** The symbol below is an equal sign with a slash through it. It is used to represent *not equal to* in math, as in $1 \neq 2$. If $m\angle 1 = 108°$, classify the relationship between $\angle 1$ and $\angle 2$. Then find $m\angle 2$. Explain your reasoning.

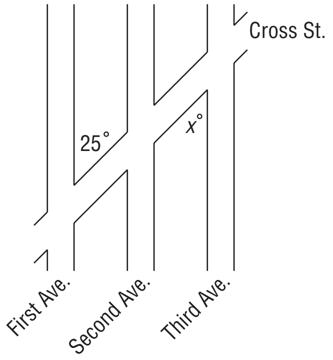


2. **SCISSORS** Arturo opened a pair of scissors so that the angle between the blades is 38°. What is the angle between the handles?



3. **LEG LIFTS** Kiara does leg lifts each morning. For each repetition she lifts her legs 35 degrees off the ground. What is the measure of the angle formed by her body and legs in this position?

4. **MAPS** In the following map, First Avenue, Second Avenue, and Third Avenue are parallel. Cross Street intersects all three avenues. First Avenue and Cross Street meet at a 25° angle. What angle does the intersection of Third Avenue and Cross Street make?



5. **ALGEBRA** Angles Q and R are supplementary. If $m\angle Q = 4x + 9$ and $m\angle R = 8x + 3$, what is the measure of each angle?

6. **PROPERTY LINES** The front and back property lines of Michaela's land are parallel lines. If the angle between the west side property line and back property line is 106°, what is the angle between the front property line and west side property line?

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10-3 Explore Through Reading

SCAS 7-6.2

Statistics: Display Data in a Circle Graph

Get Ready for the Lesson

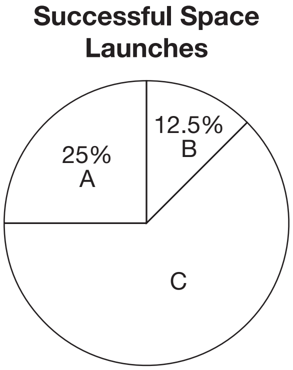
Read the introduction at the top of page 518 in your textbook. Write your answers below.

1. Explain how you know that each student only selected one favorite vegetable.

2. If 400 students participated in the survey, how many students preferred carrots?

Read the Lesson

3. In the following circle graph, what is the percent represented by section C? How do you know?



4. As stated in Example 2 on page 519, when you construct a circle graph, you can check your work by measuring the last section of a circle graph to verify that the angles have the correct measures. Why will this work as a check?

Remember What You Learned

5. If you are given the results of a survey and the results are given in percents, how do you draw a circle graph to represent the results of the survey? Describe each step.

NAME ______________________________ DATE ____________ PERIOD _____

10-3 Study Guide

SCAS 7-6.2

Statistics: Display Data in a Circle Graph

A graph that shows data as parts of a whole circle is called a **circle graph**. In a circle graph, the percents add up to 100. When percents are not given, you must first determine what part of the whole each item represents.

Example 1 ENERGY **Make a circle graph of the data in the table.**

Nuclear Reactors in Operation	
Country	**Number of Reactors**
United States	104
France	59
Japan	54
Other Countries	222

Step 1 Find the total number of reactors: $104 + 59 + 54 + 222 = 439$.

Step 2 Find the ratio that compares each number with the total. Write the ratio as a decimal rounded to the nearest hundredth.

United States: $\frac{104}{439} \approx 0.24$ Japan: $\frac{54}{439} \approx 0.12$

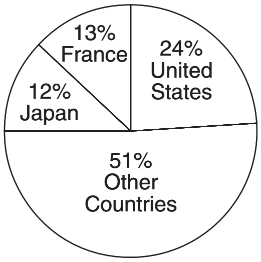
France: $\frac{59}{439} \approx 0.13$ Other: $\frac{222}{439} \approx 0.51$

Step 3 Find the number of degrees for each section of the graph.
United States: $0.24 \cdot 360° \approx 86°$ Japan: $0.12 \cdot 360° \approx 43°$
France: $0.13 \cdot 360° \approx 47°$ Other: $0.51 \cdot 360° \approx 184°$

Step 4 Use a compass to construct a circle and draw a radius. Then use a protractor to draw an 86° angle. This represents the percent of nuclear reactors in the United States.

Step 5 From the new radius, draw a 47° angle for France. Repeat this step for the other two sections. Label each section and give the graph a title.

Nuclear Reactors in Operation, 2001



Exercises

1. SWIMMING The table shows the number of members of the swim team who competed at the swim meet. Each competed in only one event. Make a circle graph of the data.

Swim Team Member Participation	
Event	**Number**
Freestyle	18
Breaststroke	7
Backstroke	5
Butterfly	2

Swim Team Member Participation

NAME ______________________________ DATE ______________ PERIOD _____

10-3 Homework Practice

SCAS 7-6.2

Statistics: Display Data in a Circle Graph

Display each set of data in a circle graph.

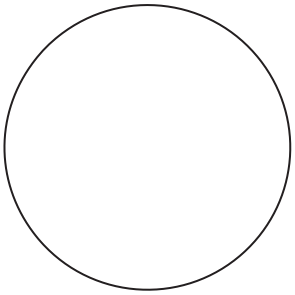
1.

Volume of World's Oceans	
Ocean	**Percent**
Pacific	49%
Atlantic	26%
Indian	21%
Arctic	4%

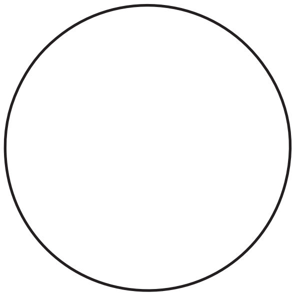
2.

America's Energy Sources	
Type	**Percent**
Petroleum	40%
Natural Gas	23%
Coal	22%
Nuclear	8%
Other	7%

Volume of World's Oceans

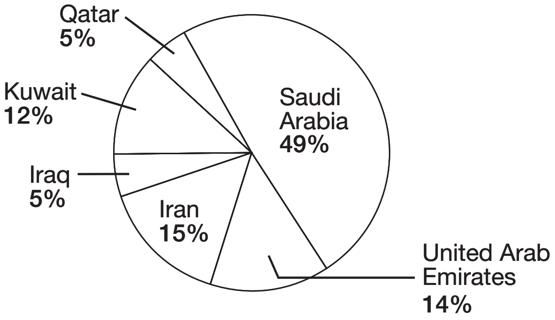


America's Energy Sources



EXPORTS **For Exercises 3 and 4, use the circle graph that shows the percent of Persian Gulf petroleum exports by country.**

Persian Gulf Exports

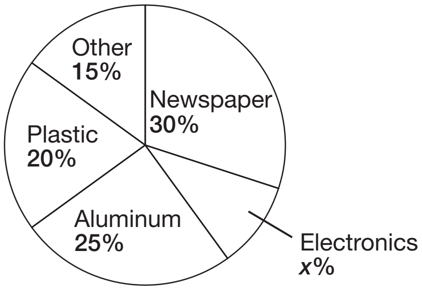


3. Which country has the most petroleum exports?

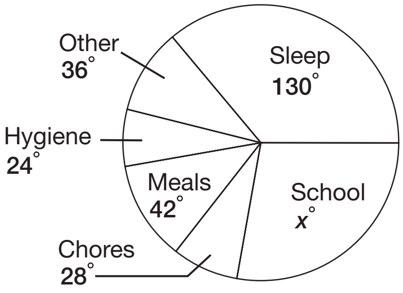
4. How many times more exports does Iran have than Qatar?

DATA SENSE **For each graph, find the missing values.**

5. **Recycled Products**



6. **Time Management**



NAME ______________________ DATE ____________ PERIOD _____

10-3 Problem-Solving Practice

SCAS 7-6.2

Statistics: Display Data in a Circle Graph

LANGUAGES For Exercises 1 and 2, use the table that shows the number of people that speak the five languages that are spoken by the most people in the world.

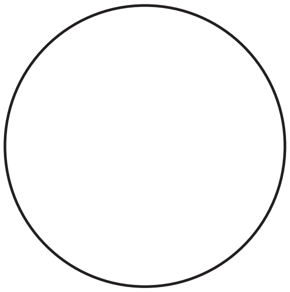
Languages Spoken by the Most People

Language	Speakers (millions)
Chinese, Mandarin	874
Hindi	366
English	341
Spanish	322
Bengali	207

1. Find the degrees for each part of a circle graph that shows the data.

2. Make a circle graph of the data. Which three languages account for 41% of the total?

Languages Spoken by the Most People



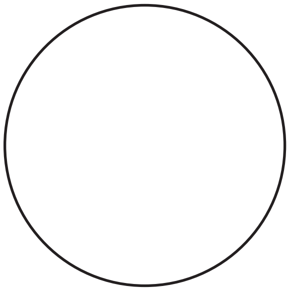
MILITARY For Exercises 3 and 4, use the table that shows the number of people active in the United States military.

United States Military, Active Duty

Branch	Personnel (thousands)
Army	486
Navy	385
Marine Corps	174
Air Force	368
Coast Guard	38

3. Make a circle graph of the data.

United States Military Personnel Active Duty



4. Which two branches taken together account for almost half of the total?

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10-4 Explore Through Reading

SCAS 7-4.1

Triangles

Get Ready for the Lesson

Complete the Mini Lab at the top of page 524 in your textbook. Write your answers below.

1. What kind of angle is formed where the three vertices meet?

2. Repeat the activity with another triangle. Make a conjecture about the sum of the measures of the angles of any triangle.

Read the Lesson

3. How can you indicate that two sides of a triangle are congruent?

4. Write the following equation in words: $m\angle 1 + m\angle 2 + m\angle 3 = 180°$.

5. If you know the measures of two angles of a triangle, how can you find the measure of the third angle?

Remember What You Learned

6. Complete the table to help you remember the ways to classify triangles.

Type of Triangle	Classified by Angles or Sides	Description
acute	angles	
obtuse		
	sides	no congruent sides
		1 right angle
equilateral		
isosceles		

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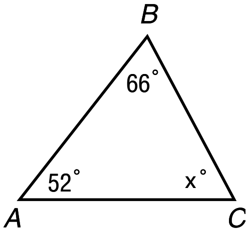
10-4 Study Guide

SCAS 7-4.1

Triangles

A **triangle** is a figure with three sides and three angles. The symbol for triangle is △. The sum of the measures of the angles of a triangle is 180°. You can use this to find a missing angle measure in a triangle.

Example 1 **Find the value of x in $\triangle ABC$.**



$$\begin{aligned} x + 66 + 52 &= 180 && \text{The sum of the measures is 180.} \\ x + 118 &= 180 && \text{Simplify.} \\ -118 &\;\; -118 && \text{Subtract 118 from each side.} \\ x &= 62 \end{aligned}$$

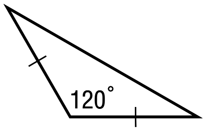
The missing angle is 62°.

Triangles can be classified by the measures of their angles. An **acute triangle** has three acute angles. An **obtuse triangle** has one obtuse angle. A **right triangle** has one right angle.

Triangles can also be classified by the lengths of their sides. Sides that are the same length are **congruent segments** and are often marked by tick marks. In a **scalene triangle**, all sides have different lengths. An **isosceles** triangle has at least two congruent sides. An **equilateral triangle** has all three sides congruent.

Example 2 **Classify the triangle by its angles and by its sides.**

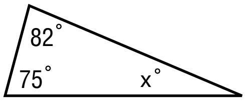
The triangle has one obtuse angle and two sides the same length. So, it is an obtuse, isosceles triangle.



Exercises

Find the missing measure in each triangle. Then classify the triangle as *acute*, *right*, or *obtuse*.

1.



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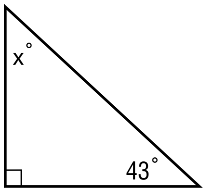

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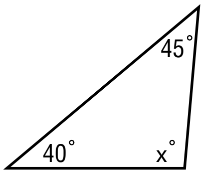
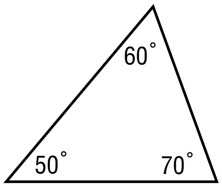


Classify each triangle by its angles and by its sides.

4.



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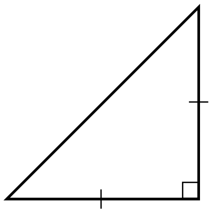

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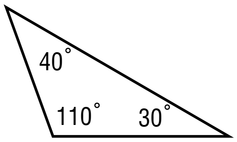

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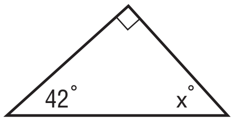
10-4 Homework Practice

Triangles

SCAS 7-4.1

Find the value of *x*.

1.



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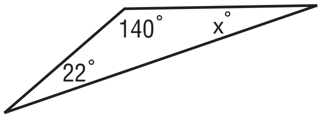

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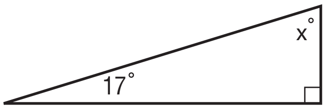

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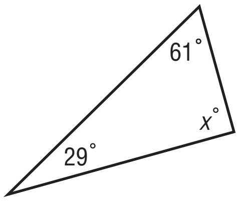

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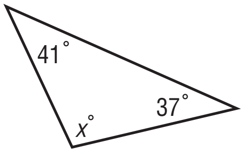

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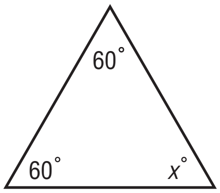


Find the missing measure in each triangle with the given angle measures.

7. 45°, 35.8°, x°

8. 100°, x°, 40.7°

9. x°, 90°, 16.5°

10. Find the third angle of a right triangle if one of the angles measures 24°.

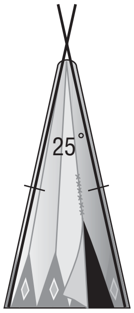
11. What is the third angle of a right triangle if one of the angles measures 51.1°?

12. **ALGEBRA** Find $m\angle A$ in $\triangle ABC$ if $m\angle B = 38°$ and $m\angle C = 38°$.

13. **ALGEBRA** In $\triangle XYZ$, $m\angle Z = 113°$ and $m\angle X = 28°$. What is $m\angle Y$?

Classify the marked triangle in each object by its angles and by its sides.

14.



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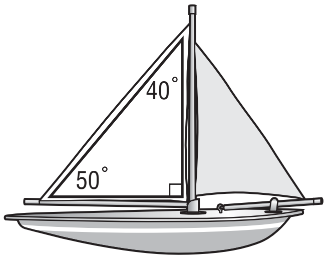
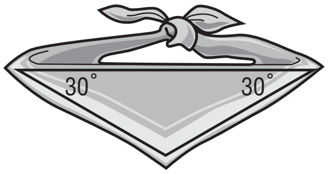
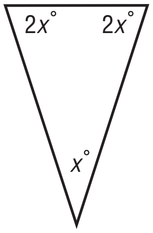


16.

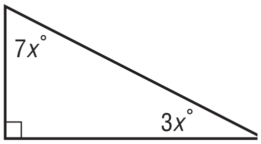


ALGEBRA **Find the value of *x* in each triangle.**

20.



21.



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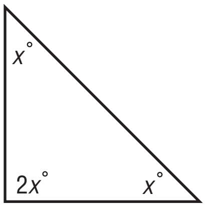

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10-4 Problem-Solving Practice

SCAS 7-4.1

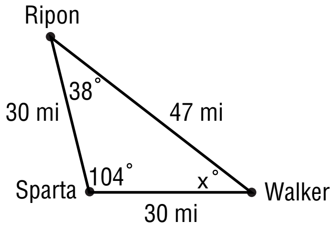
Triangles

1. **TAILORING** Each lapel on a suit jacket is in the shape of a triangle. The three angles of each triangle measure 47°, 68°, and 65°. Classify the triangle by its angles.

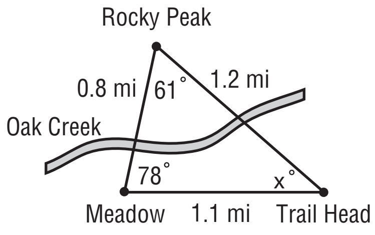
2. **FLAGS** A naval distress signal flag is in the shape of a triangle. The three sides of the triangle measure 5 feet, 9 feet, and 9 feet. Classify the triangle by its sides.

3. **CARPENTRY** The supports of a wood table are in the shape of a right triangle. Find the third angle of the triangle if the measure of one of the angles is 23°.

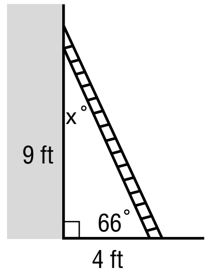
4. **MAPS** The three towns of Ripon, Sparta, and Walker form a triangle as shown below. Classify the triangle by its angles and by its sides. What is the value of x in the triangle?



5. **HIKING** The figure shows the Oak Creek trail, which is shaped like a triangle. Classify the triangle by its angles and by its sides. What is the value of x in the figure?



5. **LADDER** The figure shows a ladder leaning against a wall, forming a triangle. Classify the triangle by its angles and by its sides. What is the value of x in the figure?



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10-5 Study Guide

SCAS 7-1.3, 7-4.1

Problem-Solving Investigation: Use Logical Reasoning

Logical reasoning is a method of problem solving that uses **inductive reasoning**, making a rule after seeing several examples, or **deducting reasoning**, using a rule to make a decision.

Example **Use the formula $d = rt$ where d is distance, r is rate, and t is time to determine how far a car will travel after 4 hours if it is traveling at a constant rate of 65 miles per hour.**

Understand You know the car will travel for 4 hours at a constant rate of 65 mi/h.

Plan Try a few examples to find a pattern. Make a table.

Solve

Seconds Passed	Distance Traveled
1	65
1.5	97.5
2	130
2.5	162.5
3	195
t	$65t$

After each hour, the car will travel 65 miles. So, after 4 hours the car will travel 260 mi.

Check The formula is $d = rt$ so $d = 65 \times 4$ or 260 mi.

Exercises

Solve the following problems using logical reasoning.

1. **TRAVEL** Use the formula $d = rt$ where d is the distance, r is the rate, and t is the time to determine how far the Moralez family has traveled if they are driving at a rate of 72 miles per hour for 9 hours.

2. **CELL PHONES** Determine the cost per phone call if Maria made 30 calls last month and her total bill for the month was $45.00.

3. **MUSIC** Sarah, Juan, and Derrick play the piano, trumpet, and violin, but not necessarily in that order. Sarah and Derrick sit on either side of the trumpet player. Sarah does not play the violin. Who plays the violin?

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10-5 Skills Practice

SCAS 7-1.3, 7-4.1

Problem-Solving Investigation: Use Logical Reasoning

Use logical reasoning to solve.

1. **GEOMETRY** Draw several squares and measure their interior angles. What can you conclude about the measures of the angles of a square? Did you use inductive or deductive reasoning?

2. **MONEY** Luke is investing money in a savings account. Use the formula $I = Prt$ where I is the amount of interest earned, P is the principal amount of money invested, r is the interest rate, and t is the length of time the money is invested. If Luke invests 500 at 5% interest for 1 year, how much interest will he earn? Did you use inductive or deductive reasoning?

3. **PATTERNS** Write a rule to represent the pattern shown below. Did you use inductive or deductive reasoning?
   2, 4, 6, 8, 10, …

4. **STUDENT COUNCIL** Chen, Sue and Jacob are president, vice president and secretary of the student council, not necessarily in that order. Chen and the vice president stayed after school with Jacob to plan a dance. Chen is not the president. Who is the president?

5. **GEOMETRY** Draw several parallelograms and measure their sides. What can you conclude about the measures of the opposite sides of a parallelogram? Did you use inductive or deductive reasoning?

6. **TRAVEL** Use the formula $D = rt$ where D is the distance, r is the rate, and t is the time to determine how far Lucinda traveled if she drove 65 miles per hour for 6 hours without stopping. Did you use inductive or deductive reasoning?

NAME ______________________________ DATE ______________ PERIOD _____

10-5 Homework Practice

SCAS 7-1.3, 7-4.1

Problem-Solving Investigation: Use Logical Reasoning

Mixed Problem Solving

For Exercises 1 and 2, use logical reasoning to solve the problem.

1. **TOWNS** Tia, Bianca, and Hiroko live in the towns of Parkside, Westlake, and Summerville, but not necessarily in that order. Tia and her friend that lives in Westlake helped Bianca with her chores. Bianca does not live in Parkside. Where does Tia live? Did you use inductive or deductive reasoning?

2. **GEOMETRY** Draw a right triangle. Mark the midpoints of each side of the triangle and draw a smaller triangle by connecting the midpoints. Do this several more times. What can you conclude about the smaller triangle? Did you use inductive or deductive reasoning?

Use any strategy to solve Exercises 3–6. Some strategies are shown below.

Problem-Solving Strategies
• Look for a pattern. • Use a graph. • Use logical reasoning.

3. **ANGLES** One angle of a triangle is 33° less than the other two angles. Find the measures of the angles of the triangle. Did you use inductive or deductive reasoning?

4. **METEORITES** An astronomer found three meteorites weighing 9.4 pounds, 5.7 pounds, and 24.5 pounds. If 1 kilogram weighs 2.2 pounds, find the average mass of the meteorites in kilograms.

5. **PUBLIC TRANSPORTATION** A bus stopped at a bus stop and 12 people got on and 5 got off. At the next stop, 14 people got on and 3 got off. If the number of passengers has doubled, find the number of passengers on the bus.

6. **DISCOUNTS** The table shows the different discounts two stores offer for the same product. Which store offers the better price after the discount is applied and by how much?

	Price	Discount
Store A	\$129.00	\$25
Store B	\$139.00	25%

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10-5 Problem-Solving Practice

SCAS 7-1.3, 7-4.1

Problem-Solving Investigation: Use Logical Reasoning

1. **PHYSICS** A ball is dropped from a height of 40 feet. If the ball bounces $\frac{1}{2}$ as high on each successive bounce, what is the height on the fourth bounce?

2. **RECIPES** Shawn is making a cake. He needs a total of $3\frac{1}{4}$ cups of flour. If he has already added $2\frac{1}{2}$ cups, how much more does he need to add?

A 2 cups
C $\frac{1}{2}$ cup
B 1 cup
D $\frac{3}{4}$ cup

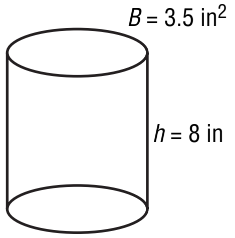
3. **GEOMETRY** Draw several pentagons and measure their interior angles. What can you conclude about the sum of the measures of the angles of a pentagon? Did you use inductive or deductive reasoning?

4. **PATTERNS** Find the next three terms in the sequence.
2, 5, 9, 14, …

5. **WORK** The table below shows how much Lu got paid based on the number of hours she babysat. Predict her pay for 7 hours.

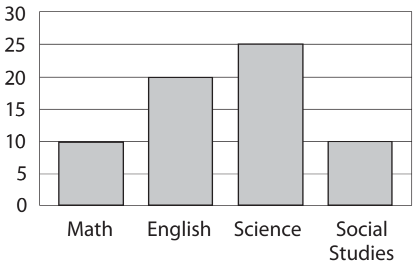
Number of hours	Pay
1	$5
2	$10
3	$15
4	$20

6. **GEOMETRY** Use the formula $V = Bh$ where V is the volume of a cylinder, B is the area of the base and h is the height of the cylinder to find the volume of the cylinder below.



7. **FRAMING** A photograph is 8 in. by 10 in. and is to be surrounded by a mat that is 1.5 in. all around. What will be the dimensions of the picture and mat together?

8. **SCHOOL** Students filled out a survey about their favorite school subjects. The results are shown in the bar graph below. How many more students listed English as their favorite subject than math?



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10B Study Guide

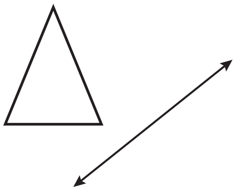
SCAS 7-4.2

Intersections of Geometric Figures

An **intersection** is a point that two or more geometric figures have in common. Suppose two figures lie in the same plane. There are several possibilities of how many points they may have in common.

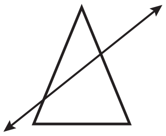
Example **A line and a triangle lie in the same plane. How many points of intersection are there in each figure below?**

a.



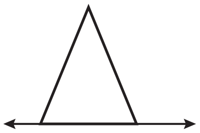
The triangle and line do not intersect. There are *no* points of intersection.

b.



The line intersects the triangle in *two* points.

c.

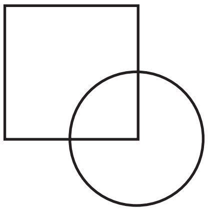


The line intersects the triangle along one of its sides. The intersection is a segment and a segment contains an infinite number of points.

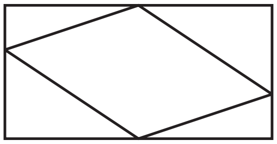
Exercises

Determine how many points of intersection are shown in each figure.

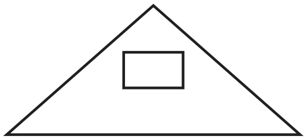
1.



2.



3.



4. Draw figures to show all possible numbers of intersections of a line and a circle. Tell how many intersections there are in each figure.

NAME ______________________________ DATE ____________ PERIOD _____

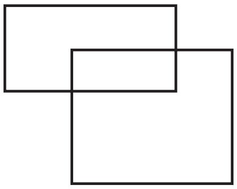
10B Skills Practice

SCAS 7-4.2

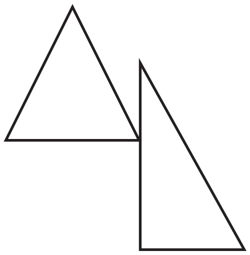
Intersections of Geometric Figures

Determine how many points of intersection are shown in each figure.

1.



2.



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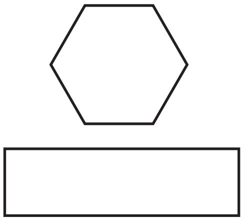

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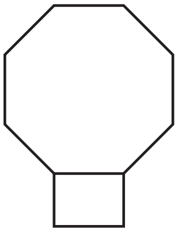

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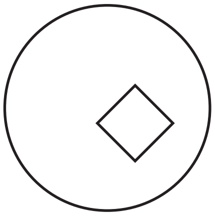

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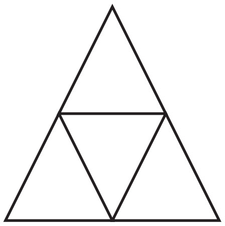

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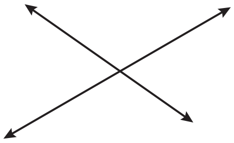

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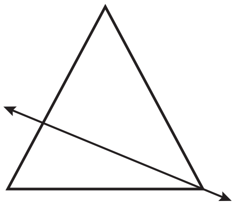

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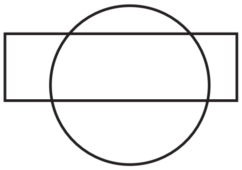


NAME ______________________________ DATE ____________ PERIOD _____

10B

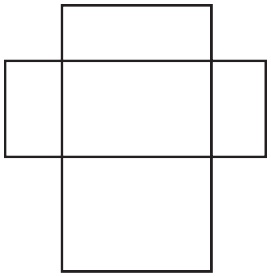
Homework Practice

SCAS 7-4.2

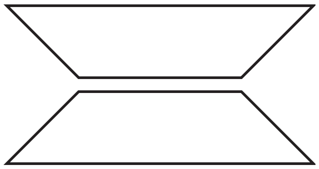
Intersections of Geometric Figures

Determine how many points of intersection are shown in each figure.

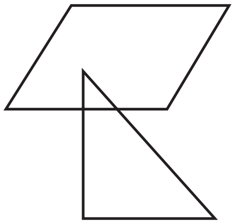
1.



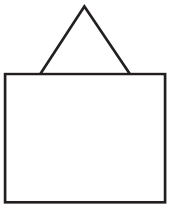
2.



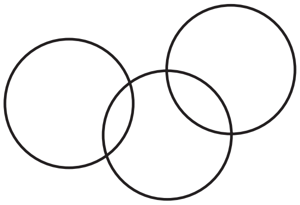
3.



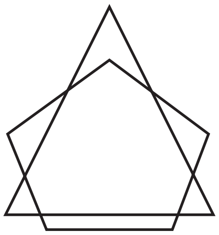
4.



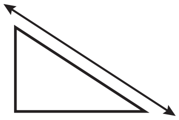
5.

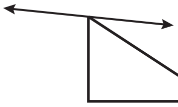


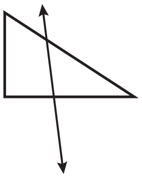
6.

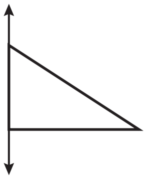


7. Draw figures to show all possible numbers of intersections of a line and a right triangle. Tell how many intersections there are in each figure.









8. A circle and a triangle intersect in a plane. What is the maximum number of points of intersection possible? Make a drawing to explain your answer.

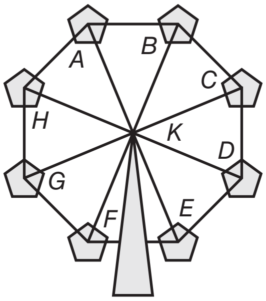
NAME ______________________________ DATE ______________ PERIOD _____

10B Problem-Solving Practice

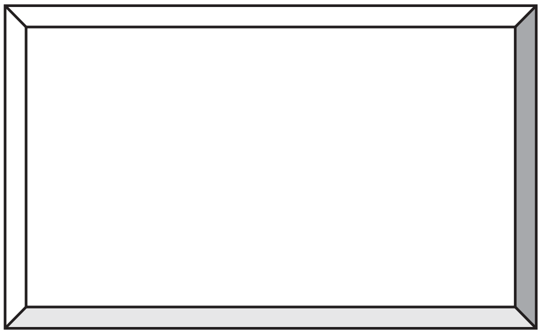
SCAS 7-4.2

Intersections of Geometric Figures

1. **AMUSEMENT PARK RIDES** The parents group at the middle school sponsored a carnival. The sketch below represents the framework of the small Ferris Wheel ride they had. From this picture, which point represents the point that is the intersection of *all* triangles in the picture?

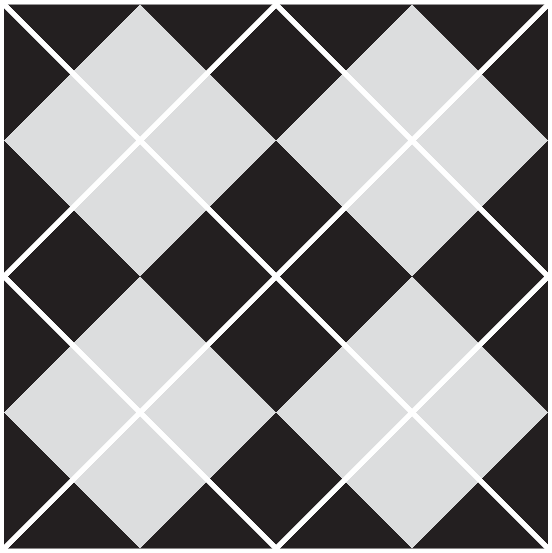


2. **ART** Juanita has an assignment for art class in which she must arrange a rectangle or square, an isosceles triangle and a circle into a frame so that all three figures intersect each other. Draw a sketch of what her art piece might look like in the picture frame below.



3. **CLOTHING** Argyle is a pattern composed of intersecting polygons. This pattern is often used in sweaters and socks.
   a. Select one triangle in the pattern. How many times does a single white line intersect that triangle?
   b. Part of the pattern is made of squares. How many points of intersection exist between two gray squares?

   c. Find a gray square and a black square. How many points of intersection exist between these two squares?



10-7 Explore Through Reading

SCAS 7-4.7, 7-4.8, 7-4.1, 7-4.6, 7-5.1

Similar Figures

Get Ready for the Lesson

Complete the Mini Lab on page 540 in your textbook. Write your answers below.

1. $\overline{AB}$ on the smaller rectangle matches $\overline{EF}$ on the larger rectangle. Name all pairs of matching sides in each pair of figures. The notation $\overline{AB}$ means the segment with endpoints at A and B.

2. Write each ratio in simplest form. The notation AB means the *measure* of segment AB.

3. What do you notice about the ratios of matching sides?

4. Name all pairs of matching angles in the Mini Lab figures on page 540. What do you notice about the measure of these angles?

5. **MAKE A CONJECTURE** about figures that have the same shape but not necessarily the same size.

Read the Lesson

6. Write the statement $\triangle ABC \sim \triangle DEF$ in words.

7. Write the statement $\angle A \cong \angle D$ in words.

8. Suppose you know that two figures are similar, and that the following corresponding sides are proportional: side JK corresponds to side DE, and side KL corresponds to side EF. How would you write a proportion to find the length of side KL if the lengths of all other sides are known?

Remember What You Learned

9. Think of a real-life example that you could measure using indirect measurement if you were given a miniature replica of your example. Explain how you could find an unknown measurement using known measurements of your example and the measurements of the replica.

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10-7 Study Guide

Similar Figures

SCAS 7-4.7, 7-4.8, 7-4.1, 7-4.6, 7-5.1

Figures that have the same shape but not necessarily the same size are *similar figures*. The symbol ~ means *is similar to*. You can use proportions to find the missing length of a side in a pair of similar figures.

For example $\triangle ABC \sim \triangle DEF$.

Corresponding angles

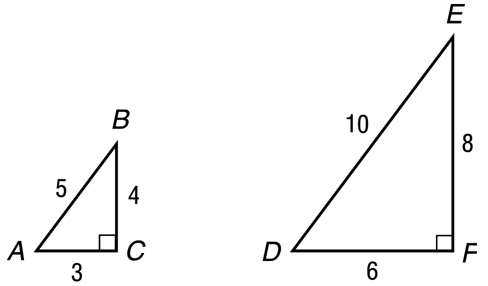
$\angle A \cong \angle D$

$\angle B \cong \angle E$

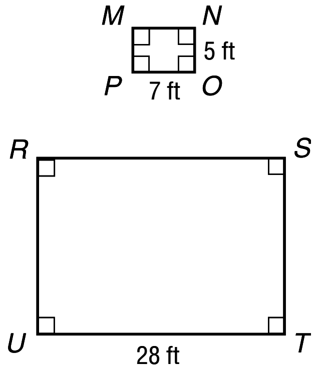
$\angle C \cong \angle F$

Corresponding sides

$\frac{5}{10} = \frac{4}{8} = \frac{3}{6}$


B
5
4
A
C
3
E
10
8
D
F
6

Example 1 **If $MNOP \sim RSTU$, find the length of $\overline{ST}$.**


M
N
5 ft
P
7 ft
O
R
S
U
28 ft
T

Since the two figures are similar, the ratios of their corresponding sides are equal. You can write and solve a proportion to find $\overline{ST}$.

$\frac{PO}{UT} = \frac{NO}{ST}$ Write a proportion.

$\frac{7}{28} = \frac{5}{n}$ Let *n* represent the length of *ST*. Then substitute.

$7n = 28(5)$ Find the cross products.

$7n = 140$ Simplify.

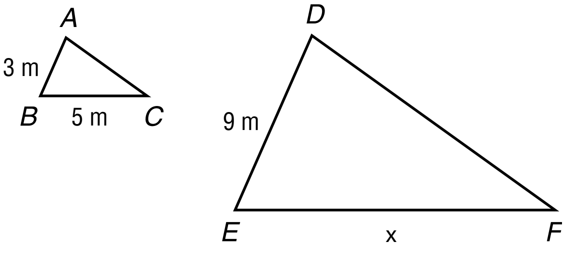
$n = 20$ Divide each side by 7.

The length of $\overline{ST}$ is 20 feet.

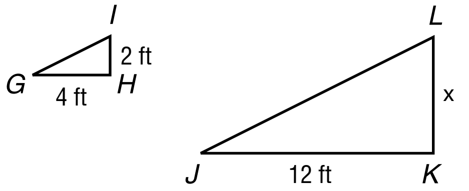
Exercises

Find the value of *x* in each pair of similar figures.

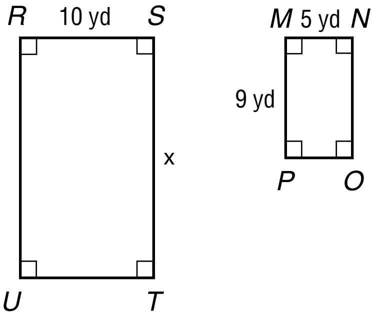
1.


A
3 m
B
5 m
C
D
9 m
E
x
F

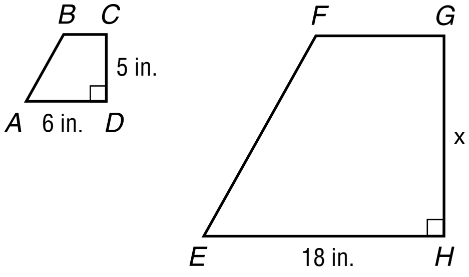
2.


I
2 ft
G
H
4 ft
L
x
J
12 ft
K

3.


R
10 yd
S
x
U
T
M
5 yd
N
9 yd
P
O

4.


B
C
5 in.
A
6 in.
D
F
G
x
E
18 in.
H

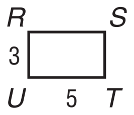
NAME ________________________________ DATE ____________ PERIOD _____

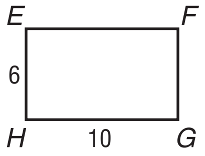
10-7 Homework Practice

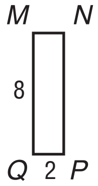
SCAS 7-4.7, 7-4.8, 7-4.1, 7-4.6, 7-5.1

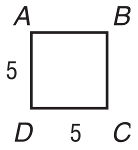
Similar Figures

1. Which rectangle is similar to rectangle *RSTU*?

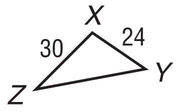


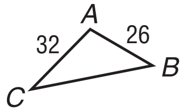


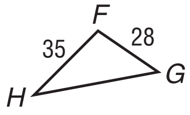


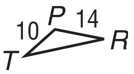


2. Which triangle is similar to triangle *XYZ*?



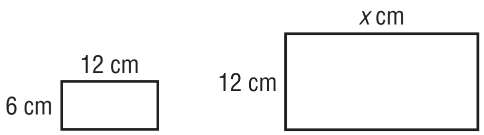




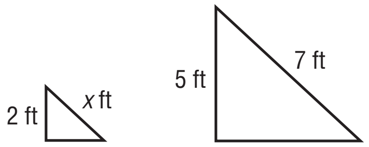


Find the value of *x* in each pair of similar figures.

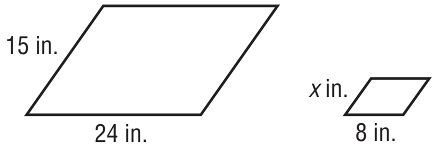
3.


12 cm
6 cm
x cm
12 cm

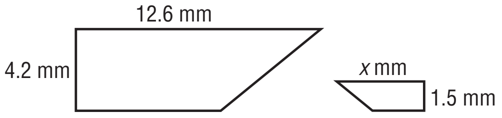
4.


2 ft
x ft
5 ft
7 ft

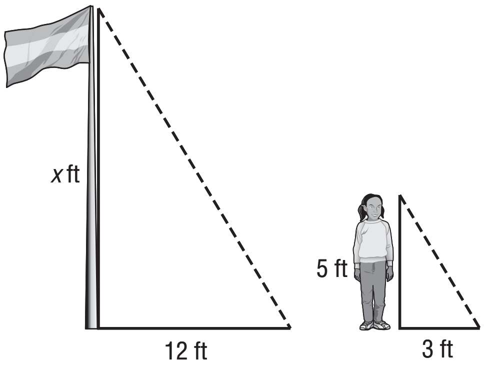
5.


15 in.
24 in.
x in.
8 in.

6.


12.6 mm
4.2 mm
x mm
1.5 mm

7. **FLAGPOLES** Tasha wants to find the height of the flagpole at school. One morning, she determines the flagpole casts a shadow of 12 feet. If Tasha is 5 feet tall and casts a shadow of 3 feet, what is the height of the flagpole?


x ft
12 ft
5 ft
3 ft

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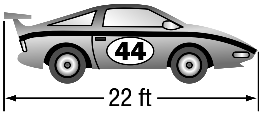
10-7 Problem-Solving Practice

SCAS 7-4.7, 7-4.8, 7-4.1, 7-4.6, 7-5.1

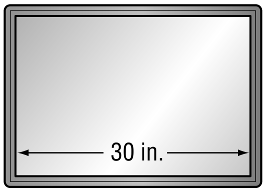
Similar Figures

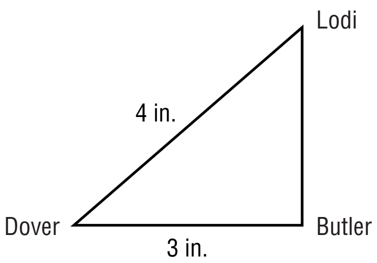
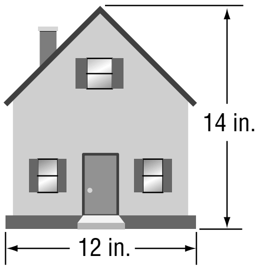
MODEL CARS For Exercises 1 and 2, use the following information. A scale model racing car is 11 inches long, 3 inches wide, and 2 inches tall. The actual racing car is shown at the right.



1. How wide is the actual racing car?	**2.** How tall is the actual racing car?

PHOTOGRAPHY For Exercises 3–4, use the given information. James wants to enlarge a photograph that is 6 inches wide and 4 inches tall so that it fits into the frame shown.



3. How tall must the frame be for the picture to fit?	**4.** Suppose James cuts 1 inch from the width of the photo, so that it is 5 inches wide, before he makes the enlargement. How tall will the frame have to be for the picture to fit?
5. **MAPS** A map below shows the towns of Dover, Butler, and Lodi. If the actual distance between Dover and Butler is 24 miles, how far is it from Dover to Lodi? 	**6.** **BLUEPRINTS** A blueprint for a house is shown below. If the front of the house is actually 30 feet wide, how tall is the house? 

NAME ______________________________ DATE ____________ PERIOD _____

10-8 Explore Through Reading

SCAS 7-4.9, 7-4.10

Polygons and Tessellations

Get Ready for the Lesson

Read the introduction at the top of page 546 in your textbook. Write your answers below.

1. In the pool catalog, the Aquarius and the Roman styles are listed under Group A. The remaining three pools are listed under Group B. Describe one difference between the shapes of the pools in the two groups.

2. Create your own drawing of the shape of a pool that would fit into Group A; Group B.

Read the Lesson

3. How many straight lines can a polygon have?

4. What is a simple figure?

5. When you draw a figure, how can you tell whether or not it is closed?

6. How do you find the sum of the angle measures in a regular polygon?

7. In this lesson, the terms *vertex* and *vertices* are used. How are the terms related?

Remember What You Learned

8. Using dot paper, draw a tessellation different from the ones shown in this lesson. You can use all the same shape or you can use combinations of shapes that form patterns. Share your work with your class.

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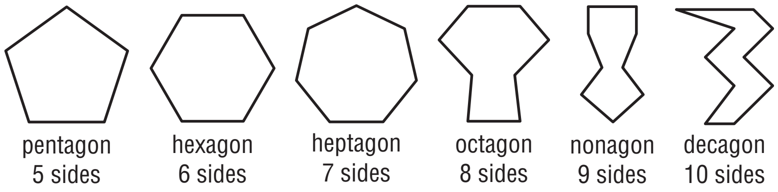
10-8 Study Guide

SCAS 7-4.9, 7-4.10

Polygons and Tessellations

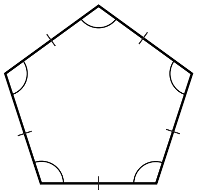
A **polygon** is a simple, closed figure formed by three or more straight lines. A simple figure does not have lines that cross each other. You have drawn a closed figure when your pencil ends up where it started. Polygons can be classified by the number of sides they have.


pentagon
5 sides
hexagon
6 sides
heptagon
7 sides
octagon
8 sides
nonagon
9 sides
decagon
10 sides

A polygon that has all sides congruent and all angles congruent is called a **regular polygon.**

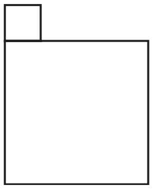
Examples **Determine whether each figure is a polygon. If it is, classify the polygon and state whether it is regular. If it is *not* a polygon, explain why.**

①



The figure has 5 congruent sides and 5 congruent angles. It is a regular pentagon.

②

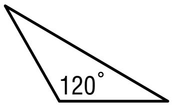


The figure is not a polygon because it has sides that overlap.

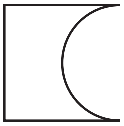
Exercises

Determine whether each figure is a polygon. If it is, classify the polygon and state whether it is regular. If it is *not* a polygon, explain why.

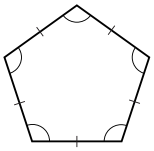
1.



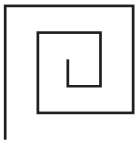
2.



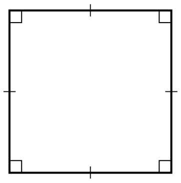
3.



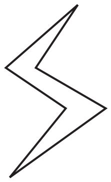
4.



5.



6.



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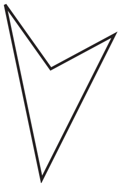
10-8 Homework Practice

SCAS 7-4.9, 7-4.10

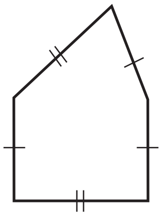
Polygons and Tessellations

Determine whether each figure is a polygon. If it is, classify the polygon and state whether it is regular. If it is not a polygon, explain why.

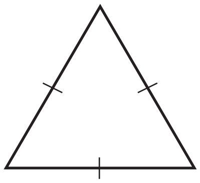
1.



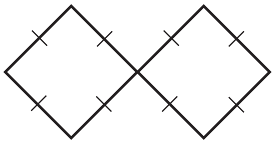
2.



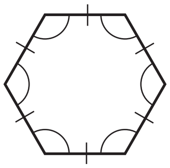
3.



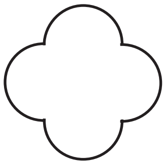
4.



5.



6.



Find the measure of an angle in each polygon if the polygon is regular. Round to the nearest tenth of a degree if necessary.

7. dodecagon (12-sided)

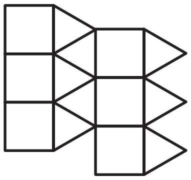
8. 14-gon

9. 18-gon

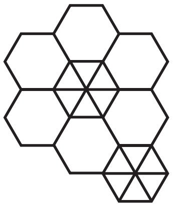
10. 36-gon

Classify the polygons that are used to create each tessellation.

11.



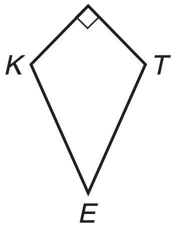
12.



13. What is the perimeter of a regular decagon with sides 6.2 meters long?

14. Find the perimeter of a regular hexagon having sides $5\frac{2}{3}$ inches long.

KITES **For Exercises 15–17, use the following information. A kite manufacturer makes kites in the shape of the figure shown.**



15. Classify the shape of the kite.

16. If $\angle K \cong \angle T$ and $\angle E = 30°$, find $m\angle K$ and $m\angle T$.

17. Can a tessellation be made by using the shape of the kite? Justify your answer.

NAME ______________________________ DATE ______________ PERIOD ______

Mini-Project

SCAS 7-4.9, 7-4.10

(Use with Lesson 10-8)

Quadrilateral Tessellations

1. A convex polygon is a polygon whose diagonals lie entirely within the polygon. Draw a convex quadrilateral with four different angles.

2. Measure the angles of your quadrilateral with a protractor. Write the measure of each angle on the drawing.

3. Use tracing paper to make at least 8 copies of your quadrilateral.

4. Use scissors to carefully cut out your 8 quadrilaterals.

5. Rearrange the quadrilaterals until they form a tessellation pattern.

6. Sketch the tessellation pattern you found.

7. What is the sum of the angles of your quadrilateral? ______________________

8. Do you think any convex quadrilateral will tessellate? ______________________

Why or why not? ____

____

____

____

NAME ________________________________ DATE ______________ PERIOD _____

10-9 Explore Through Reading

SCAS 7-4.1

Translations

Get Ready for the Lesson

Complete the Mini Lab at the top of page 553 in your textbook. Write your answers below.

1. Trace the horizontal and vertical path between corresponding vertices. What do you notice?

2. Add 5 to each x-coordinate of the vertices of the original figure. Then subtract 2 from each y-coordinate of the vertices of the original figure. What do you notice?

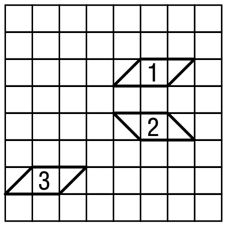
Read the Lesson

3. When translating a figure, what do you know about every point of the original figure?

4. Can a figure be turned in a translation? Explain.

5. What notation is used to indicate the vertices of a translated figure?

6. Which figure is a translation of Figure 1—Figure 2 or Figure 3? Explain why one figure is a translation and why the other figure is not a translation.



Remember What You Learned

7. Describe the translation given by the ordered pair (−7, 3). Think of a way to remember which direction to translate when the x-coordinate of the ordered pair describing the translation is negative.

NAME ______________________________ DATE ____________ PERIOD _____

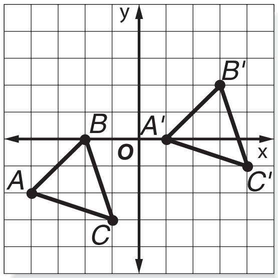
10-9 Study Guide

SCAS 7-4.1

Translations

A **translation** is the movement of a geometric figure in some direction without turning the figure. When translating a figure, every point of the original figure is moved the same distance and in the same direction. To graph a translation of a figure, move each vertex of the figure in the given direction. Then connect the new vertices.

Example **Triangle *ABC* has vertices *A*(–4, –2), *B*(–2, 0), and *C*(–1, –3). Find the vertices of triangle *A′B′C′* after a translation of 5 units right and 2 units up.**



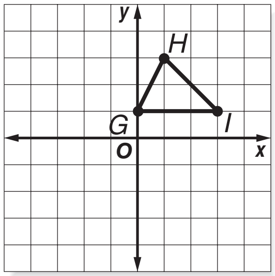
Add 5 to each *x*-coordinate. Add 2 to each *y*-coordinate.

Vertices of △*ABC*	(*x* + 5, *y* + 2)	Vertices of △*A′B′C′*
A(–4, –2)	(–4 + 5, –2 + 2)	*A′*(1, 0)
B(–2, 0)	(–2 + 5, 0 + 2)	*B′*(3, 2)
C(–1, –3)	(–1 + 5, –3 + 2)	*C′*(4, –1)

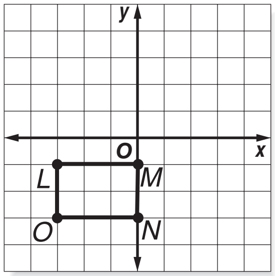
The coordinates of the vertices of △*A′B′C′* are *A′*(1, 0), *B′*(3, 2), and *C′*(4, –1).

Exercises

1. Translate △*GHI* 1 unit left and 5 units down.

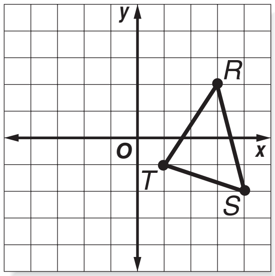


2. Translate rectangle *LMNO* 4 units right and 3 units up.

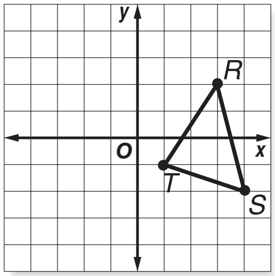


Triangle *RST* has vertices *R*(3, 2), *S*(4, –2), and *T*(1, –1). Find the vertices of *R′S′T′* after each translation. Then graph the figure and its translated image.

3. 5 units left, 1 unit up



4. 3 units left, 2 units down



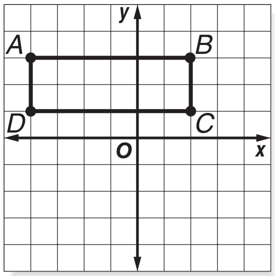
NAME ______________________________ DATE ____________ PERIOD _____

10-9 Homework Practice

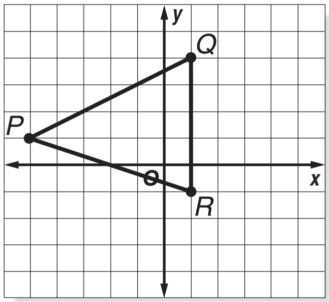
SCAS 7-4.1

Translations

1. Translate rectangle $ABCD$ 3 units right and 4 units down. Graph rectangle $A'B'C'D'$.

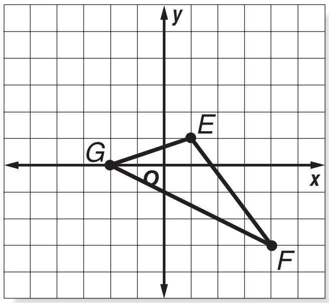


2. Triangle PQR is translated 3 units left and 3 units down. Then the translated figure is translated 6 units right. Graph the resulting triangle.

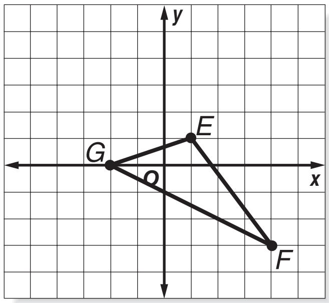


Triangle EFG has vertices $E(1, 1)$, $F(4, -3)$, and $G(-2, 0)$. Find the vertices of $E'F'G'$ after each translation. Then graph the figure and its translated image.

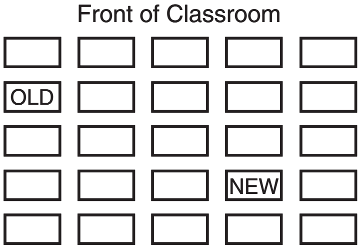
3. 3 units left, 2 units down



4. 4 units up



5. **SEATS** Jatin was given a new seating assignment in science class. The diagram shows his old seat and his new seat. Describe this translation in words and as an ordered pair.



REASONING The coordinates of a point and its image after a translation are given. Describe the translation in words and as an ordered pair.

6. $A(1, -2) \rightarrow A'(3, 4)$

7. $H(3, 3) \rightarrow H'(-4, 0)$

8. $Z(-2, -4) \rightarrow Z'(1, -5)$

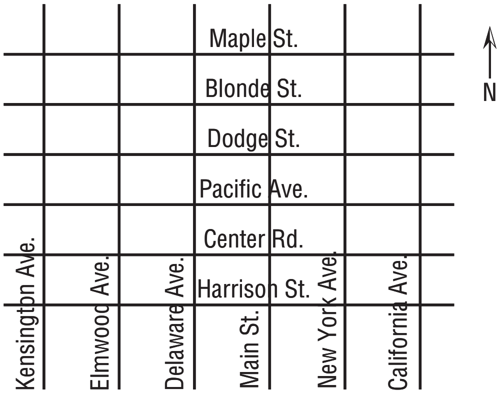
NAME ______________________________ DATE ____________ PERIOD _____

10-9 Problem-Solving Practice

Translations

SCAS 7-4.1

MAPS For Exercises 1–4, use the map at the right.


Maple St.
Blonde St.
Dodge St.
Pacific Ave.
Center Rd.
Harrison St.
Kensington Ave.
Elmwood Ave.
Delaware Ave.
Main St.
New York Ave.
California Ave.
N

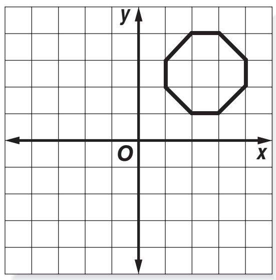
1. Stanley's school is located at the corner of Center and Elmwood. The library is located at the corner of Dodge and Delaware. Describe Stanley's walk from school to the library as an ordered pair of the number of blocks.

2. After he goes to the library, Stanley goes to his Aunt Jeanne's house at the corner of California and Harrison. Describe Stanley's walk from the library to his aunt's house as an ordered pair of the number of blocks.

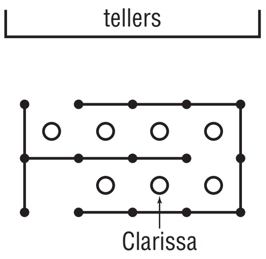
3. If a bus picks up passengers at the corner of New York and Maple and drives 2 blocks south and 3 blocks west, where does the bus end up?

4. Organizers of a walkathon want to map out a route that will lead people from the corner of Center and Kensington to the corner of California and Maple. Write a coordinate pair that describes the most direct route.

5. **GEOMETRY** The figure shows an octagon plotted on a coordinate system. The figure is to be translated by 5 units left and 5 units down. Graph the translated image of the figure.



6. **BANKS** Clarissa is waiting in line at the bank. There are several people in line in front of her. Describe the path Clarissa must take to get to the front of the line if each time she moves up in line by one position is considered one unit.


tellers
Clarissa

NAME ______________________________ DATE ____________ PERIOD _____

10-10 Explore Through Reading

SCAS 7-4.1

Reflections

Get Ready for the Lesson

Complete the Mini Lab at the top of page 558 in your textbook. Write your answers below.

1. The top half of the words at the right are missing. Identify the words.

2. List all the capital letters of the alphabet that, when folded across a horizontal line, look exactly the same.

3. On a piece of paper, write the bottom half of other words that, when reflected across a horizontal line, look exactly the same.

Read the Lesson

4. Is the image of a reflection smaller, larger, or the same size as the original figure?

5. In Example 4 on page 559, how can you tell that one image is a reflection of the other across the x-axis?

6. Study the coordinates given in Examples 4 and 5 on page 559. How can you tell how many units a vertex is away from the x-axis without graphing it? How can you tell how many units a vertex is away from the y-axis?

Remember What You Learned

7. Work with a partner. Draw and cut out figures of regular polygons. Demonstrate which regular polygons have lines of symmetry and which do not. Mark the lines of symmetry with dashed lines on the models.

NAME ______________________________ DATE ____________ PERIOD _____

10-10 Study Guide

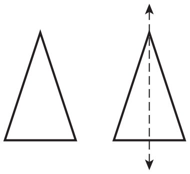
SCAS 7-4.1

Reflections

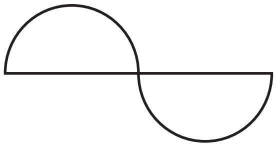
Figures that match exactly when folded in half have **line symmetry.** Each fold line is called a **line of symmetry.** Some figures have more than one line of symmetry.

Examples **Determine whether each figure has line symmetry. If so, draw all lines of symmetry.**

①



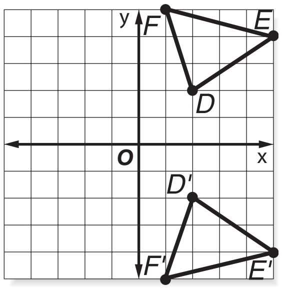
②



no symmetry

A type of transformation where a figure is flipped over a line of symmetry is a **reflection.** To draw the reflection of a polygon, find the distance from each vertex of the polygon to the line of symmetry. Plot the new vertices the same distance from the line of symmetry but on the other side of the line. Then connect the new vertices to complete the reflected image.

Example 3 **Triangle *DEF* has vertices *D*(2, 2), *E*(5, 4), and *F*(1, 5). Find the coordinates of the reflected image. Graph the figure and its reflected image over the *x*-axis.**

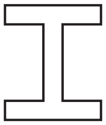


Plot the vertices and connect to form △*DEF*. The *x*-axis is the line of symmetry. The distance from a point on △*DEF* to the line of symmetry is the same as the distance from the line of symmetry to the reflected image. The image coordinates are *D*′(2, −2), *E*′(5, −4), and *F*′(1, −5).

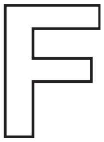
Exercises

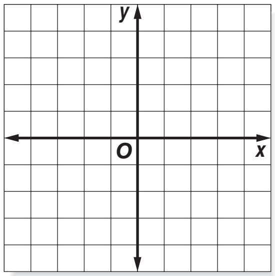
For Exercises 1 and 2, determine which figures have line symmetry. Write *yes* or *no*. If *yes*, draw all lines of symmetry.

1.



2.





3. Triangle *ABC* has vertices *A*(0, 4), *B*(2, 1), and *C*(4, 3). Find the coordinates of the vertices of *ABC* after a reflection over the *x*-axis. Then graph the figure and its reflected image.

NAME ______________________________ DATE ______________ PERIOD _____

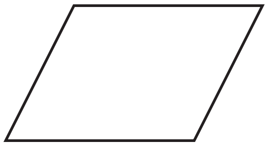
10-10 Homework Practice

SCAS 7-4.1

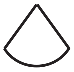
Reflections

Determine whether each figure has line symmetry. If so, copy the figure and draw all lines of symmetry.

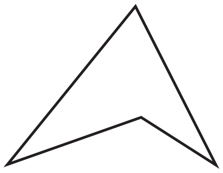
1.



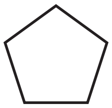
2.



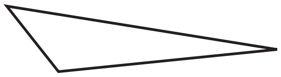
3.



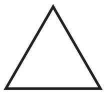
4.



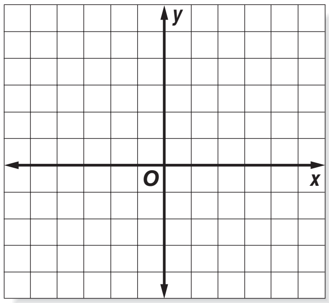
5.



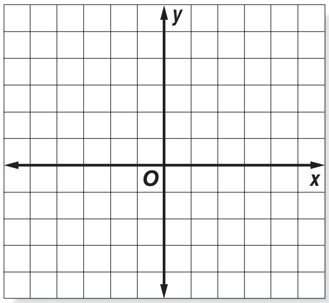
6.



7. Graph $\triangle ABC$ with vertices $A(2, 2)$, $B(5, 4)$,and $C(5, 1)$ and its reflection over the x-axis. Then find the coordinates of the reflected image.



8. Graph square $ABCD$ with vertices $A(-1, 2)$, $B(2, -1)$, $C(5, 2)$, and $D(2, 5)$ and its reflection over the y-axis. Then find the coordinates of the reflected image.



The coordinates of a point and its image after a reflection are given. Describe the reflection as over the *x*-axis or *y*-axis.

9. $B(1, -2) \rightarrow B'(1, 2)$

10. $J(-3, 5) \rightarrow J'(-3, -5)$

11. $W(-7, -4) \rightarrow W'(7, -4)$

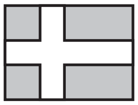
NAME ______________________________ DATE ____________ PERIOD _____

10-10 Problem-Solving Practice

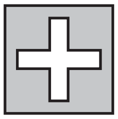
SCAS 7-4.1

Reflections

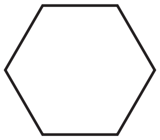
1. **FLAGS** The figure shows a flag similar to the national flag of Denmark. How many lines of symmetry does the flag have? Draw all lines of symmetry.



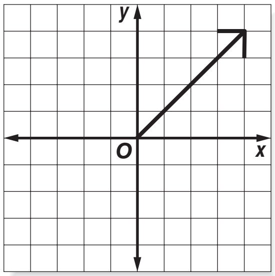
2. **FLAGS** The figure shows a flag similar to the national flag of Switzerland. How many lines of symmetry does the flag have? Draw all lines of symmetry.



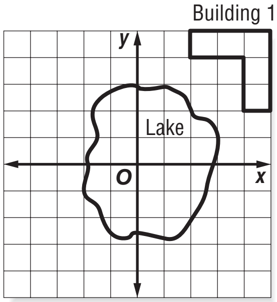
3. **INTERIOR DESIGN** An interior designer has been hired to decorate a room that has the shape of a regular hexagon. Before beginning work, the designer studies the symmetry of the room. How many lines of symmetry does the room have? Draw all lines of symmetry on the figure.



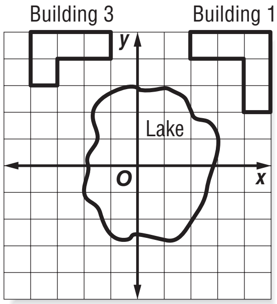
4. **ASTROLOGY** The figure shows the astrological symbol for Sagittarius plotted on a coordinate system. Reflect the symbol across the *x*-axis. Graph the reflected image.



5. **ARCHITECTURE** A corporate plaza is to be built around a small lake. Building 1 has already been built. Suppose there are axes through the lake as shown. Show where Building 2 should be built if it will be a reflection of Building 1 across the *y*-axis followed by a reflection across the *x*-axis.



6. **ARCHITECTURE** Use the information from Exercise 5. Suppose that a third building is to be built as shown. To complete the business park, show where a fourth building should be built if it is a reflection of Building 3 across the *x*- and *y*-axis.

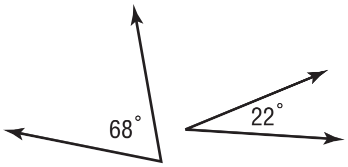


Name Date

Chapter 10 Test

Mastering the SC Standards

1 Which of the following terms best describes the relationship between these angles?



Ⓐ adjacent

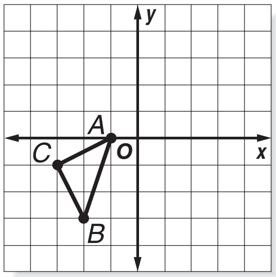
Ⓑ complementary

Ⓒ supplementary

Ⓓ vertical

7-4.5

2 If the triangle below is reflected across the *y*-axis, what will the coordinates of C' be?



Ⓐ $C'(1, 0)$

Ⓑ $C'(3, -1)$

Ⓒ $C'(-3, -1)$

Ⓓ $C'(-3, 1)$

7-4.1

3 $\triangle ABC$ is similar to $\triangle PQR$. The scale factor of $\triangle ABC$ to $\triangle PQR$ is 3:2. If $\overline{AB}$ is 18 centimeters, what is the length of $\overline{PQ}$?

Ⓐ 12 cm

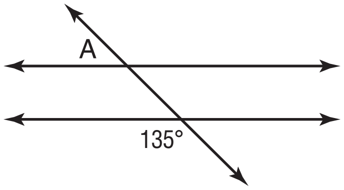
Ⓑ 18 cm

Ⓒ 21 cm

Ⓓ 27 cm

7-4.8

4 What is the measure of ∠A below?



Ⓐ 35°

Ⓑ 45°

Ⓒ 60°

Ⓓ 135°

7-4.5

5 What statement is always true of an equilateral triangle?

Ⓐ It has exactly two congruent angles.

Ⓑ It has one right angle.

Ⓒ The sum of any two angles is 180°.

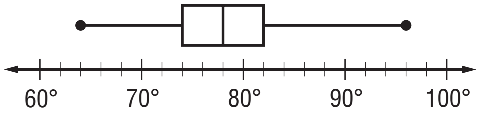
Ⓓ It has exactly three congruent sides.

7-4.1

Chapter 10 Test (continued)

Mastering the SC Standards

6 The box-and-whisker plot below represents the daily high temperatures in degrees Fahrenheit at an amusement park during the summer.

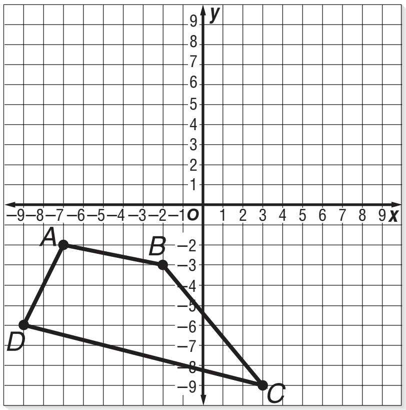


What was the highest temperature recorded at the amusement park during the summer?

- Ⓐ 62°
- Ⓑ 78°
- Ⓒ 96°
- Ⓓ 100°

7-6.2

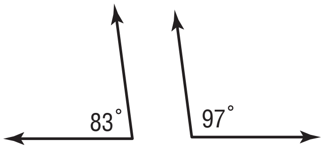
7 If quadrilateral *ABCD* is translated 5 units to the right and 6 units up, what will be the new coordinate of point *B*?



- Ⓐ (3, 3)
- Ⓑ (3, −9)
- Ⓒ (−7, 3)
- Ⓓ (−7, −9)

7-4.1

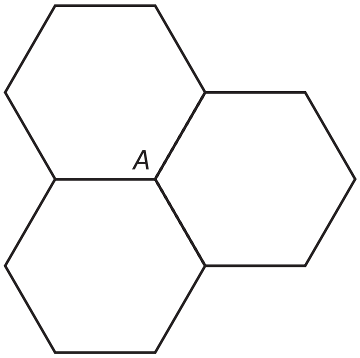
8 Which of the following terms best describes the relationship between these angles?



- Ⓐ adjacent
- Ⓑ complementary
- Ⓒ vertical
- Ⓓ supplementary

7-4.5

9 Keiko drew the tessellation below. She wants to find the measure of ∠*A*. She knows that the sum of the angles at the point where the vertices meet in a tessellation is equal to 360°. What is the measure of ∠*A*?



- Ⓐ 70°
- Ⓑ 120°
- Ⓒ 240°
- Ⓓ 720°

7-4.10

NAME ______________________________ DATE ____________ PERIOD _____

11 Anticipation Guide

Measurement: Two- and Three-Dimensional Figures

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).

STEP 1 A, D, or NS	Statement	STEP 2 A or D
	1. The area of a parallelogram is the product of the length of its base and the length of its side.	
	2. The area of a triangle can be found if the length of the base and the height is known.	
	3. The area of any figure is given in square units.	
	4. The diameter of a circle is the distance from the center to any point of the circle.	
	5. The circumference of a circle equals the product of π and r^2, where r is the radius of the circle.	
	6. $A = \pi(10)^2$ is the area of a circle with a diameter of 10 units.	
	7. The area of an irregular shape may be found by separating the shape into geometric shapes with known area formulas, then finding the sum of the areas of each smaller shape.	
	8. A rectangular prism has 6 faces and 8 vertices.	
	9. All the faces of a pyramid must be triangles.	
	10. The top view of a rectangular solid could be a rectangle or a square.	
	11. A rectangular prism with a volume of 90 cubic units could have dimensions of 3, 4, and 6 units.	
	12. Since the base of a cylinder is a circle, the formula for the area of a circle is part of the formula for the volume of a cylinder.	

STEP 2 ***After you complete Chapter 11***

- Reread each statement and complete the last column by entering an A or a D.
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a piece of paper to write an example of why you disagree.

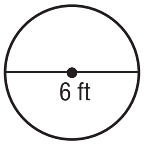
NAME ________________________ DATE ______________ PERIOD _____

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. A circular table has a diameter of 6 feet.



Which of the following is also true about this table?

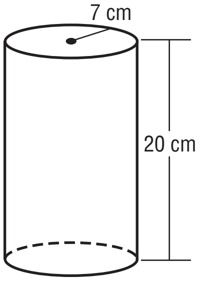
A The radius of this table is 2.5 feet.

B The circumference of this circle is about 18.84 feet.

C The area of this circle is about 18.84 square feet.

D The are of this circle is about 109 square feet.

2. Mrs. Andrew's homeroom is collecting change to donate to the local homeless shelter. The container they are using is a cylinder.



What is the volume of the container?

A 140 square centimeters

B 879.2 square centimeters

C 980 cubic centimeters

D 3,077.2 cubic centimeters

Fold here.

Solution

1. *Hint: The radius of a circle is half of the diameter. The formula for circumference is* $C = \pi d$ *or* $2\pi r$*. The formula for the area of a circle is* $A = \pi r^2$*, and* $\pi = 3.14$*.*

The radius of the table is half of the diameter, or 3, so Choice A is false.

The circumference of the circle is calculated below.

$$\begin{aligned} C &= \pi d \\ &\approx 3.14 \cdot 6 \text{ ft} \\ &\approx 18.84 \text{ ft} \end{aligned}$$

Option B is true.

The answer is **B.**

Solution

2. The formula for the volume of a cylinder is $V = \pi r^2 h$, where r represents the radius and h represents the height.

The formula for the volume of the container is $V = \pi r^2 h$.

$$\begin{aligned} V &\approx 3.14 \cdot (7 \text{ cm})^2 \cdot 20 \text{ cm} \\ &\approx 3{,}077.2 \text{ cm}^3 \end{aligned}$$

Notice that the units are cubed because we multiplied cm by cm^2. Units to express volume are always cubic.

The answer is **D.**

NAME ______________________________ DATE ____________ PERIOD _____

11-2 Explore Through Reading

SCAS 7-4.1, 7-5.3

Area of Triangles and Trapezoids

Get Ready for the Lesson

Complete the Mini Lab at the top of page 578 in your textbook. Write your answers below.

1. What is the area of the parallelogram?

2. Cut along the diagonal. What is true about the triangles formed?

3. What is the area of each triangle?

4. If the area of a parallelogram is bh, then write an expression for the area A of each of the two congruent triangles that form the parallelogram.

Read the Lesson

5. In a triangle, which side is the base?

6. How do you find the height of a triangle?

7. For what kind of triangle might the height be found outside of the triangle?

8. How is the height of a trapezoid similar to the height of a triangle or parallelogram?

Remember What You Learned

9. The Mini Lab in this lesson gave you a good way to remember the formula for the area of a triangle by showing you that it is half the area of a parallelogram, so $A = \frac{1}{2}bh$. Think of a way to help you remember the formula for the area of a trapezoid. Do you recognize anything in the formula $A = \frac{1}{2}h(b_1 + b_2)$?

NAME ______________________________ DATE ____________ PERIOD _____

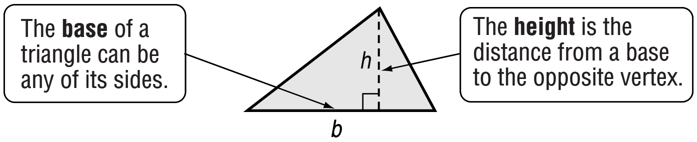
11-2 Study Guide

SCAS 7-4.1, 7-5.3

Area of Triangles and Trapezoids

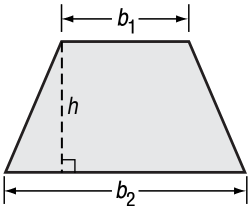
The area *A* of a triangle equals half the product of its base *b* and its height *h*.

$A = \frac{1}{2}bh$

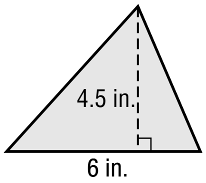

The **base** of a triangle can be any of its sides.
h
b
The **height** is the distance from a base to the opposite vertex.

A trapezoid has two bases, b_1 and b_2. The height of a trapezoid is the distance between the two bases. The area *A* of a trapezoid equals half the product of the height *h* and the sum of the bases b_1 and b_2.

$$A = \frac{1}{2}h(b_1 + b_2)$$



Example 1 **Find the area of triangle.**



Estimate $\frac{1}{2}(6)(5) = 15$

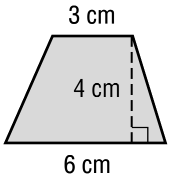
$A = \frac{1}{2}bh$ Area of a triangle.

$A = \frac{1}{2} \cdot 6 \cdot 4.5$ Replace *b* with 6 and *h* with 4.5.

$A = 13.5$ Multiply.

The area of the triangle is 13.5 square inches. This is close to the estimate.

Example 2 **Find the area of the trapezoid.**



$A = \frac{1}{2}h(b_1 + b_2)$ Area of a trapezoid.

$A = \frac{1}{2}(4)(3 + 6)$ Replace *h* with 4, b_1 with 3, and b_2 with 6.

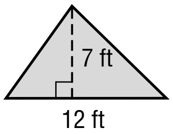
$A = 18$ Simplify.

The area of the trapezoid is 18 square centimeters.

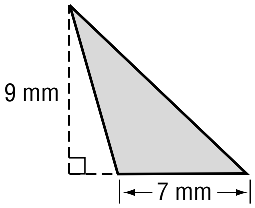
Exercises

Find the area of each figure. Round to the nearest tenth if necessary.

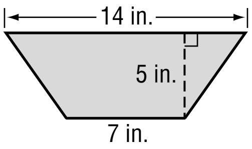
1.



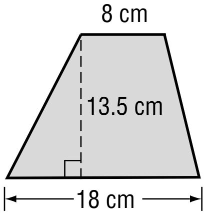
2.



3.


14 in.
5 in.
7 in.

4.


8 cm
13.5 cm
18 cm

NAME ______________________________ DATE ____________ PERIOD _____

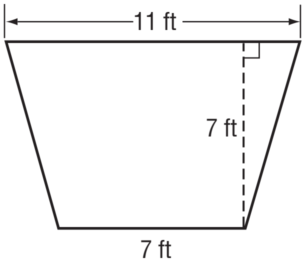
11-2 Homework Practice

SCAS 7-4.1, 7-5.3

Area of Triangles and Trapezoids

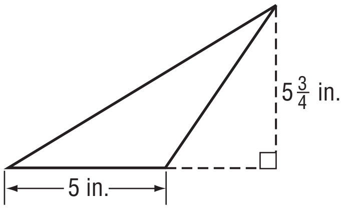
Find the area of each figure. Round to the nearest tenth if necessary.

1.



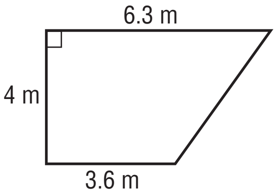
11 ft
7 ft
7 ft

2.

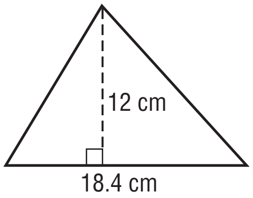


$5\frac{3}{4}$ in.
5 in.

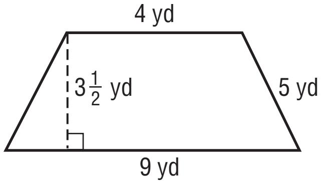
3.



4.

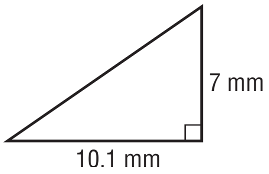


5.

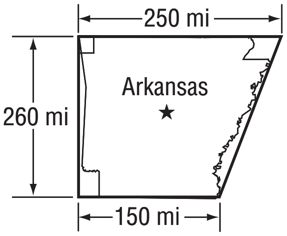


4 yd
$3\frac{1}{2}$ yd
5 yd
9 yd

6.



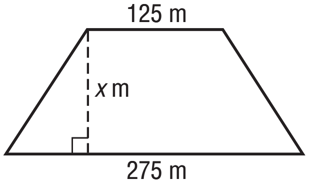
7. GEOGRAPHY The shape of Arkansas is roughly trapezoidal with bases of 150 miles and 250 miles and a height of 260 miles. What is the approximate area of Arkansas?



250 mi
Arkansas
260 mi
150 mi

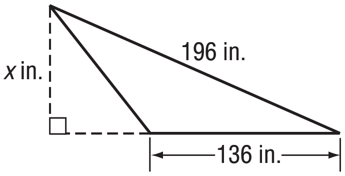
ALGEBRA Find the height of each figure.

8. Area = 23,000 m^2



125 m
x m
275 m

9. Area = 6,460 in^2



x in.
196 in.
136 in.

Draw and label each figure. Then find the area.

10. a trapezoid with a height less than 5 feet and an area greater than 50 square feet

11. a right triangle with a base greater than 10 meters and an area greater than 75 square meters

NAME ______________________________ DATE ____________ PERIOD _____

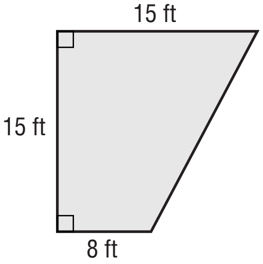
11-2 Problem-Solving Practice

SCAS 7-4.1, 7-5.3

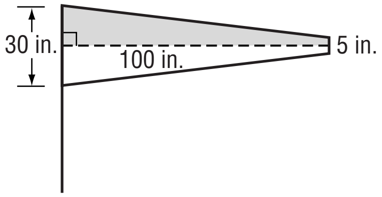
Area of Triangles and Trapezoids

1. **GEOGRAPHY** Arkansas has a shape that is similar to a trapezoid with bases of about 182 miles and 267 miles and a height of about 254 miles. Estimate the area of the state.

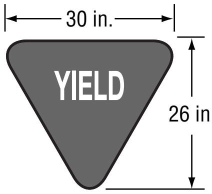
2. **PATIOS** Greta is making a patio with the dimensions given in the figure. What is the area of the patio?



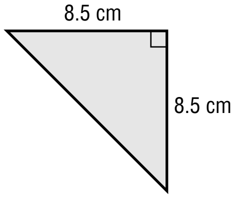
3. **FLAGS** Malila wants to make the International Marine Signal flag shown which represents the number six. What is the area of the flag?



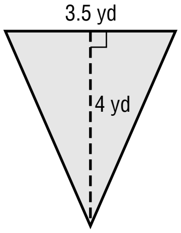
4. **SIGNS** Estimate the area of the yield sign.



5. **TILING** A ceramics company wants to produce tiles in the shape shown. What is the area of the surface of each tile?



6. **GARDENING** Kinu wants to buy topsoil for a section of her garden that has the dimensions shown in the figure. What is the area of this section of Kinu's garden?



NAME ____ DATE ______________ PERIOD _____

11A Study Guide

SCAS 7-4.6

Areas of Similar and Congruent Polygons

Vocabulary

Congruent means having the same measure.

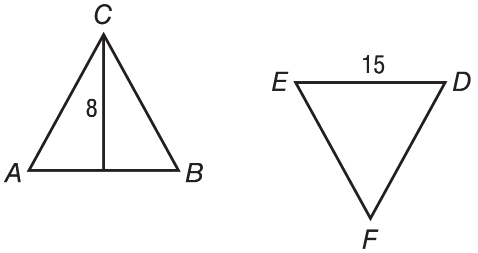
Congruent polygons are polygons in which each pair of corresponding angles and corresponding sides are congruent.

Similar polygons are polygons in which each pair of corresponding angles are congruent and the measures of the corresponding sides are proportional.

A **scale factor** is the ratio of the lengths of two corresponding sides of two similar polygons.

Example 1

If $\triangle ABC \cong \triangle DEF$, find the area of $\triangle DEF$.



Since the parts of congruent triangles are congruent, the height of $\triangle DEF$ is 8 units. The area is $\frac{8(15)}{2}$ or 60 square units.

Example 2

The ratio of the two perimeters of two similar rectangles is 16 to 9. What is the ratio of the areas of these two rectangles?

The ratio of the areas is equal to the square of the ratio of the sides. The ratio of the perimeters is equal to the ratio of the sides. So,

$$\frac{A_1}{A_2} = \left(\frac{16}{9}\right)^2 = \frac{256}{81}$$

Example 3

A parallelogram has an area of 30 square centimeters. If both the base and the height were doubled, what would be the new area?

The new parallelogram would be similar to the original and the scale factor would be 2. The area of the new parallelogram would be $30 \times (2)^2$ or 120 square centimeters.

Exercises

1. A rectangle has an area of 12 square centimeters. What would the area be if both the length and width were doubled?

2. If the radius of a circle were tripled, how would the area change?

NAME ______________________ DATE ____________ PERIOD _____

11A Skills Practice

SCAS 7-4.6

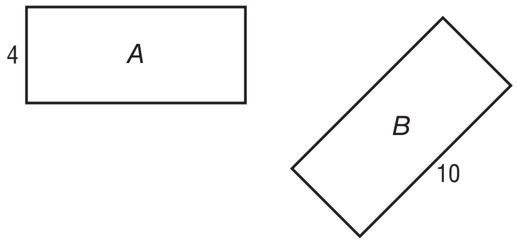
Areas of Similar and Congruent Polygons

1. The heights of two similar parallelograms are in a ratio of 9 to 4. What is the ratio of the areas of these two parallelograms?

2. The ratio of the areas of two squares is 25 to 49. What is the ratio of the lengths of the sides?

3. Two right triangles are similar. The area of the first triangle is x^2 square units, while the area of the second triangle is $4x^2$ square units. If the hypotenuse of the first triangle has a length of 14 units, then what is the length of the hypotenuse of the second triangle?

The figures below are congruent. Use these figures to answer questions 4 and 5.



4. What is the area of figure B?

5. What would be the area if both the length and width were doubled?

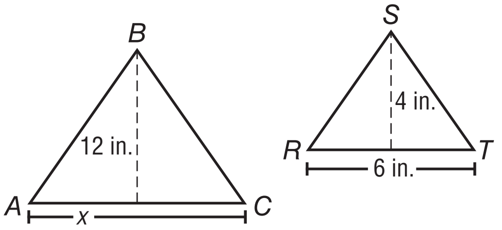
NAME ______________________ DATE ____________ PERIOD _____

11A Homework Practice

SCAS 7-4.6

Areas of Similar and Congruent Polygons

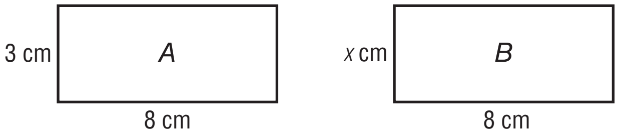
1. $\triangle ABC$ is similar to $\triangle RST$.



a. What is the value of x?

b. How many times larger is the area of $\triangle ABC$ than $\triangle RST$?

2. The rectangles below are congruent. What is the area of rectangle B?



3. An architect is building a house, but first he builds a scale model. In his model, the area of a bedroom is 30 square inches. If he used a scale of 1 inch equals 2 feet, what is the area of the actual bedroom in square feet?

4. Amaya is building an exact replica of her cousin's doll house. If the base of her cousin's doll house measures 2 feet long and 1 foot wide, what is the area of Amaya's base?

5. Two right triangles are similar. The area of the first triangle is 24 square centimeters. If the scale factor is $\frac{2}{3}$, what is the area of the second triangle?

NAME ______________________________ DATE ____________ PERIOD _____

11A Problem-Solving Practice

SCAS 7-4.6

Areas of Similar and Congruent Polygons

1. **GEOMETRY** $\triangle ABC$ is similar to $\triangle XYZ$. The area of $\triangle ABC$ is 24 square units. What is the area of $\triangle XYZ$ if $AB = 8$ and $XY = 12$?

2. **ART** Rio drew two similar rectangles. One rectangle was 6 inches wide and had an area of 56 square inches. The second rectangle was 15 inches wide. What was the area of the second rectangle?

3. **PERIMETER AND AREA** The front yard and back yard at the Jones' home are similar rectangles. The back yard is 20 feet by 30 feet. The longer dimension of the front yard is 20 feet.

   a. Find the scale factor of the two yards. What is the other dimension of the front yard?

   b. Find the perimeters of both yards. What is the scale factor of the perimeters?

   c. Find the areas of both yards. What is the scale factor of the areas?

4. **GARDENING** Jesse marked off two congruent rectangular plots in his garden. The length of the first rectangle was 5 feet and the width was 3 feet. What is the area of the second rectangular plot?

NAME ______________________________________ DATE ______________ PERIOD _____

11-7 Explore Through Reading

SCAS 7-4.4, 7-5.2

Three-Dimensional Figures

Get Ready for the Lesson

Complete the Mini Lab at the top of page 603 in your textbook. Write your answers below.

1. Study the shape of each object at the top of page 603. Then compare and contrast the properties of each object.

Read the Lesson

Fill in the blanks.

2. The top and bottom faces of a prism are __________________ and are __________________.

3. The shape of the base tells the name of the ______________.

4. The base of a cone is a __________________.

5. A __________________ has no faces, bases, edges, or vertices.

6. The bases of a cylinder are __________________.

7. All of the points on a __________________ are the same distance from the __________________.

Remember What You Learned

8. Compare and contrast a triangular prism, a triangular pyramid, and a cone.

NAME ______________________ DATE ____________ PERIOD _____

11-7 Study Guide

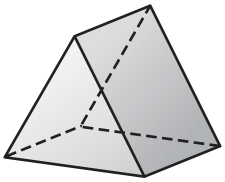
SCAS 7-4.4, 7-5.2

Three-Dimensional Figures

Prisms	At least 3 rectangular lateral faces	Top and bottom bases are parallel	Shape of the base tells the name of the prism
Pyramids	At least three triangular lateral faces	One base shaped like any 3-sided closed figure	Shape of the base tells the name of the pyramid
Cones	Only one base	Base is a circle	One vertex and no edges
Cylinders	Only two bases	Bases are circles	No vertices and no edges
Spheres	All points are the same distance from the center	No faces or bases	No edges or vertices

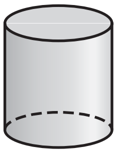
Example **For each figure, name the shape of the base(s). Then classify each figure.**

A.



The figure has two parallel triangular bases and three rectangular faces. The figure is a triangular prism.

B.

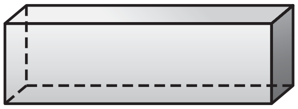


The figure has two circular bases and no edges. The figure is a cylinder.

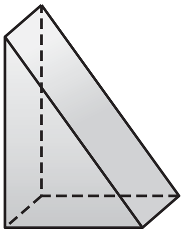
Exercises

For each figure name the shape of the base(s). Then classify each figure.

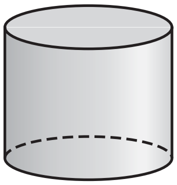
1.



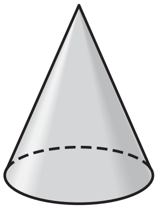
2.



3.



4.



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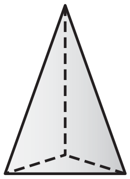

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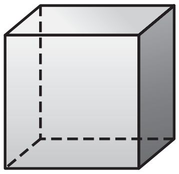


NAME ______________________________ DATE ____________ PERIOD _____

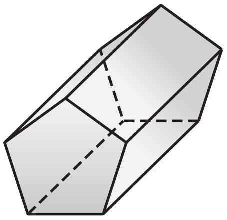
11-7 Homework Practice

SCAS 7-4.4, 7-5.2

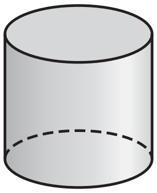
Three-Dimensional Figures

For each figure, identify the shape of the base(s), if any. Then classify the figure.

1.



2.



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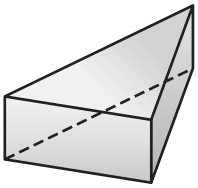

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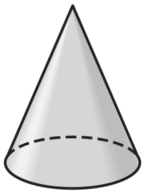
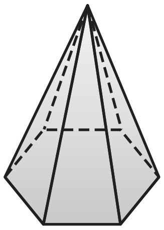


5.



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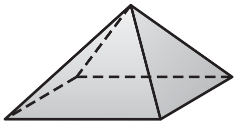
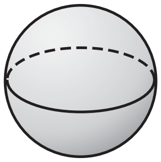


7.



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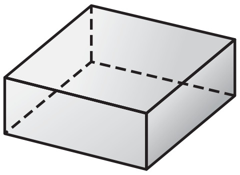
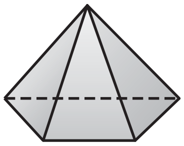
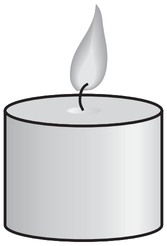


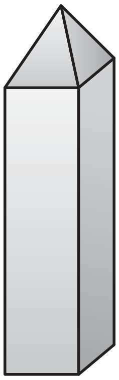
9.



10. **CANDLES** What three-dimensional figure describes the candle shown?



11. **FENCES** The basic shape of a fence post is made of two geometric figures. Classify these figures.



NAME ______________________________ DATE ____________ PERIOD _____

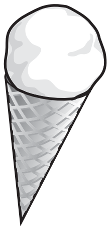
11-7 Problem-Solving Practice

SCAS 7-4.4, 7-5.2

Three-Dimensional Figures

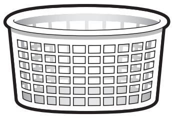
1. **SPORTS** A regulation basketball weighs 20-22 ounces. Classify the shape of a regulation basketball as a three-dimensional figure.

2. **ICE CREAM** The picture shows an ice cream cone with a single scoop on top. What two three-dimensional shapes make up the ice cream and cone?



3. **SHIPPING** Jessie bought a box to ship her gifts to her grandmother. Classify the shape of a box as a three-dimensional figure.

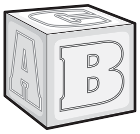
4. **LAUNDRY** Classify the shape of a the laundry hamper shown as a three-dimensional figure.



5. **SCHOOL PROJECT** Jarnel is creating a diorama for his class project. He plans to use a shoebox to build the diorama. Classify the shape of a shoebox as a three-dimensional figure.

6. **SOUP** Classify the shape of a soup can as a three-dimensional figure.

7. **BABY BLOCKS** Classify the shape of the baby block as a three-dimensional figure.



8. **EARTH** Classify the shape of the Earth as a three-dimensional figure.

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11-8 Explore Through Reading

SCAS 7-4.4, 7-4.3

Drawing Three-Dimensional Figures

Get Ready for the Lesson

Read the introduction at the top of page 608 in your textbook.
Write your answers below.

1. Describe the two-dimensional figure(s) that make up the front view.

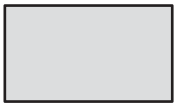
2. The monument is a three-sided building. Sketch what you think the top view might look like.

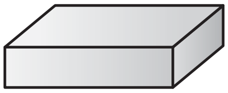
Read the Lesson

3. A two-dimensional figure has two dimensions. What are they?

4. A three-dimensional figure has three dimensions. What are they?

5. Label the dimensions of each figure.





6. Underline the word that makes the sentence true.
A (rectangle, cube) is a three-dimensional figure.

Remember What You Learned

7. Make models of a two-dimensional figure and a three-dimensional figure. Use any material you like—for example, paper, cardboard, toothpicks, gumdrops.

NAME ______________________ DATE ____________ PERIOD _____

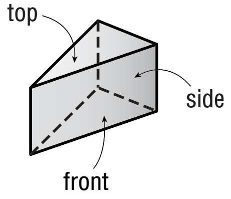
11-8 Study Guide

SCAS 7-4.4, 7-4.3

Drawing Three-Dimensional Figures

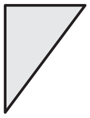
A solid is a three-dimensional figure.

Example 1 **Draw a top, a side, and a front view of the solid at the right.**

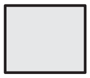


The top view is a triangle. The side and front views are rectangles.

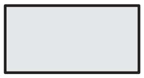
top



side

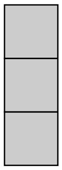


front

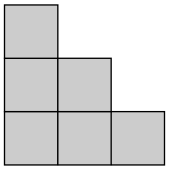


Example 2 **Draw the solid using the top, side, and front views shown below.**

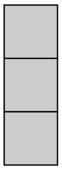
top

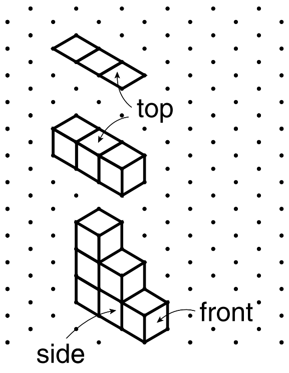


side



front





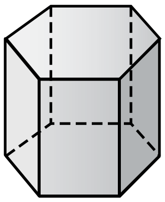
Step 1 Use the top view to draw the base of the figure, a 1-by-3 rectangle.

Step 2 Add edges to make the base a solid figure.

Step 3 Use the side and front views to complete the figure.

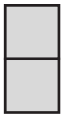
Exercises

1. Draw a top, a side, and front view of the solid.

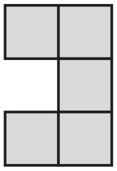


2. Draw a corner view of the three-dimensional figure whose top, side, and front views are shown. Use isometric dot paper.

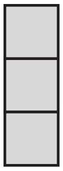
top



side



front



NAME ____ DATE ______________ PERIOD _____

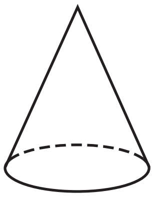
11-8 Homework Practice

SCAS 7-4.4, 7-4.3

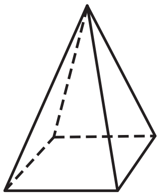
Drawing Three-Dimensional Figures

Draw a top, a side, and a front view of each solid.

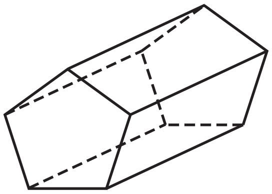
1.



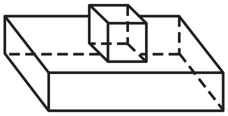
2.



3.

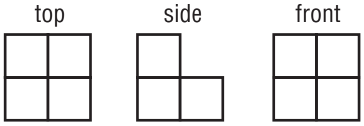


4.

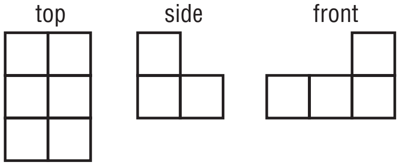


Draw a corner view of each three-dimensional figure whose top, side, and front views shown. Use isometric dot paper.

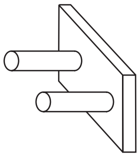
5.



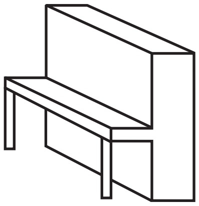
6.



7. **HAT RACK** Draw a top, a side, and a front view of the hat rack shown.



8. **MUSIC** Sketch views of the top, side, and front of the piano shown.



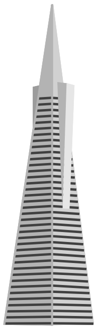
11-8 Problem-Solving Practice

SCAS 7-4.4, 7-4.3

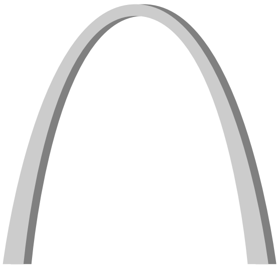
Drawing Three-Dimensional Figures

1. **ARCHITECTURE** The Transamerica Pyramid, built from 1969 to 1972, towers above the San Francisco skyline.

   Draw the top, side, and front views of the Transamerica building.

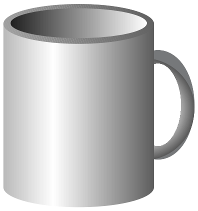


2. **MONUMENTS** Since its completion in 1965, Eero Saarinen's 630-foot Gateway Arch has stood above St. Louis.

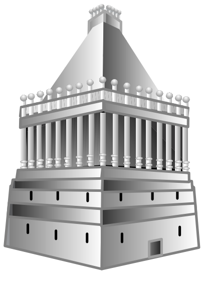


   Draw the top, side, and front views of the Gateway Arch.

3. **GRAPHICS** Dan is creating a computer-generated image of a coffee cup. To do this, he needs to enter the top, side, and front views of the cup. Draw the views that Dan should enter.



4. **HISTORY** The Mausoleum at Halicarnassus is one of the Seven Wonders of the Ancient World. Draw a top view, a side view, and a front view of the mausoleum without the chariot statue at the top.



NAME ________________________________ DATE ______________ PERIOD _____

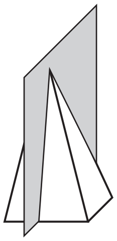
11B Study Guide

SCAS 7-4.3

Cross Sections of Solids

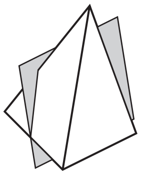
CROSS SECTIONS When a plane intersects, or slices, a figure, the resulting figure is called a cross section. Figures can be sliced vertically, horizontally, or at an angle.

Vertical Slice



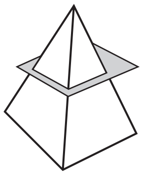
This cross section is a triangle.

Angled Slice



This cross section is a trapezoid.

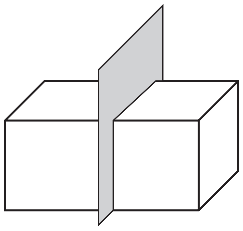
Horizontal Slice



This cross section is a square.

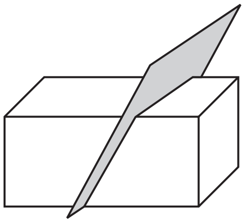
Example **Draw and describe the shape resulting from the following vertical, angled, and horizontal cross sections of a rectangular prism.**

Vertical Slice



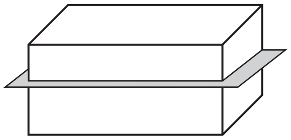
This cross section is a rectangle.

Angled Slice



This cross section is a parallelogram.

Horizontal Slice

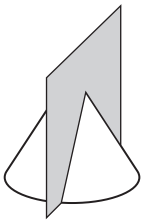


This cross section is a rectangle.

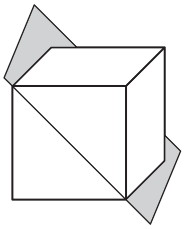
Exercises

Draw and describe the shape resulting from each cross section.

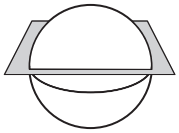
1.



2.



3.



NAME ______________________________________ DATE ______________ PERIOD _____

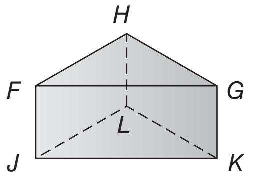
11B Skills Practice

SCAS 7-4.3

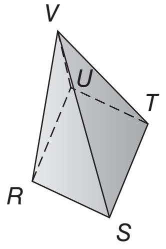
Cross Sections of Solids

Identify each figure. Name the bases, faces, edges, and vertices.

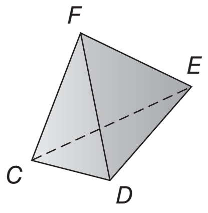
1.



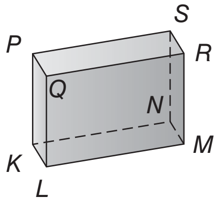
2.



3.

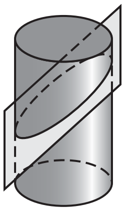


4.



Draw and describe the shape resulting from each cross section.

5.



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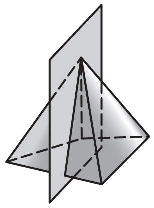

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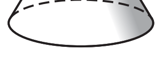

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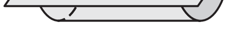


NAME ____ DATE ______________ PERIOD _____

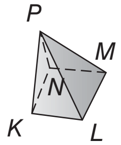
11B Homework Practice

SCAS 7-4.3

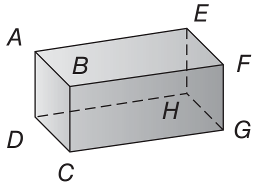
Cross Sections of Solids

Identify each figure. Name the bases, faces, edges, and vertices.

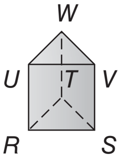
1.



2.

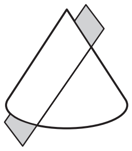


3.

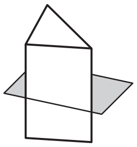


Draw and describe the shape resulting from each cross section.

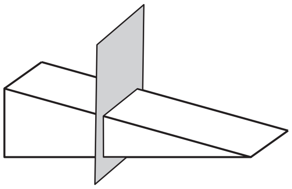
4.



5.



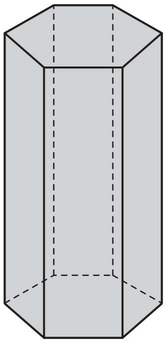
6.



7. **GLOBES** Miguel has a globe on his shelf. Draw and describe the shape resulting from vertical, angled, and horizontal cross sections of the globe.

vertical **angled** **horizontal**

8. **CRYSTALS** Janie collects rocks and minerals. She bought the beryl crystal shown at the right. Draw the top view and side view. Then draw and describe the shape resulting from an angled cross section of the figure.



top view **side view** **angled cross section**

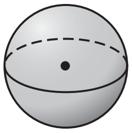
NAME ____ DATE ______________ PERIOD _____

11B Problem-Solving Practice

SCAS 7-4.3

Cross Sections of Solids

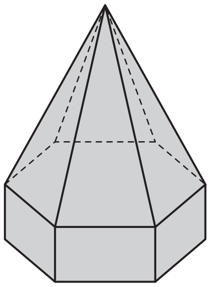
1. **SPHERES** Look at the sphere below.



a. Determine the cross section resulting from the horizontal and vertical slice of the sphere.

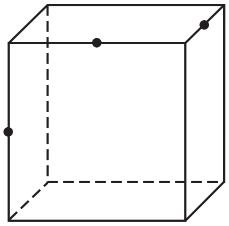
b. Based on the cross-section resulting from the horizontal and vertical slice of the sphere, make a conjecture about all spherical cross-sections.

2. **LIGHTS** Deck lights, like the one below, were used to send natural light into the lower decks of sailing ships.

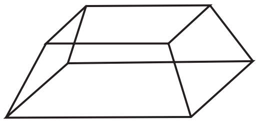


Sketch the cross section from a horizontal slice of the light.

3. **CUBES** Nathan marks the midpoints of three edges of a cube as shown. He then slices the cube along a plane that contains these three points. Describe the resulting cross section.



4. **FIGURES** Look at the figure below.



Sketch the cross section resulting from a horizontal slice of the figure.

5. **MINERALS** pyrite, also known as fool's gold, can form crystals that are perfect cubes. Suppose a geinologist wants to cut a cube of pyrite to get a square and a rectanglar face. What cuts should be made to get each of the shapes? Illustrate your answers.

NAME ________________________________ DATE ____________ PERIOD _____

11-9 Explore Through Reading

SCAS 7-4.4, 7-5.2

Volume of Prisms

Get Ready for the Lesson

Complete the Mini Lab at the top of page 613 in your textbook. Write your answers below.

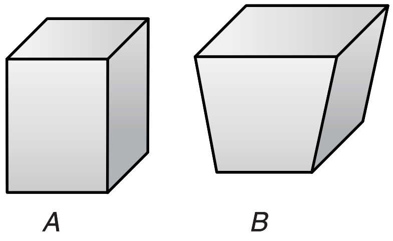
1. What is the area of the base, or bottom, of the box? What is the height of the box?

2. How many centimeter cubes fit in the box?

3. What do you notice about the product of the base area and the height of the box?

Read the Lesson

4. Which of the figures at the right is a rectangular prism? Why is the other figure not a rectangular prism?



Remember What You Learned

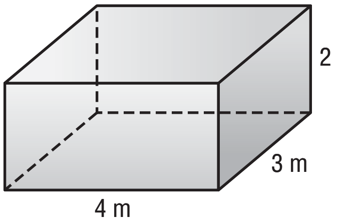
5. Tell how to find the volume of a rectangular prism in words.

11-9 Study Guide

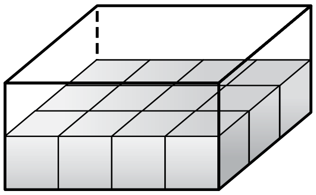
SCAS 7-4.4, 7-5.2

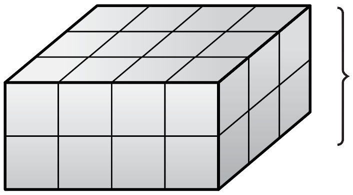
Volume of Prisms

The **volume** of a three-dimensional figure is the measure of space occupied by it. It is measured in cubic units such as cubic centimeters (cm^3) or cubic inches (in^3). The volume of the figure at the right can be shown using cubes.



The bottom layer, or base, has 4 • 3 or 12 cubes.





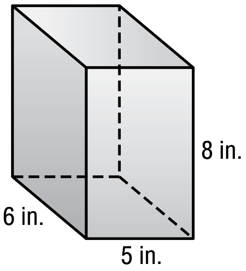
There are two layers.

It takes 12 • 2 or 24 cubes to fill the box. So, the volume of the box is 24 cubic meters.

A **rectangular prism** is a three-dimensional figure that has two parallel and congruent sides, or bases, that are rectangles. To find the volume of a rectangular prism, multiply the area of the base and the height, or find the product of the length ℓ, the width w, and the height h.

$V = Bh$ or $V = \ell wh$

Example **Find the volume of the rectangular prism.**



$V = \ell wh$ Volume of a rectangular prism.

$V = 5 \cdot 6 \cdot 8$ Replace ℓ with 5, w with 6, and h with 8.

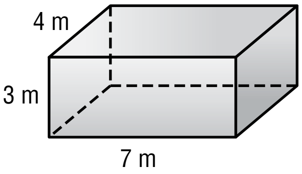
$V = 240$ Multiply.

The volume is 240 cubic inches.

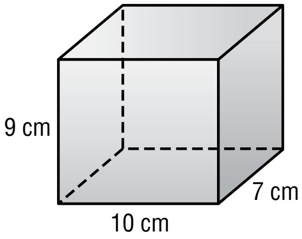
Exercises

Find the volume of each rectangular prism. Round to the nearest tenth if necessary.

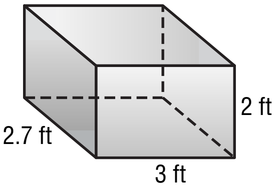
1.



2.



3.



NAME ______________________________ DATE ____________ PERIOD _____

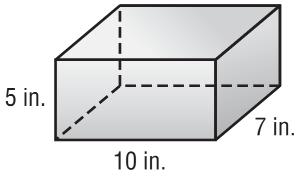
11-9 Homework Practice

SCAS 7-4.4, 7-5.2

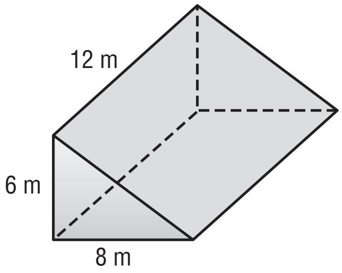
Volume of Prisms

Find the volume of each prism. Round to the nearest tenth if necessary.

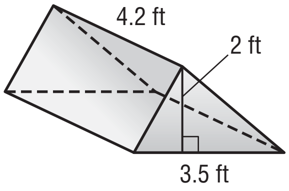
1.


5 in.
7 in.
10 in.

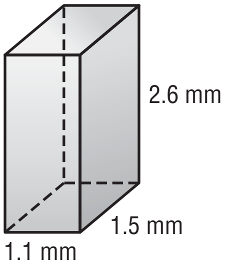
2.



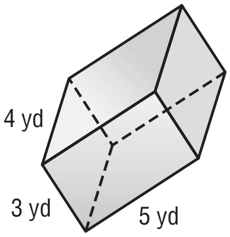
3.


4.2 ft
2 ft
3.5 ft

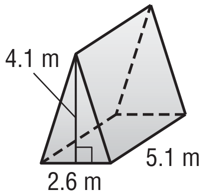
4.


2.6 mm
1.5 mm
1.1 mm

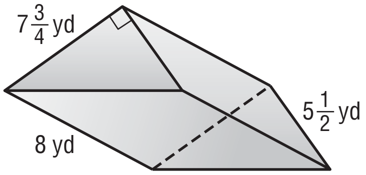
5.



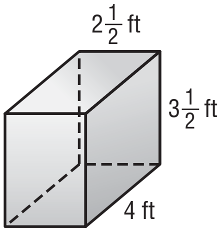
6.



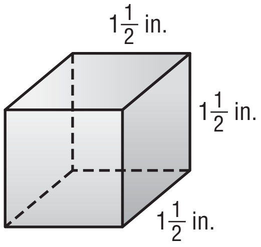
7.


$7\frac{3}{4}$ yd
$5\frac{1}{2}$ yd
8 yd

8.

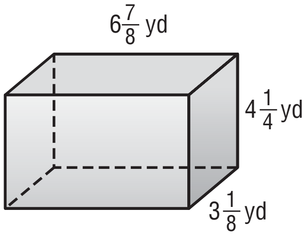

$2\frac{1}{2}$ ft
$3\frac{1}{2}$ ft
4 ft

9.

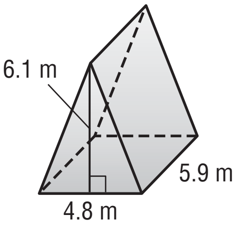

$1\frac{1}{2}$ in.
$1\frac{1}{2}$ in.
$1\frac{1}{2}$ in.

ESTIMATION **Estimate to find the approximate volume of each prism.**

10.


$6\frac{7}{8}$ yd
$4\frac{1}{4}$ yd
$3\frac{1}{8}$ yd

11.



12. **ALGEBRA** The base of a rectangular prism has an area of 15.3 square inches and a volume of 185.13 cubic inches. Write an equation that can be used to find the height h of the prism. Then find the height of the prism.

13. **MAIL** The United States Post Office has two different priority mail flat rate boxes. Which box has the greater volume? Justify your answer. Box 1: $6\frac{1}{2}$ in. × $8\frac{1}{2}$ in. × 11 in. Box 2: $3\frac{3}{8}$in. × $11\frac{7}{8}$ in. × $13\frac{5}{8}$ in.

NAME ______________________________ DATE ____________ PERIOD _____

11-9 Problem-Solving Practice

SCAS 7-4.4, 7-5.2

Volume of Prisms

1. **PACKAGING** A cereal box has a length of 8 inches, a width of $1\frac{3}{4}$ inches, and a height of $12\frac{1}{8}$ inches. What is the volume of the cereal box?

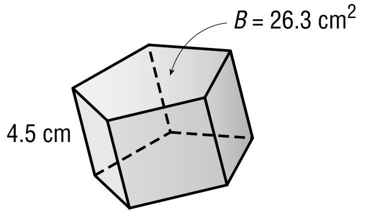
2. **FOOD STORAGE** Nara wants to determine how much ice it will take to fill her cooler. If the cooler has a length of 22 inches, a width of 12 inches, and a height of $10\frac{1}{2}$ inches, how much ice will her cooler hold?

3. **TRANSPORTATION** The cargo-carrying part of Billy's truck has a length of 8.3 meters, a width of 3 meters, and a height of 4.2 meters. What is the maximum volume of sand that Billy's truck can carry?

4. **PLUMBING** Alexia's bathroom has a tub in the shape of a rectangular prism with a length of 1.5 meters, a width of 0.5 meter, and a height of 0.4 meter. How many cubic feet of water can it hold?

5. **PACKAGING** A box of tissues has a length of 11.2 centimeters, a width of 11.2 centimeters, and a height of 13 centimeters. What is the volume of the tissue box?

6. **GEOMETRY** A *pentagonal prism* is a prism that has bases that are pentagons. Use $V = Bh$ where B is the area of the base, to find the volume of the pentagonal prism below.



NAME ________________________________ DATE ______________ PERIOD _____

11-10 Explore Through Reading

SCAS 7-4.4, 7-5.2

Volume of Cylinders

Get Ready for the Lesson

Complete the Mini Lab at the top of page 619 in your textbook. Write your answers below.

1. Estimate the number of centimeter cubes that would fit at the bottom of the can. Include parts of cubes.

2. If each layer is 1 centimeter high, how many layers would it take to fill the cylinder?

3. **MAKE A CONJECTURE** How can you find the volume of the can?

Reading the Lesson

4. Write *C* if the phrase is true of a cylinder, *P* if the phrase is true of a prism, or *CP* if the phrase is true of both.

__________ has bases that are parallel and congruent

__________ has sides and bases that are polygons

__________ has bases that are circular

__________ is a solid

__________ has volume

__________ is three-dimensional

5. What shape is the base of a cylinder?

6. What is the formula for the area of the base of a cylinder?

Remember What You Learned

7. Work with a partner. Bring an object that is a cylinder to school. Take the measurements and determine the volume of your cylindrical object. Exchange objects with your partner, but do not share the calculations. Determine the volume of your partner's object. Then compare your results with those of your partner.

NAME ______________________ DATE ____________ PERIOD _____

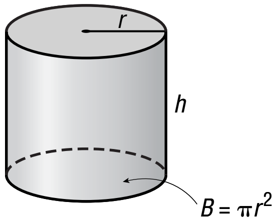
11-10 Study Guide

SCAS 7-4.4, 7-5.2

Volume of Cylinders

As with prisms, the area of the base of a **cylinder** tells the number of cubic units in one layer. The height tells how many layers there are in the cylinder. The volume V of a cylinder with radius r is the area of the base B times the height h.

$V = Bh$ or $V = \pi r^2 h$, where $B = \pi r^2$

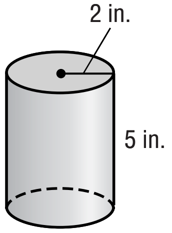


Example **Find the volume of the cylinder. Use 3.14 for π. Round to the nearest tenth.**

$V = \pi r^2 h$ Volume of a cylinder.

$V \approx 3.14\,(2)^2(5)$ Replace π with 3.14, r with 2, and h with 5.

$V \approx 62.8$ Simplify.

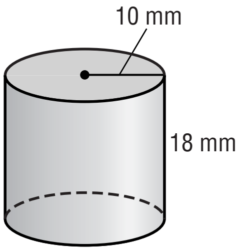


The volume is approximately 62.8 cubic inches. Check by using estimation.

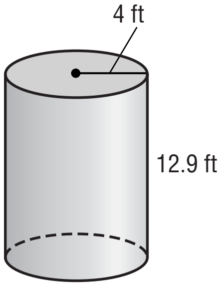
Exercises

Find the volume of each cylinder. Use 3.14 for π. Round to the nearest tenth.

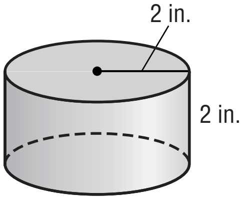
1.



2.



3.



4. radius = 9.5 yd
height = 2.2 yd

5. diameter = 6 cm
height = 11 cm

6. diameter = $3\frac{2}{5}$ cm
height = $1\frac{1}{4}$ m

NAME ______________________________ DATE ____________ PERIOD _____

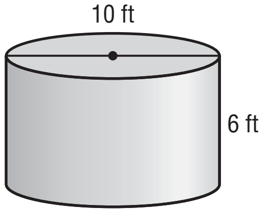
11-10 Homework Practice

SCAS 7-4.4, 7-5.2

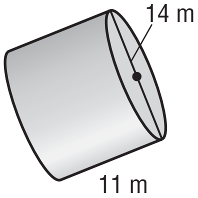
Volume of Cylinders

Find the volume of the cylinder. Use 3.14 for π. Round to the nearest tenth.

1.



2.



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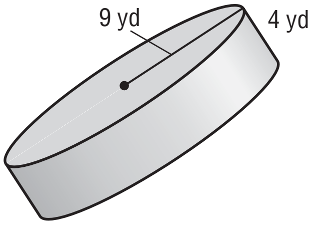
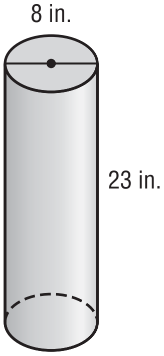
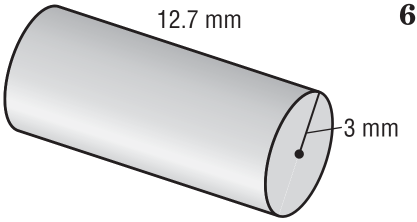


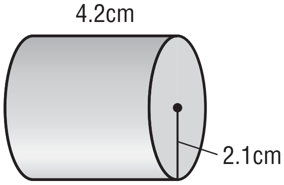
4.



5.



6.



7. radius = 3.7 cm
height = 5.2 cm

8. diameter = 6 in.
height = $4\frac{1}{2}$ in.

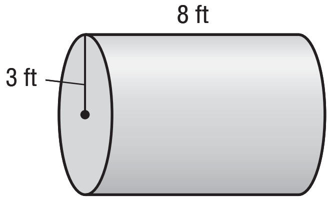
9. radius = $5\frac{1}{4}$ yd
height = $6\frac{1}{2}$ yd

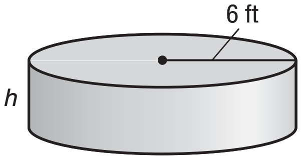
10. CONTAINER What is the volume of a barrel that has a diameter of $1\frac{1}{2}$ feet and a height of 4 feet?

ESTIMATION **Match each cylinder with its approximate volume.**

11. diameter = 4 cm, height = 3.6 cm	**a.** 108 ft^3
12. radius = 2.7 cm, height = 5 cm	**b.** 135 ft^3
13. radius = 3 cm, height = 4.1 cm	**c.** 96 ft^3
14. diameter = 8.2 cm, height = 2 cm	**d.** 48 ft^3

15. FUEL Two fuel tanks with the dimensions shown have the same volume. What is the value of h?



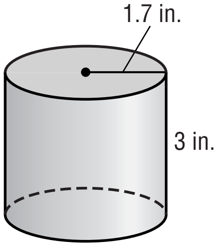


NAME ______________________________ DATE ______________ PERIOD _____

11-10 Problem-Solving Practice

SCAS 7-4.4, 7-5.2

Volume of Cylinders

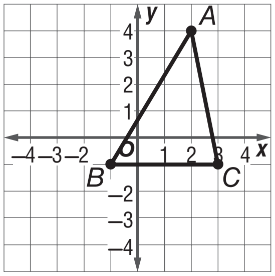
1. WATER STORAGE A cylindrical water tank has a diameter of 5.3 meters and a height of 9 meters. What is the maximum volume that the water tank can hold? Round to the nearest tenth.	**2. PACKAGING** A can of corn has a diameter of 6.6 centimeters and a height of 9.9 centimeters. How much corn can the can hold? Round to the nearest tenth.
3. CONTAINERS Tionna wants to determine the maximum capacity of a cylindrical bucket that has a radius of 6 inches and a height of 12 inches. What is the capacity of Tionna's bucket? Round to the nearest tenth.	**4. DESIGN** Rodolfo is designing a new, cylindrical drinking glass. If the glass has a diameter of 8 centimeters and a height of 12.8 centimeters, what is its volume? Round to the nearest tenth.
5. PAINT A can of paint is 15 centimeters high and has a diameter of 13.6 cm. What is the volume of the can? Round to the nearest tenth.	**6. SPICES** A spice manufacturer uses a cylindrical dispenser like the one shown. Find the volume of the dispenser to the nearest tenth. 

Name Date

Chapter 11 Test

Mastering the SC Standards

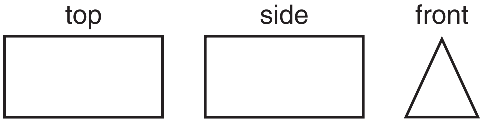
1 What is the area of triangle *ABC*?



Ⓐ 9 square units
Ⓑ 10 square units
Ⓒ 15 square units
Ⓓ 20 square units

7-4.1

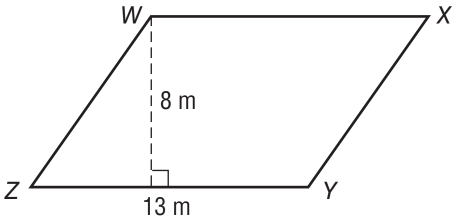
2 What three-dimensional figure has the top, side, and front views shown here?



Ⓐ triangular prism
Ⓑ rectangular prism
Ⓒ pyramid
Ⓓ cylinder

7-4.4

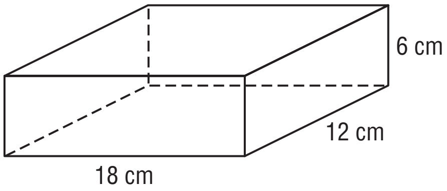
3 What is the area of parallelogram *WXYZ*?



Ⓐ 21 m^2
Ⓑ 64 m^2
Ⓒ 104 m^2
Ⓓ 169 m^2

7-5.3

4 Clara plans to send the package shown below to her friend in Greenville. What is the volume of the package? ($V = l \times w \times h$)



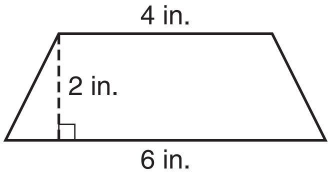
Ⓐ 396 m^3
Ⓑ 792 m^3
Ⓒ 1,266 m^3
Ⓓ 1,296 m^3

7-5.2

Chapter 11 Test (continued)

Mastering the SC Standards

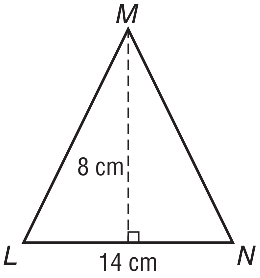
5 Jeremy needs to find the area of the trapezoid below. Which expression can he use to find the area?



Ⓐ $2 \times 4 \times 6$
Ⓑ $2 \times 2 \times (4 + 6)$
Ⓒ $\frac{1}{2} \times (2 + 4 + 6)$
Ⓓ $\frac{1}{2} \times 2 \times (4 + 6)$

7-5.3

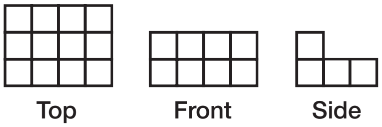
6 What is the area of $\triangle LMN$?



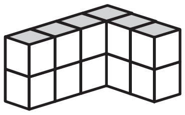
Ⓐ 22 cm^2
Ⓑ 44 cm^2
Ⓒ 56 cm^2
Ⓓ 112 cm^2

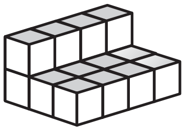
7-4.1

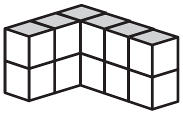
7 The top, front, and side views of a solid figure are shown below.

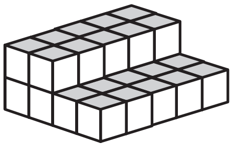


Which solid figure matches the views above?

Ⓐ


Ⓑ


Ⓒ


Ⓓ


7-4.4

8 The height, h, of a cylinder is 12 centimeters. The radius, r, is 3 centimeters. Which equation could be used to find the volume, V, of the cylinder?

Ⓐ $V = 3 \times 12 \times \pi$
Ⓑ $V = 3^2 \times 12 \times \pi$
Ⓒ $V = (3 + 12)^2 \times \pi$
Ⓓ $V = (3 \times 12)^2 \times \pi$

7-5.2

NAME ______________________________ DATE ____________ PERIOD _____

12 Anticipation Guide

Geometry and Measurement

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).

STEP 1 A, D, or NS	Statement	STEP 2 A or D
	1. A square root of a number is one of its two equal factors.	
	2. You can find an estimate for the square root of 45 by finding the square root of the perfect square closest to 45.	
	3. All square roots are irrational numbers.	
	4. The hypotenuse of a right triangle is the side opposite the right angle.	
	5. Since $10^2 = 6^2 + 8^2$, a triangle whose sides have lengths 6, 8, and 10 will be a right triangle.	
	6. Since a rectangular prism has six sides, the surface area can be found by finding the area of one side and multiplying by 6.	
	7. If the dimensions of a rectangular prism are doubled, the surface area will also double.	
	8. If the dimensions of a rectangular prism are doubled, the volume will triple.	
	9. In finding the surface area of a cylinder, you are finding the area of two circles and a rectangle.	
	10. The units for surface area are always cubic units since surface area involves three-dimensional figures.	

STEP 2 ***After you complete Chapter 12***

- Reread each statement and complete the last column by entering an A or a D.
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a piece of paper to write an example of why you disagree.

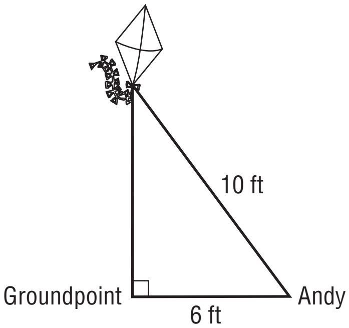
NAME ______________________________ DATE ______________ PERIOD _____

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. Andy is flying a kite as shown in the diagram.



What is the height of the kite?

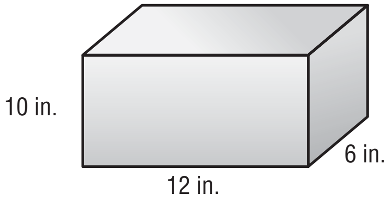
A 4 feet

B 8 feet

C 12 feet

D 16 feet

2. Polly is painting all sides of the wooden block shown below as the first step in an art project.



Which of the following will help her calculate how much paint to buy?

A the volume; 720 cubic inches

B the surface area; 504 square inches

C adding the perimeter of each face; 224 inches

D the sum of the edges; 112 inches

Fold here.

Solution

1. *Hint: The Pythagorean Theorem states that the sum of the squares of the legs of a right triangle is equal to the square of the hypotenuse, or* $a^2 + b^2 = c^2$.

The height of the kite is a leg of a right triangle.

$$\begin{aligned} h^2 + 6^2 &= 10^2 \\ h^2 + 36 &= 100 \\ h^2 &= 64 \\ h &= 8 \end{aligned}$$

The answer is **B**.

Solution

2. The paint will cover all of the outside surfaces of the box. The measurement that corresponds with the area of all of the faces is the surface area, which is calculated by adding the areas of all of the faces.

The answer is **B**.

NAME ______________________________ DATE ____________ PERIOD _____

12-1 Explore Through Reading

SCAS 7-2.10, 7-1.5

Estimating Square Roots

Get Ready for the Lesson

Complete the Mini Lab at the top of page 636 in your textbook. Write your answers below. Use algebra tiles to estimate the square root of each number to the nearest whole number.

1. 40 **2.** 28 **3.** 85 **4.** 62

5. Describe another method that you could use to estimate the square root of a number.

Read the Lesson

6. Why is $\sqrt{4}$ a rational number and $\sqrt{2}$ an irrational number?

7. How do you read the statement $\sqrt{64} < \sqrt{75} < \sqrt{81}$?

8. Why are $\sqrt{64}$ and $\sqrt{81}$ used in Example 1?

Remember What You Learned

9. The key to estimating square roots without a calculator is to be familiar with common perfect squares. Complete the following table of common perfect squares then test yourself to see how many you can remember without using a calculator.

Number	5	6	7	8	9	10	11	12	13	14	15	16	20	25
Square	25													

NAME ______________________ DATE ____________ PERIOD _____

12-1 Study Guide

SCAS **7-2.10,** 7-1.5

Estimating Square Roots

Recall that a perfect square is a square of a rational number. In Lesson 5-8, you learned that any number that can be written as a fraction is a rational number. A number that cannot be written as a fraction is an **irrational number.**

Example 1 **Estimate $\sqrt{40}$ to the nearest whole number.**

List some perfect squares.

1, 4, 9, 16, 25, 36, 49, …

$36 < 40 < 49$ 40 is between the perfect squares 36 and 49.

$\sqrt{36} < \sqrt{40} < \sqrt{49}$ Find the square root of each number.

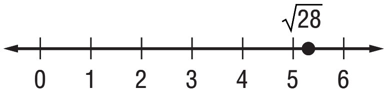
$6 < \sqrt{40} < 7$ $\sqrt{36} = 6$ and $\sqrt{49} = 7$

So, $\sqrt{40}$ is between 6 and 7. Since 40 is closer to 36 than to 49, the best whole number estimate is 6.

Example 2 **Graph $\sqrt{28}$ on a number line.**

2nd √ 28 ENTER **5.291502622**

$\sqrt{28} \approx 5.3$



Check for Reasonableness Since $5^2 = 25$ and 25 is close to 28, the answer is reasonable.

Exercises

Estimate each square root to the nearest whole number.

1. $\sqrt{3}$

2. $\sqrt{8}$

3. $\sqrt{26}$

4. $\sqrt{41}$

5. $\sqrt{61}$

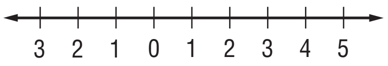
6. $\sqrt{94}$

7. $\sqrt{152}$

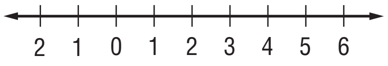
8. $\sqrt{850}$

Graph each square root on a number line.

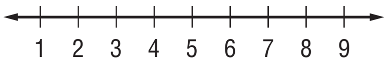
9. $\sqrt{2}$



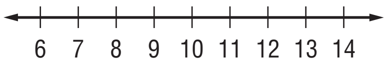
10. $\sqrt{27}$



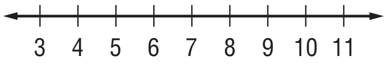
11. $\sqrt{73}$



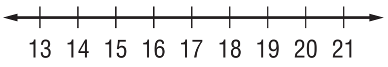
12. $\sqrt{82}$


6 7 8 9 10 11 12 13 14

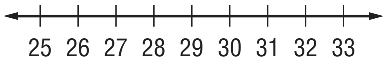
13. $\sqrt{105}$


3 4 5 6 7 8 9 10 11

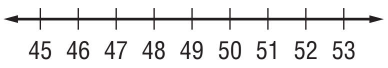
14. $\sqrt{395}$


13 14 15 16 17 18 19 20 21

15. $\sqrt{846}$


25 26 27 28 29 30 31 32 33

16. $\sqrt{2{,}298}$


45 46 47 48 49 50 51 52 53

NAME ______________________________ DATE ____________ PERIOD _____

12-1 Homework Practice

SCAS **7-2.10,** 7-1.5

Estimating Square Roots

Estimate each square root to the nearest whole number.

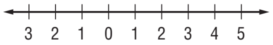
1. $\sqrt{8}$ **2.** $\sqrt{19}$ **3.** $\sqrt{47}$ **4.** $\sqrt{70}$

5. $\sqrt{91}$ **6.** $\sqrt{125}$ **7.** $\sqrt{150}$ **8.** $\sqrt{389}$

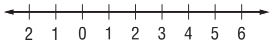
9. $\sqrt{2{,}468}$ **10.** $\sqrt{899}$ **11.** $\sqrt{4{,}840}$ **12.** $\sqrt{8{,}080}$

Graph each square root on a number line.

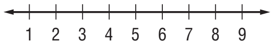
13. $\sqrt{6}$



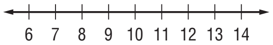
14. $\sqrt{21}$



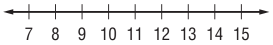
15. $\sqrt{53}$



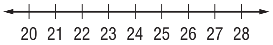
16. $\sqrt{79}$


6 7 8 9 10 11 12 13 14

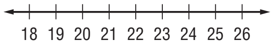
17. $\sqrt{190}$


7 8 9 10 11 12 13 14 15

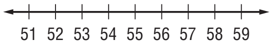
18. $\sqrt{624}$


20 21 22 23 24 25 26 27 28

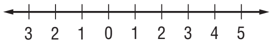
19. $\sqrt{427}$


18 19 20 21 22 23 24 25 26

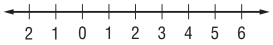
20. $\sqrt{3{,}178}$


51 52 53 54 55 56 57 58 59

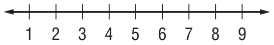
21. $\sqrt{0.36}$



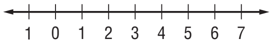
22. $\sqrt{0.81}$



23. $\sqrt{1.44}$



24. $\sqrt{2.25}$



25. **ALGEBRA** What whole number is closest to $\sqrt{a + b}$ if $a = 24$ and $b = 38$?

26. **ALGEBRA** Evaluate $\sqrt{x - y}$ to the nearest tenth if $x = 10$ and $y = 4.5$

27. **QUILTING** A queen-size quilt in the shape of a square has an area of 51 square feet. What is the approximate length of one side of the quilt to the nearest tenth?

28. **PENDULUM** The formula below can be used to estimate the time it takes for a pendulum to swing back and forth once. Use the formula to find the time it takes for a pendulum with a length of 0.8 meter to swing back and forth once. Round to the nearest tenth.

$$T = 2 \times \sqrt{L}$$

- T = time (seconds)
- L = length (meters)

NAME ______________________________ DATE ____________ PERIOD _____

12-1 Problem-Solving Practice

SCAS **7-2.10,** 7-1.5

Estimating Square Roots

1. **GEOMETRY** The diameter d of a circle with area A is given by the formula $d = \sqrt{\frac{4A}{\pi}}$. What is the diameter of a circle with an area of 56 square inches? Use 3.14 for π and round to the nearest tenth.

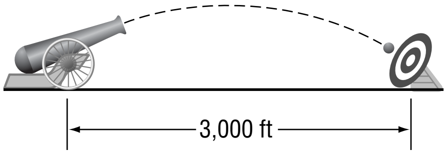
2. **FENCING** Carmen wants to buy fencing to enclose a square garden with an area of 500 square feet. How much fencing does Carmen need to buy? Round to the nearest tenth.

3. **OCEANS** The speed v in feet per second of an ocean wave in shallow water of depth d in feet is given by the formula $v = \sqrt{32d}$. What is the speed of an ocean wave at a depth of 10 feet? Round to the nearest tenth.

4. **LIGHTING** A new flashlight has a beam whose width w at a distance d from the flashlight is given by the formula $w = 1.2\sqrt{d}$. What is the width of the beam at a distance of 30 feet? Round to the nearest tenth.

5. **SOUND** The speed of sound in air c in meters per second at a temperature T in degrees Celsius is given approximately by the formula $c = \sqrt{402(T + 273)}$. What is the speed of sound in air at a temperature of 25 degrees Celsius? Round to the nearest tenth.

6. **PROJECTILES** The muzzle velocity v in feet per second necessary for a cannon to hit a target x feet away is estimated by the formula $v = \sqrt{32x}$. What muzzle velocity is required to hit a target 3,000 feet away? Round to the nearest tenth.



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12-3 Study Guide

SCAS **7-5.2,** 7-1.1

Problem-Solving Investigation: Make a Model

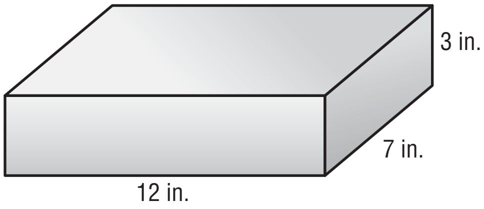
When solving problems, make a model to represent the given situation in order to determine the best plan for a solution.

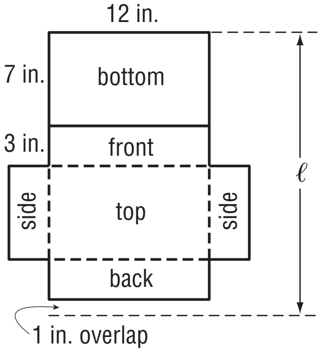
Example GIFT WRAP **Rita wants to wrap a rectangular box. The box is 12 inches by 7 inches by 3 inches high. What must be the area of the paper so that she has a 1 inch overlap to neatly wrap the paper?**

Understand You know that the box is 12 × 7 × 3 and that you need to add 1 inch to some measures for the overlap. You also know that the wrapping paper will be a rectangle.

Plan Draw a sketch of the box and then make a model of the box if it were cut apart and laid flat. You need the overlap going around the box.

Solve Sketch the box. Make a model of the box unfolded.





The length of the paper needed is the distance around the box plus 1 inch. So, $\ell = 7 + 3 + 7 + 3 + 1$ or 21 inches.
The width of the paper would be $3 + 12 + 3$ or 18 inches.
The area would be 21×18 or 378 in^2.

Check Make a box using centimeters instead of inches. Then cut a piece of paper 18 centimeters by 21 centimeters to see if you can wrap the box neatly.

Exercises

1. **GARDENING** Peg wants to put a stone path 3 feet wide around her rectangular garden measuring 10 feet by 15 feet. What will be the perimeter of her garden including the stone path?

2. **DRAWING** Dante is making a full-size drawing of his favorite cartoon character. If the figure is 1 inch by 0.5 inches and his scale is 1 inch = 10 inches, how large will the full size character be?

NAME ______________________________ DATE ____________ PERIOD _____

12-3 Skills Practice

SCAS **7-5.2,** 7-1.1

Problem-Solving Investigation: Make a Model

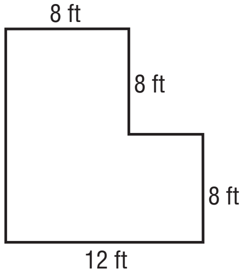
Make a model to solve.

1. **PETS** Jack's Pet Store has 5 pets for sale. Some are birds and some are dogs. When Jack looks at the pets, he counts 18 legs. How many of each type of pet are there?

2. **INTERIOR DESIGN** JoAnn is creating a model of a living room. The room is 20 feet by 20 feet. If the scale she is using is 1 foot = $\frac{1}{2}$ inch, what are the dimensions of her model room?

3. **ART COMPETITION** An art competition allows for submitted work to be no larger than 11 inches by 14 inches. If Christene's photograph is 8 inches by 10 inches, what is the largest matte she can use if she wants the border to be the same width all the way around the photo?

4. **FLOORING** James is laying carpet in an L-shaped room whose model is shown below. How much carpet does he need?



5. **SCALE MODEL** Charlotte is building a model of the Eiffel Tower. If the actual tower is 986 feet tall and Charlotte's scale is 1 inch = 10 feet, how tall is her model?

6. **SCIENCE FAIR** Audrey wants to make a poster that is folded into three sections for her science fair project. The length of the poster is 36 inches. If she wants the middle section to be twice the length of the side sections and she wants the two side sections to be equal, what should be the length of the middle section?

NAME ______________________________ DATE ____________ PERIOD _____

12-3 Homework Practice

SCAS **7-5.2,** 7-1.1

Problem-Solving Investigation: Make a Model

Mixed Problem Solving

For Exercises 1 and 2, make a model to solve the problem.

1. **ARCHITECT** Mrs. Peron is designing a home for a client. The house is 45 feet by 76 feet. If she uses a scale of 1 foot = $\frac{1}{2}$ inch, what are the dimensions of the house on the blue prints?

2. **SWIMMING POOL** Mr. Forrester has a swimming pool that measures $3\frac{1}{3}$ yards by 8 yards. If the deck around the pool is $2\frac{2}{3}$ yards wide, what is the outside perimeter of the deck?

Use any strategy to solve Exercises 3 through 6. Some strategies are shown below.

Problem-Solving Strategies
• Draw a diagram. • Use logical reasoning. • Make a model.

3. **BATTERIES** A manufacturing plant can make 350 batteries in 15 minutes. How long will it take the manufacturing plant to make 3,500 batteries?

4. **SHOPPING** A grocery store has five cash registers. About 4 customers are checked out at each register every 20 minutes. How many customers are checked out at the store each hour?

5. **TESTS** Diego scored a 95 on his first test in science class. He then scored 100 on his next 5 tests. If he scored a 91 on his seventh test, what is his test average?

6. **NEWSPAPERS** Candace wants to increase the number of newspapers she delivers. She currently delivers 58 newspapers. In fourteen weeks, she wants to be delivering 100 newspapers. How many newspaper deliveries must she increase each week to obtain her goal?

NAME ____ DATE _______________ PERIOD _____

12-3 Problem-Solving Practice

SCAS 7-5.2, 7-1.1

Problem-Solving Investigation: Make a Model

Solve each problem using any strategy you have learned.

1. **FOOTBALL** Bill, Damon and Steve are the quarterback, center and punter on the football team, not necessarily in that order. The quarterback and Bill go on the bus with Damon after the game. Damon is not the punter. What position does Bill play?

2. **SPORTS** Janelle can walk one mile in 15 minutes. How long will it take her to walk 3 miles?

3. **WEATHER** The Loudonville Times prints the following chart showing the snowfall for each day last week. The reporter estimates that they got 10 inches of snow during the past week. Is this a reasonable estimate?

Day	Snowfall
Monday	1 inch
Tuesday	2 inches
Wednesday	0.5 inches
Thursday	1.5 inches
Friday	3.75 inches
Saturday	0 inches
Sunday	0 inches

4. **GARDENING** The table below shows how many tomatoes Nicholas picked each day during the week. How many does he need to pick on Sunday so that he has picked a total of 20 for the week?

Day	M	T	W	R	F	S	S
Number of Tomatoes	2	5	3	1	0	5	

5. **PAINT** If one gallon of paint covers 150 square feet, is one gallon enough for Susie to cover a kitchen wall that is 15 feet by 8 feet? Justify your answer.

6. **SHOPPING** Avery bought a DVD for \$22.99 and got \$2.01 back in change. How much did Avery give the cashier?

7. **MONEY** The amount in Carly's checkbook is \$750 after writing a check for \$65 and making a deposit of \$100 and a deposit of \$75. How much did she start with in her checkbook?

8. **VEHICLES** Jim has 15 vehicles at his garage. Some are cars and some are motorcycles. If he counts 58 wheels, how many of each type of vehicle does he have?

NAME ______________________________ DATE ____________ PERIOD _____

12-4 Explore Through Reading

SCAS 7-5.2

Surface Area of Rectangular Prisms

Get Ready for the Lesson

Complete the Mini Lab at the top of page 649 in your textbook. Write your answers below.

1. Record the dimensions, volume, and surface area in a table.

Dimensions	Volume	Surface Area

2. Build two more prisms using all of the cubes. For each, record the dimensions, volume, and surface area.

3. Describe the prisms with the greatest and least surface areas.

Read the Lesson

4. How many pairs of congruent faces are there in a rectangular prism? Name them.

5. Tell how to find the surface area of a rectangular prism in words.

Remember What You Learned

6. Work with a partner. Bring a box that is a rectangular prism to class (any size, such as a crayon box) that you can cut apart to form a net. Label the surfaces front, back, top, bottom, side, side. Measure the faces and find the surface area. Use adhesive tape to form the net into a three-dimensional figure. Then exchange nets with your partner. Calculate the volume of the prism. Compare the answers found from using a net and a solid.

NAME ______________________________ DATE ____________ PERIOD _____

12-4 Study Guide

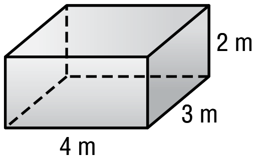
SCAS 7-5.2

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 ℓ, width w, and height h is found using the following formula.

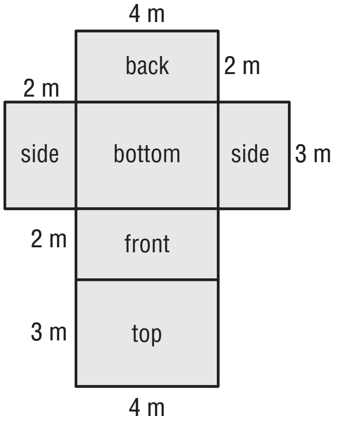
$S = 2\ell w + 2\ell h + 2wh$

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 ℓ with 4, w with 3, and h with 2 in the formula for surface area.

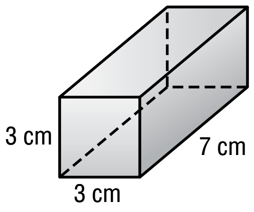
$$\begin{aligned} S &= 2\ell w + 2\ell h + 2wh \\ &= 2 \cdot 4 \cdot 3 + 2 \cdot 4 \cdot 2 + 2 \cdot 3 \cdot 2 && \text{Follow order of operations.} \\ &= 24 + 16 + 12 \\ &= 52 \end{aligned}$$

So, the surface area of the rectangular prism is 52 square meters.

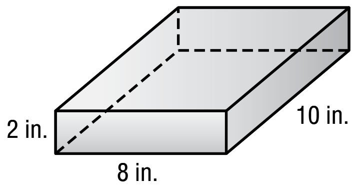
Exercises

Find the surface area of each rectangular prism.

1.



2.



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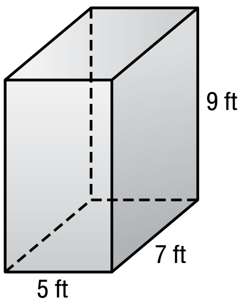


NAME ______________________________ DATE ____________ PERIOD _____

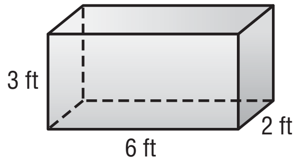
12-4 Homework Practice

SCAS 7-5.2

Surface Area of Rectangular Prisms

Find the surface area of each rectangular prism. Round to the nearest tenth if necessary.

1.



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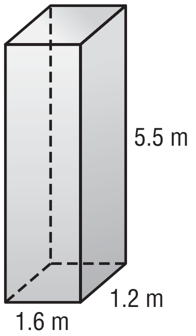
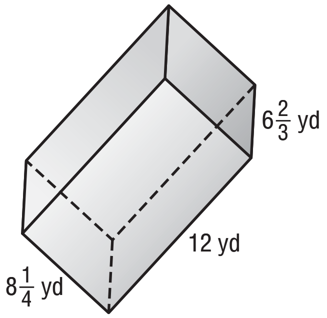


3.

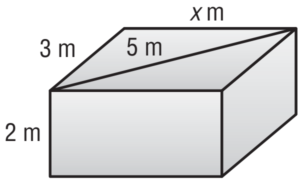


4. length = 20 cm
width = 18 cm
height = 25 cm

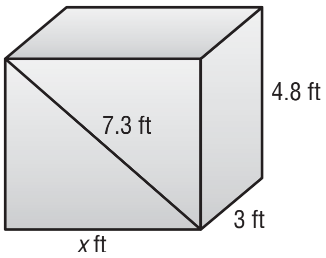
5. length = 31.5 in.
width = 12.2 in.
height = 24.8 in.

6. length = 5.3 mm
width = 1.1 mm
height = 3.4 mm

7.

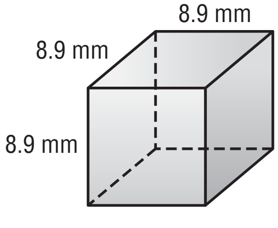


8.

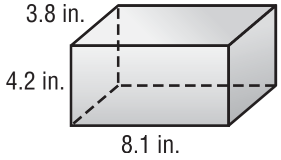


ESTIMATION **Estimate the surface area of each prism.**

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?

NAME ______________________________ DATE ____________ PERIOD _____

12-4 Problem-Solving Practice

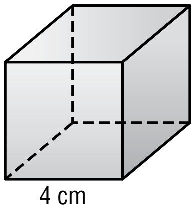
SCAS 7-5.2

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?

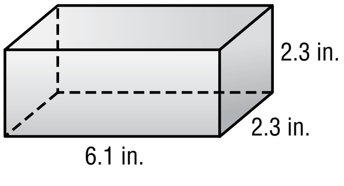
3. **ICE** Suppose the length of each edge of a cube of ice is 4 centimeters. Find the surface area of the cube.



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?



12-4 Explore Through Reading

SCAS 7-5.2

Surface Area of Cylinders

Get Ready for the Lesson

Complete the Mini Lab at the top of page 656 in your textbook. Write your answers below.

1. Make a net of the cylinder.

2. Name the shapes in the net.

3. How is the length of the rectangle related to the circles?

Read the Lesson

Write the formula to use to find each of the following.

4. the area of a circle ________________

5. the circumference of a circle ________________

6. the area of a rectangle ________________

7. How would you find the surface area of a cylinder with no top? Give your answer in words and symbols.

Remember What You Learned

8. Complete the table.

Words	The surface area of a cylinder	equals	the area of two bases	plus	the area of the curved surface
Symbols					

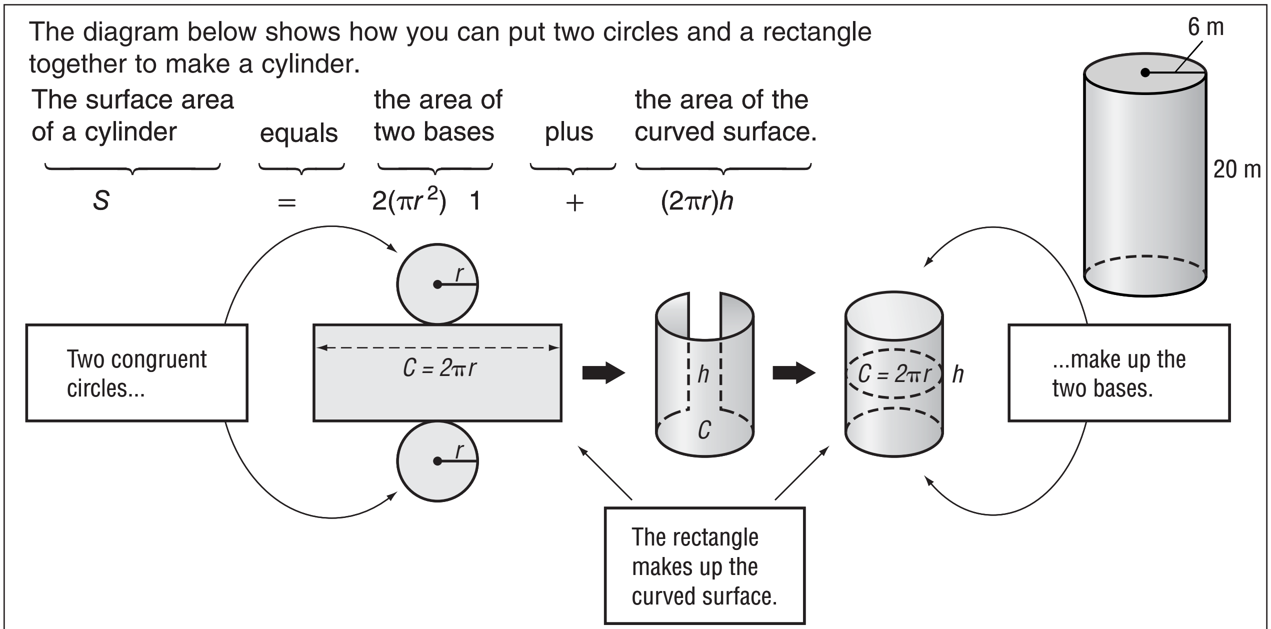
12-5 Study Guide

SCAS 7-5.2

Surface Area of Cylinders

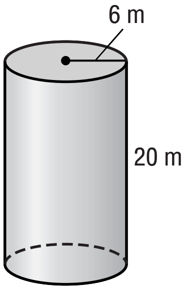
The diagram below shows how you can put two circles and a rectangle together to make a cylinder.

$$\overbrace{S}^{\text{The surface area of a cylinder}} \overbrace{=}^{\text{equals}} \overbrace{2(\pi r^2)\ 1}^{\text{the area of two bases}} \overbrace{+}^{\text{plus}} \overbrace{(2\pi r)h}^{\text{the area of the curved surface.}}$$


6 m
20 m
r
C = 2πr
r
h
C
C = 2πr
h
Two congruent circles...
...make up the two bases.
The rectangle makes up the curved surface.

In the diagram above, the length of the rectangle is the same as the circumference of the circle. Also, the width of the rectangle is the same as the height of the cylinder.

Example **Find the surface area of the cylinder. Use 3.14 for π. Round to the nearest tenth.**



$S = 2\pi r^2 + 2\pi rh$ Surface area of a cylinder.

$S = 2\pi(6)^2 + 2\pi(6)(20)$ Replace p with 3.14, r with 6, and h with 20.

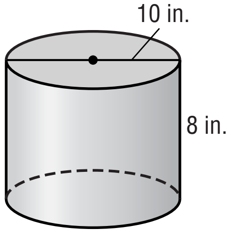
≈ 979.7 Simplify.

The surface area is about 979.7 square meters.

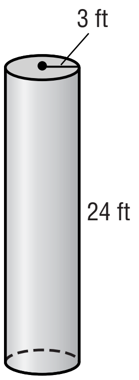
Exercises

Find the surface area of each cylinder. Use 3.14 for π. Round to the nearest tenth.

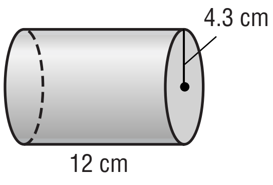
1.



2.



3.



NAME ______________________________ DATE ______________ PERIOD _____

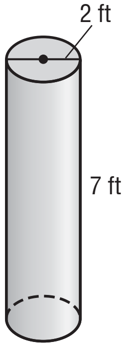
12-5 Homework Practice

SCAS 7-5.2

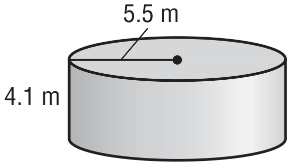
Surface Area of Cylinders

Find the surface area of each cylinder. Use 3.14 for π. Round to the nearest tenth.

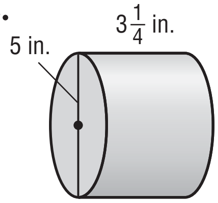
1.



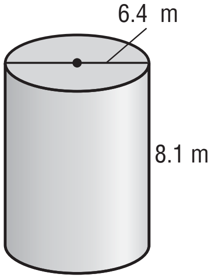
2.



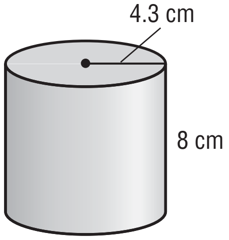
3.



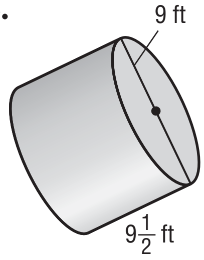
4.



5.



6.



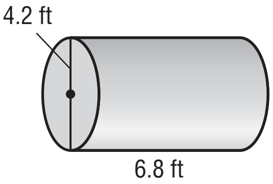
7. diameter = 15.5 mm
height = 9.4 mm

8. diameter = 28.4 yd
height = 15.1 yd

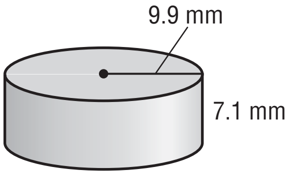
9. radius = 50 cm
height = 30 cm

ESTIMATION **Estimate the area of each cylinder.**

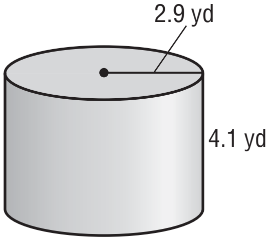
10.



11.



12.



13. FUEL STORAGE A fuel storage tank needs to be painted on the inside. If the height of the tank is 40 feet and the diameter is 120 feet, what is the surface that needs to be painted? Round to the nearest hundred square feet.

14. PAPER TOWELS Each of the three rolls of paper towels in a package are individually wrapped in plastic. The radius of each roll is 5.6 centimeters and the height is 27.9 centimeters. How much plastic is used to individually wrap the three rolls? Round to the nearest tenth.

NAME ________________________________ DATE ______________ PERIOD _____

12-5 Problem-Solving Practice

SCAS 7-5.2

Surface Area of Cylinders

1. **PACKAGING** What is the area of the label on a box of oatmeal with a radius of 9.3 centimeters and a height of 16.5 centimeters? Round to the nearest tenth.

2. **TIRES** Betty wants to know the total surface area of the tread on one of her tires. If the diameter of the tire is 18 inches and the width of the tire is 5 inches, what is the total surface area of the tire's tread? Round to the nearest tenth.

3. **CANS** A cylindrical can has a diameter of 6 inches and a height of 7.3 inches. What is the surface area of the can? Round to the nearest tenth.

4. **CANS** A cylindrical can has a height of 14 centimeters and a radius of 4.2 centimeters. Find the surface area of the can. Round to the nearest tenth.

5. **MANUFACTURING** How much sheet metal is required to make a cylindrical trash can with a diameter of 2 feet and height of $4\frac{1}{4}$ feet? Round to the nearest tenth. (*Hint*: Do not include the top.)

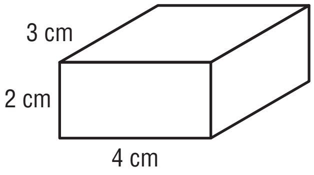
6. **PLUMBING** How much steel is needed to make a hollow pipe with a radius of 3 inches and a height of 15 inches? Round to the nearest tenth.

Name Date

Chapter 12 Test

Mastering the SC Standards

1 Which expression represents a strategy Meiko could use to find the surface area of the figure below?



Ⓐ $2 \times 3 \times 4$
Ⓑ $(2 \times 4) + (3 \times 4) + (3 \times 2)$
Ⓒ $2(2 + 4) \times 2(3 + 4) \times 2(3 + 2)$
Ⓓ $2(2 \times 4) + 2(3 \times 4) + 2(3 \times 2)$

7-5.2

2 The square root of 48 is between which two integers?

Ⓐ 4 and 5
Ⓑ 5 and 6
Ⓒ 6 and 7
Ⓓ 7 and 8

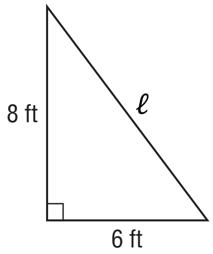
7-2.10

3 What is the surface area of a cylinder that has a radius of 2 meters and a height of 7 meters? Use 3.14 for π. Round your answer to the nearest tenth.

Ⓐ 29.3 m^2
Ⓑ 56.8 m^2
Ⓒ 72.1 m^2
Ⓓ 113.0 m^2

7-5.2

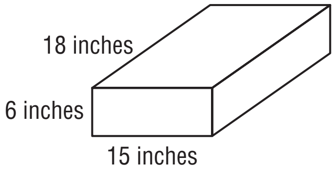
4 What is the length of the hypotenuse, ℓ, of right triangle shown below?



Ⓐ 2 feet
Ⓑ 6 feet
Ⓒ 10 feet
Ⓓ 14 feet

8-4.1

5 What is the surface area of the rectangular solid shown below?



Ⓐ 234 in^2
Ⓑ 468 in^2
Ⓒ 936 in^2
Ⓓ 1008 in^2

7-5.2

Name Date

Chapter 12 Test (continued)

Mastering the SC Standards

6 Listed in the table below are the lengths of the sides of four triangles. Which of the triangles is a right triangle?

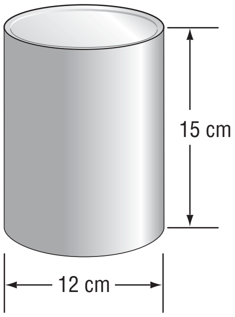
Triangle	Length of Sides in Inches
one	15, 20, 25
two	10, 23, 25
three	5, 6, $\sqrt{51}$
four	12, 14, 15

Ⓐ triangle one
Ⓑ triangle two
Ⓒ triangle three
Ⓓ triangle four

8-4.1

---

7 Thomas uses the empty can below to store his colored pencils. What is the volume of the can?



Ⓐ 113.04 cm^3
Ⓑ 706.50 cm^3
Ⓒ 1,413.00 cm^3
Ⓓ 1,695.60 cm^3

7-5.2

---

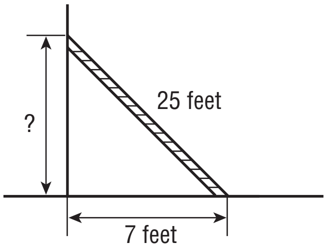
8 $\sqrt{234}$ lies between which two integers on a number line?

Ⓐ 14 and 15
Ⓑ 15 and 16
Ⓒ 16 and 17
Ⓓ 17 and 18

7-2.10

---

9 A 25-foot ladder is placed 7 feet from the base of a wall. How high up the wall does the ladder reach?



Ⓐ $\sqrt{24}$
Ⓑ 18 feet
Ⓒ 24 feet
Ⓓ $\sqrt{674}$

8-4.1

Name Date

Tips for Taking the PASS

In seventh 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.

Name Date

Tips for Taking the PASS (continued)

How do I answer multiple-choice questions?

Read the question and choose the best answer.

The square root of 126 is between which two integers?

Ⓐ 9 and 10

Ⓑ 10 and 11

Ⓒ 11 and 12

Ⓓ 12 and 13

- 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.

Name Date

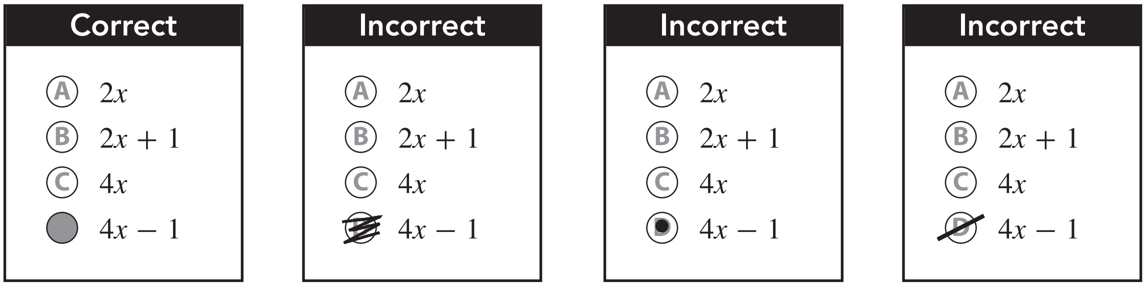
Tips for Taking the PASS (continued)

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
Ⓐ $2x$
Ⓑ $2x + 1$
Ⓒ $4x$
● $4x - 1$
Incorrect
Ⓐ $2x$
Ⓑ $2x + 1$
Ⓒ $4x$
$4x - 1$
Incorrect
Ⓐ $2x$
Ⓑ $2x + 1$
Ⓒ $4x$
$4x - 1$
Incorrect
Ⓐ $2x$
Ⓑ $2x + 1$
Ⓒ $4x$
$4x - 1$

- 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.

Name Date

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.

Name Date

Tips for Taking the PASS (continued)

Read each question and write in your answers completely on the lines provided.

1 Selma wants to solve the equation below for x.

$$8x + 7 = 63$$

What steps would Selma take to solve the equation?

____

2 Carlo can choose from 4 shirts, 3 ties, 3 pair of pants, and two pair of shoes for his job interview.

How many different combinations can he choose from?

____

Carlo notices that one pair of the pants he could wear is ripped which means he only has 2 pair of pants to choose from. How many different combinations can he now choose from?

____

Name Date

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.

Name Date

Tips for Taking the PASS (continued)

Practice Questions

**Read the question and choose the best answer.
Be sure to mark your answer.**

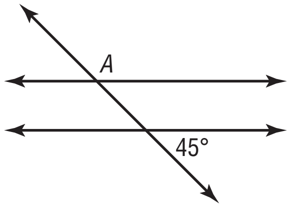
1 What is the measure of ∠*A*?

Ⓐ 45°

Ⓑ 60°

Ⓒ 135°

Ⓓ 145°



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2 Listed below are the ages of the students on a trip.

18, 15, 12, 16, 13, 11, 16, 14, 15, 17, 9, 10, 11

What is the median age of the students? _________

What is the Lower Quartile of the data? _________

What is the Upper Quartile of the data? _________

Turn the page to check your answers.

Name Date

Tips for Taking the PASS (continued)

Practice Questions

Read the question and choose the best answer.
Be sure to mark your answer.

Recall what you know about complementary and supplementary angles.

1 What is the measure of ∠A?

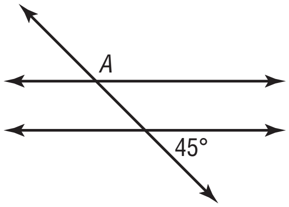
Ⓐ 45°

Ⓑ 60°

● 135°

Ⓓ 145°

The correct answer is C. You need to fill in bubble C in your test booklet.



---

2 Listed below are the ages of the students on a trip.

18, 15, 12, 16, 13, 11, 16, 14, 15, 17, 9, 10, 11

Reorder the data so that the numbers appear in ascending order. Make sure your list has all of the numbers.

What is the median age of the students? 14

What is the Lower Quartile of the data? 11

What is the Upper Quartile of the data? 16

Name Date

Diagnostic Test

1 $\triangle ABC$ is similar to $\triangle PQR$. The scale factor of $\triangle ABC$ to $\triangle PQR$ is 3:2. If $\overline{AB}$ is 18 centimeters, what is the length of $\overline{PQ}$?

Ⓐ 12 cm
Ⓑ 18 cm
Ⓒ 21 cm
Ⓓ 27 cm

7-4.7

2 Emily wants to find the value of x in the equation $2x + 4 = 16$. What would be the best first step to solve for x?

Ⓐ Add 4 to both sides of the equation.
Ⓑ Subtract 4 from both sides of the equation.
Ⓒ Multiply both sides of the equation by 2.
Ⓓ Divide both sides of the equation by 2.

7-3.4

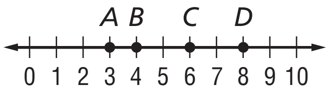
3 Which symbol correctly compares the numbers below?

$$7 \ \boxed{} \ \sqrt{36}$$

Ⓐ <
Ⓑ >
Ⓒ =
Ⓓ +

7-2.3

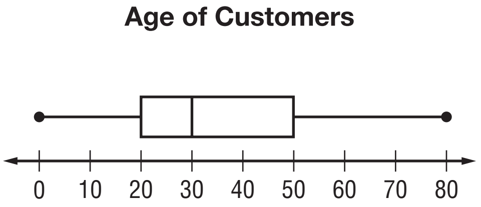
4 Which point is located at $\sqrt{16}$?



Ⓐ A
Ⓑ B
Ⓒ C
Ⓓ D

7-2.2

5 A surfboard shop in Myrtle Beach made the following box chart showing the ages of its customers:



What conclusion can be drawn from the data's interquartile range?

Ⓐ Half of the customers were between 20 and 50 years old.
Ⓑ Half of the customers were between 30 and 50 years old.
Ⓒ All of the customers were between 20 and 50 years old.
Ⓓ Half of the customers were between 20 and 30 years old.

7-6.4

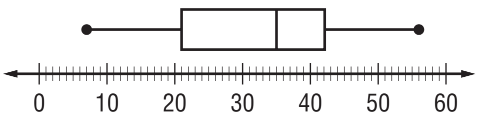
Go on

Name Date

Diagnostic Test (continued)

6 The box plot below shows the number of points scored by a football team.

Points Scored



What is the median number of points scored by the football team?

Ⓐ 7
Ⓑ 21
Ⓒ 35
Ⓓ 56

7-6.2

---

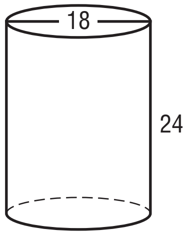
7 When a coin is flipped, the probability of the coin landing on heads is $\frac{1}{2}$. Nina wants to know the probability of the coin landing on heads twice in a row. Which equation shows this probability?

Ⓐ $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$
Ⓑ $\frac{1}{2} + \frac{1}{2} = 1$
Ⓒ $\frac{1}{2} \div \frac{1}{2} = 1$
Ⓓ $\frac{1}{2} - \frac{1}{2} = 0$

7-6.5

---

8 What is the volume of the cylinder? ($V = \pi r^2 h$)

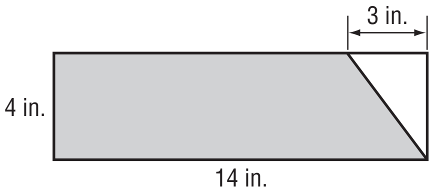


Ⓐ 1,356.48 cubic units
Ⓑ 2,712.96 cubic units
Ⓒ 6,104.16 cubic units
Ⓓ 24,416.64 cubic units

7-5.2

---

9 Megan cuts a triangle off one corner of a rectangle to make the trapezoid below.



What is the area of the shaded trapezoid?

Ⓐ 44 in^2
Ⓑ 50 in^2
Ⓒ 56 in^2
Ⓓ 70 in^2

7-5.3

Go on

Name Date

Diagnostic Test (continued)

10 Which measure is equivalent to 1 square yard?

- Ⓐ 3 square feet
- Ⓑ 6 square feet
- Ⓒ 9 square feet
- Ⓓ 12 square feet

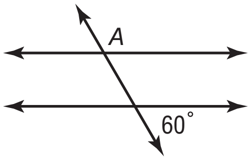
7-5.4

11 John has 3 red shirts, 5 blue shirts, and 2 orange shirts. If he randomly chooses a shirt, what is the probability of John choosing a red or a blue shirt?

- Ⓐ $\frac{3}{10}$
- Ⓑ $\frac{1}{2}$
- Ⓒ $\frac{3}{5}$
- Ⓓ $\frac{4}{5}$

7-6.6

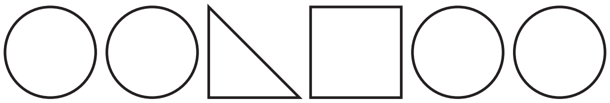
12 What is the measure of ∠*A* below?



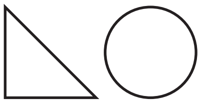
- Ⓐ 30°
- Ⓑ 60°
- Ⓒ 120°
- Ⓓ 150°

7-4.5

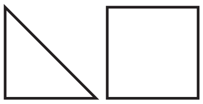
13 Which two shapes come next in the pattern?



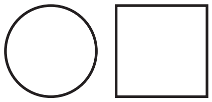
Ⓐ



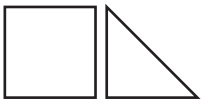
Ⓑ



Ⓒ

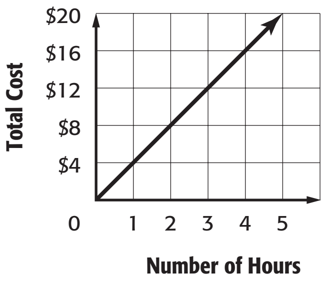


Ⓓ



7-3.1

14 The graph below shows the relationship between the total cost of renting a boat at Murray Lake and the number of hours the boat is used. How much does it cost per hour to rent the boat?



- Ⓐ $0.25
- Ⓑ $1.00
- Ⓒ $4.00
- Ⓓ $20.00

7-3.2

Go on

Diagnostic Test (continued)

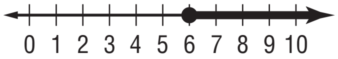
15 Which has the greatest value?

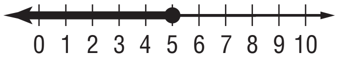
Ⓐ $|-7.5|$
Ⓑ $|-10|$
Ⓒ $|9.1|$
Ⓓ $|-8.9|$

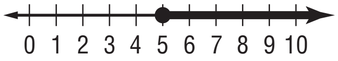
7-2.4

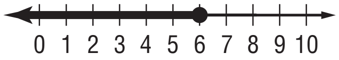
16 Which number line shows the value of b in the inequality below?

$$2b - 4 > 6$$

Ⓐ


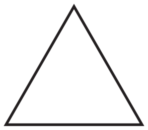
Ⓑ


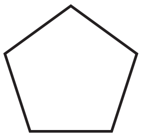
Ⓒ


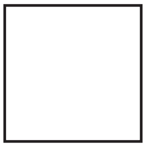
Ⓓ


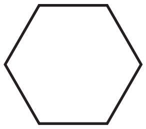
7-3.5

17 Which regular shape below cannot make a tessellation?

Ⓐ


Ⓒ


Ⓑ


Ⓓ


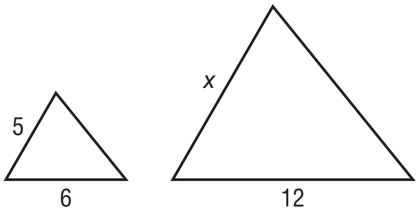
7-4.9

18 A map is drawn to a scale of 1:2,400. How long would the image be on the map of a soccer field that is 120 yards long?

Ⓐ 0.5 inch
Ⓑ 1.8 inches
Ⓒ 2.0 inches
Ⓓ 3.6 inches

7-5.1

19 The triangles below are similar.



What is the value of x?

Ⓐ 8
Ⓑ 9
Ⓒ 10
Ⓓ 11

7-4.8

20 There are about 1.09 yards in 1 meter. About how many yards are in 5 meters?

Ⓐ 4.59 yards
Ⓑ 4.91 yards
Ⓒ 5.09 yards
Ⓓ 5.45 yards

7-5.5

Go on

Name Date

Diagnostic Test (continued)

21 What is 120% of 50?

Ⓐ 40
Ⓑ 60
Ⓒ 80
Ⓓ 110

7-2.1

22 At Joe's Restaurant, customers choose 1 drink, 1 main course, and 1 vegetable from the menu below.

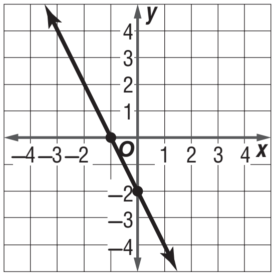
Drinks	Main Courses	Vegetables
Milk	Pasta	Carrots
Juice	Steak	Broccoli
	Chicken	

How many combinations can be made from the menu choices?

Ⓐ 7
Ⓑ 9
Ⓒ 12
Ⓓ 15

7-6.8

23 What is the slope of the line shown below?



Ⓐ 2
Ⓑ -2
Ⓒ $\frac{1}{2}$
Ⓓ $-\frac{1}{2}$

7-3.3

24 The square root of 72 is between which two integers?

Ⓐ 7 and 8
Ⓑ 8 and 9
Ⓒ 9 and 10
Ⓓ 10 and 11

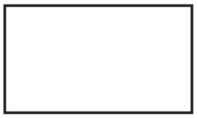
7-2.10

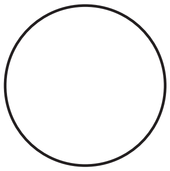
Go on

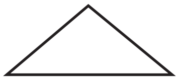
Name Date

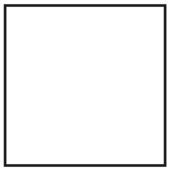
Diagnostic Test (continued)

25 Which shape below could be a cross section of a sphere?

Ⓐ


Ⓑ


Ⓒ


Ⓓ


7-4.3

26 Which symbol correctly compares the numbers below?

$$3^2 \ \boxed{} \ \sqrt{81}$$

Ⓐ $<$
Ⓑ $>$
Ⓒ $=$
Ⓓ $+$

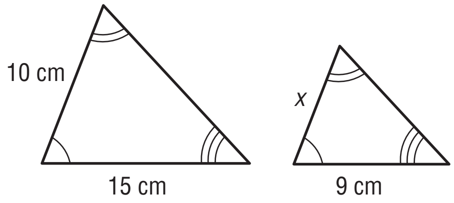
7-2.3

27 What is 7.85×10^5 in standard notation?

Ⓐ 7,850
Ⓑ 78,500
Ⓒ 785,000
Ⓓ 7,850,000

7-2.7

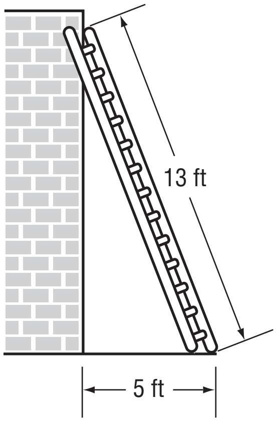
28 The two triangles are similar. What is the value of x?



Ⓐ 6 cm
Ⓑ 7 cm
Ⓒ 8 cm
Ⓓ 9 cm

7-4.8

29 A 13-foot ladder rests against the side of a building. The base of the ladder is 5 feet from the building. What is the distance between the base of the building and the height of the ladder?



Ⓐ 11.3 ft
Ⓑ 12.0 ft
Ⓒ 13.0 ft
Ⓓ 14.3 ft

7-4.1

Go on

Name Date

Diagnostic Test (continued)

30 Jerome bought 12 eggs for $2.40. What is the unit cost of the eggs that Jerome bought?

Ⓐ $0.15/egg
Ⓑ $0.20/egg
Ⓒ $0.25/egg
Ⓓ $0.40/egg

7-2.5

31 What value is equal to 6^3?

Ⓐ 18
Ⓑ 216
Ⓒ 729
Ⓓ 1,296

7-2.6

32 Which equation shows a directly proportional relationship?

Ⓐ $y = 2x - 1$
Ⓑ $y = 4x$
Ⓒ $y = x + 3$
Ⓓ $y = \frac{5}{x}$

7-3.6

33 Melissa rolled a number cube labeled 1–6. She rolled the cube 20 times and it landed on an even number 12 times. Which choice below has both the theoretical and experimental probability of Melissa rolling an even number?

Ⓐ theoretical: $\frac{1}{3}$
experimental: $\frac{3}{5}$
Ⓑ theoretical: $\frac{3}{5}$
experimental: $\frac{1}{2}$
Ⓒ theoretical: $\frac{1}{2}$
experimental: $\frac{3}{5}$
Ⓓ theoretical: $\frac{1}{2}$
experimental: $\frac{2}{5}$

7-6.7

34 Which expression shows another way of solving $\frac{5}{6} \div \frac{3}{4}$?

Ⓐ $\frac{6}{5} \times \frac{3}{4}$
Ⓑ $\frac{6}{5} \times \frac{4}{3}$
Ⓒ $\frac{5}{6} \times \frac{3}{4}$
Ⓓ $\frac{5}{6} \times \frac{4}{3}$

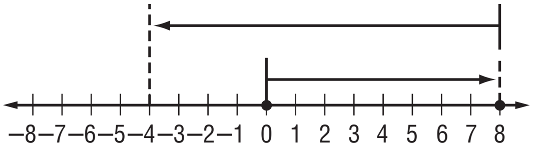
7-2.9

Go on

Name Date

Diagnostic Test (continued)

35 Carol modeled a subtraction problem on the number line below.



Which problem did she solve?

Ⓐ 8 − 12
Ⓑ 12 − 8
Ⓒ 4 − 12
Ⓓ −4 + 8

7-2.8

36 What is the interquartile range of the data below?

2, 3, 11, 12, 15, 19, 20, 21, 27, 29, 32

Ⓐ 16
Ⓑ 19
Ⓒ 25
Ⓓ 30

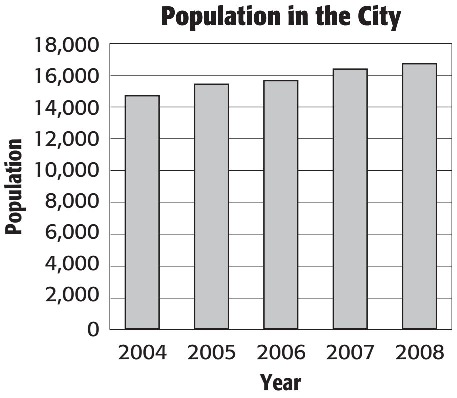
7-6.3

37 How many inches are in 1 yard?

Ⓐ 3 inches
Ⓑ 12 inches
Ⓒ 24 inches
Ⓓ 36 inches

7-5.5

38 The approximate population of a city from 2004 to 2008 is shown below.



Which of these statements is supported by the data?

Ⓐ The population of the city is likely to decrease over the next 5 years.
Ⓑ The population of the city is likely to increase over the next 5 years.
Ⓒ The population of the city is likely to stay the same over the next 5 years.
Ⓓ The population of the city is likely to decrease over the next 2 years and then increase after that.

7-6.1

Go on

Name Date

Diagnostic Test (continued)

39 Kevin wants to solve for a in the equation below.

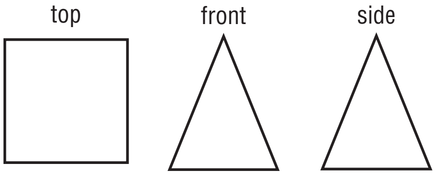
$$6a + 4 = 16$$

Which choice below shows the same equation after Kevin subtracts 4 from each side?

Ⓐ $2a + 4 = 12$
Ⓑ $6a = 12$
Ⓒ $2a = 12$
Ⓓ $6a = 20$

7-3.4

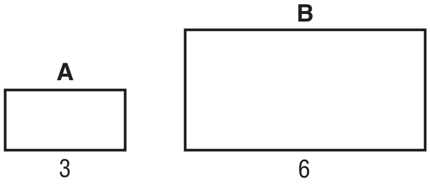
40 What three-dimensional figure has the top, side, and front views shown?



Ⓐ cone
Ⓑ cylinder
Ⓒ pyramid
Ⓓ triangular prism

7-4.4

41 The rectangles below are similar. The area of rectangle A is 3 square units.



What is the area of rectangle B?

Ⓐ 6 square units
Ⓑ 9 square units
Ⓒ 12 square units
Ⓓ 18 square units

7-4.6

42 Marcia flips two coins. What is the probability that both coins will land on tails?

Ⓐ $\frac{1}{4}$
Ⓑ $\frac{1}{2}$
Ⓒ $\frac{3}{4}$
Ⓓ 1

7-6.6

Go on

Name Date

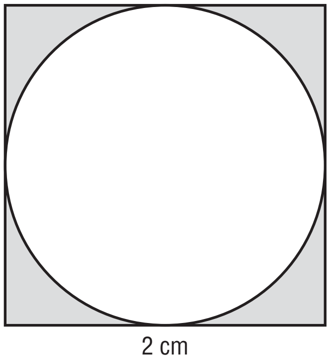
Diagnostic Test (continued)

43 Claire wrote the equation $y = \frac{1}{3}x$. Which choice below describes the relationship of x and y?

Ⓐ directly proportional
Ⓑ indirectly proportional
Ⓒ exponentially proportional
Ⓓ nonproportional

7-3.7

44 What is the area of the shaded part of the figure below? Use 3.14 for π.



7-4.2

45 In a regular tessellation, the interior angles of the regular polygon can add up to 360°.

Regular Polygon	Interior Angle	Sum of Interior Angles
Triangle	60°	180°
Square	90°	360°
Pentagon	108°	540°
Hexagon	120°	720°
Heptagon	$128\frac{4}{7}$°	900°
Octagon	135°	1,080°

Which shapes in the table above can be tessellated?

Why do the interior angles of these polygons have to be factors of 360°?

7-4.10

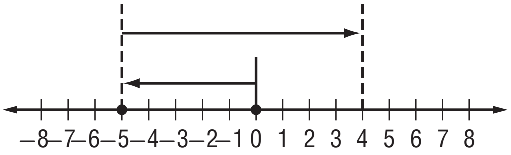
STOP

Name Date

Practice by Standard

Number and Operations

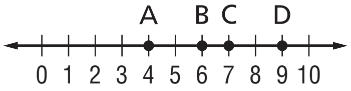
1 Which number sentence is modeled on the number line below?



Ⓐ $-5 + 9$
Ⓑ $9 - 5$
Ⓒ $4 + 9$
Ⓓ $-5 + 4$

7-2.8

2 What point is located at $\sqrt{49}$?



Ⓐ A
Ⓑ B
Ⓒ C
Ⓓ D

7-2.2

3 What is 140% of 50?

Ⓐ 60
Ⓑ 70
Ⓒ 90
Ⓓ 120

7-2.1

4 Which expression shows how to solve $\frac{1}{6} \times \frac{3}{4}$?

Ⓐ $\frac{1 + 3}{6 + 4} = \frac{4}{10}$
Ⓑ $\frac{1 \times 3}{6 + 4} = \frac{3}{10}$
Ⓒ $\frac{1 + 3}{6 \times 4} = \frac{4}{24}$
Ⓓ $\frac{1 \times 3}{6 \times 4} = \frac{3}{24}$

7-2.9

5 Boiled peanuts at Robert's produce stand cost $26.50 for a 5-pound bag.

$$\frac{\$26.50}{5 \text{ pound}}$$

What is the unit cost?

Ⓐ $4.75 per pound
Ⓑ $5.30 per pound
Ⓒ $6.50 per pound
Ⓓ $21.50 per pound

7-2.5

6 Which number sentence below is correct?

Ⓐ $3 < \sqrt{4}$
Ⓑ $0.5 > 60\%$
Ⓒ $45\% = 4.5$
Ⓓ $\sqrt{36} < 7$

7-2.3

Name Date

Practice by Standard

Number and Operations (continued)

7 The square root of 32 is between which two integers?

Ⓐ 2 and 3
Ⓑ 3 and 4
Ⓒ 4 and 5
Ⓓ 5 and 6

7-2.10

---

8 Which number below is equal to 6^3?

Ⓐ 18
Ⓑ 36
Ⓒ 216
Ⓓ 1,296

7-2.6

---

9 What is 7,850,000 in scientific notation?

Ⓐ 78.5×10^6
Ⓑ 7.85×10^7
Ⓒ 7.85×10^6
Ⓓ 78.5×10^5

7-2.7

---

10 What is 112% of 75?

Ⓐ 70
Ⓑ 84
Ⓒ 95
Ⓓ 112

7-2.1

11 Which number has the greatest absolute value?

Ⓐ -7
Ⓑ -5
Ⓒ 2
Ⓓ 6

7-2.4

---

12 Which number is equal to $\frac{1}{4}\%$?

Ⓐ 0.0025
Ⓑ 0.025
Ⓒ 0.25
Ⓓ 2.5

7-2.1

---

13 South Carolina is the second largest producer of peaches in the United States. Di bought 30 peaches from a local farm stand. She wants to split the peaches among 10 people. Which number sentence below shows how she can solve her problem?

Ⓐ $30 + 10 = 40$
Ⓑ $30 - 10 = 20$
Ⓒ $30 \times 10 = 300$
Ⓓ $30 \div 10 = 3$

7-2.8

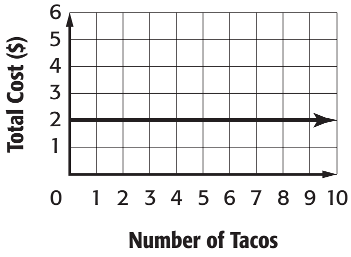
Name Date

Practice by Standard

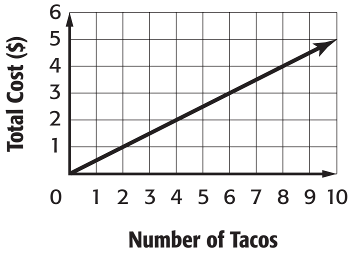
Algebra

1 Tacos are on sale, 2 for $1.00. Which of the following graphs shows the relationship between the number of tacos bought and the total cost?

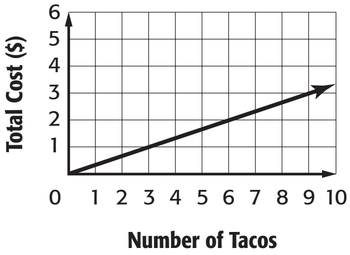
Ⓐ



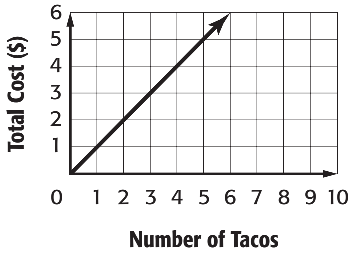
Ⓑ



Ⓒ



Ⓓ



7-3.2

2 The chart below shows the sum of the interior angles of different polygons.

Shape	Sides	Sum of Interior Angles
Triangle	3	180°
Quadrilateral	4	360°
Pentagon	5	540°
Hexagon	6	720°
Heptagon	7	900°

An octagon has 8 sides. Based on the pattern in the table, what is the sum of the interior angles of an octagon?

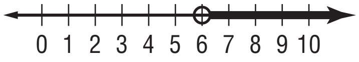
Ⓐ 1,000°
Ⓑ 1,080°
Ⓒ 1,140°
Ⓓ 1,200°

7-3.1

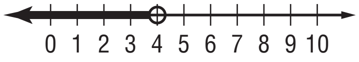
3 Which number line shows the value of x in the inequality below?

$$\frac{x}{3} + 5 < 7$$

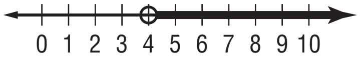
Ⓐ



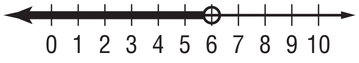
Ⓑ



Ⓒ



Ⓓ



7-3.5

Name Date

Practice by Standard

Algebra (continued)

4 Which choice below describes the relationship of x and y in the table below?

x	1	2	3	4
y	3	6	9	12

Ⓐ directly proportional

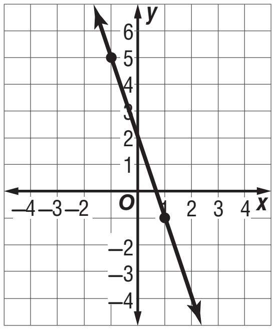
Ⓑ indirectly proportional

Ⓒ exponentially proportional

Ⓓ nonproportional

7-3.7

5 What is the slope of the line graphed below?



Ⓐ -3

Ⓑ $-\frac{1}{3}$

Ⓒ $\frac{1}{3}$

Ⓓ 3

7-3.3

6 Lamar wants to solve the equation below for x.

$$6x - 4 = 14$$

Which operation below describes how Lamar can solve the equation for x?

Ⓐ Add 4, then subtract 6.

Ⓑ Divide by 6, then add 4.

Ⓒ Subtract 4, then multiply by 6.

Ⓓ Add 4, then divide by 6.

7-3.4

7 Apples are sold at a price of $2 for 5 apples. Which table shows the relationship between the number of apples and the total cost?

Ⓐ

x	5	10	15
y	2	4	6

Ⓑ

x	5	10	15
y	2	3	4

Ⓒ

x	5	6	7
y	2	4	6

Ⓓ

x	5	10	15
y	1	2	3

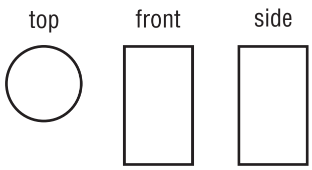
7-3.6

Name Date

Practice by Standard

Geometry

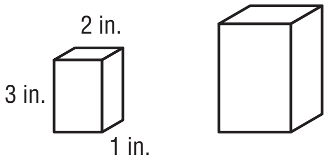
1 What three-dimensional figure has the top, side, and front views shown?



Ⓐ sphere
Ⓑ cone
Ⓒ pyramid
Ⓓ cylinder

7-4.4

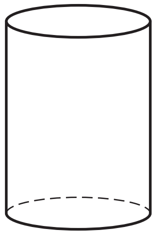
2 The surface area of a rectangular solid is 22 square inches. The lengths of the sides of a similar rectangular solid are 3 times the side lengths of the first rectangular solid. What is the surface area of the second rectangular solid?

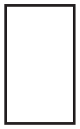


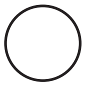
Ⓐ 25 in^2
Ⓑ 66 in^2
Ⓒ 198 in^2
Ⓓ 484 in^2

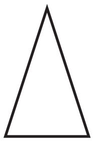
7-4.6

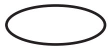
3 Which shape could be a vertical cross section of the cylinder below?



Ⓐ 

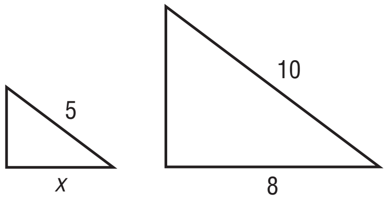
Ⓑ 

Ⓒ 

Ⓓ 

7-4.3

4 The two triangles are similar. What is the value of *x*?



Ⓐ 3 Ⓒ 6
Ⓑ 4 Ⓓ 8

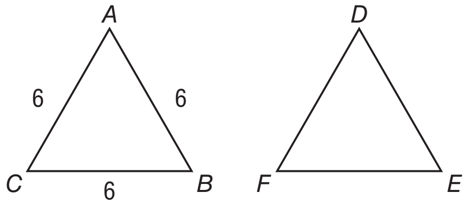
7-4.8

Name Date

Practice by Standard

Geometry (continued)

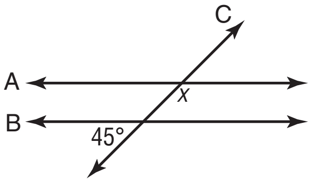
5 $\triangle ABC$ and $\triangle DEF$ are congruent triangles. What is the length of $\overline{DE}$?



Ⓐ 6 units
Ⓑ 12 units
Ⓒ 18 units
Ⓓ 36 units

7-4.1

6 Lines A and B are parallel. What is the measure of angle x?



Ⓐ 45º
Ⓑ 90º
Ⓒ 120º
Ⓓ 135º

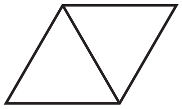
7-4.5

7 $\angle J$ and $\angle P$ are corresponding angles on similar triangles, $\triangle JKL$ and $\triangle PQR$. The scale factor of $\triangle JKL$ to $\triangle PQR$ is 3:5. If $\angle J$ measures 30°, what does $\angle P$ measure?

Ⓐ 18°
Ⓑ 30°
Ⓒ 50°
Ⓓ 60°

7-4.1

8 Jeremy starts drawing the tessellation below.

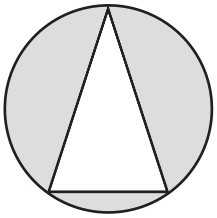


What type of transformation does he use to create the tessellation?

Ⓐ rotation
Ⓑ translation
Ⓒ reflection
Ⓓ dilation

7-4.9

9 The figure below shows a triangle inside a circle. Which procedure should be used to find the area of the shaded region?



Ⓐ Find the perimeter of the triangle, and then subtract the circumference of the circle.
Ⓑ Find the area of the triangle, and then subtract the area of the circle.
Ⓒ Find the circumference of the circle, and then subtract the perimeter of the triangle.
Ⓓ Find the area of the circle, and then subtract the area of the triangle.

7-4.2

Name Date

Practice by Standard

Measurement

1 About how many miles are in 1 kilometer?

Ⓐ 0.2 miles
Ⓑ 0.6 miles
Ⓒ 1.2 miles
Ⓓ 1.7 miles

7-5.4

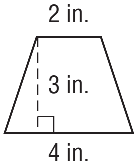
2 Alex earns \$56 for 4 hours of work. Using the proportion below, how long does he have to work to earn \$630?

$$\frac{\$56}{4 \text{ hours}} = \frac{\$630}{x \text{ hours}}$$

Ⓐ 11 hours
Ⓑ 45 hours
Ⓒ 90 hours
Ⓓ 158 hours

7-5.1

3 Jennifer draws the trapezoid below.



What is the area of the trapezoid?

Ⓐ 6 in.^{2}
Ⓑ 9 in.^{2}
Ⓒ 16 in.^{2}
Ⓓ 18 in.^{2}

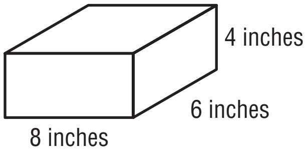
7-5.3

4 Hannah buys a South Carolina flag to hang on her bedroom wall. The flag is 5 feet long. If 1 foot is about 0.3 meters, what is the length of her flag in meters?

Ⓐ 0.3 meters
Ⓑ 0.8 meters
Ⓒ 1.5 meters
Ⓓ 5.3 meters

7-5.5

5 What is the volume of the rectangular solid shown below? $(V = l \times w \times h)$



Ⓐ 48 in.^{3}
Ⓑ 96 in.^{3}
Ⓒ 192 in.^{3}
Ⓓ 384 in.^{3}

7-5.2

6 Rich has a piece of rope that measures 200 millimeters. What is the length of the rope expressed in centimeters?

Ⓐ 0.02 centimeters
Ⓑ 0.2 centimeters
Ⓒ 2 centimeters
Ⓓ 20 centimeters

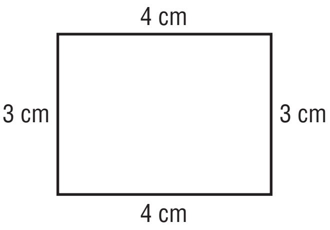
7-5.5

Name Date

Practice by Standard

Measurement (continued)

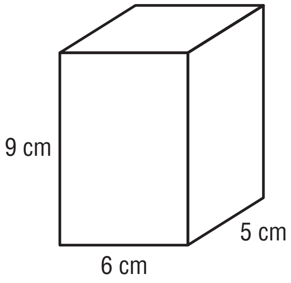
7 The figure below is a scale drawing of a plot of land. Each centimeter is equal to 1,000 meters. How many square meters is the plot of land?



Ⓐ 1,000,000
Ⓑ 7,000,000
Ⓒ 7,500,000
Ⓓ 12,000,000

7-5.1

8 What is the surface area of the rectangular solid shown below?



Ⓐ 258 cm^2
Ⓑ 360 cm^2
Ⓒ 540 cm^2
Ⓓ 648 cm^2

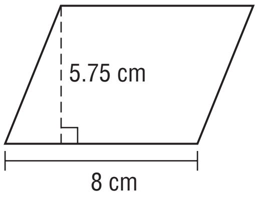
7-5.2

9 How many square centimeters are in 1 square meter?

Ⓐ 10 cm^2
Ⓑ 100 cm^2
Ⓒ 1,000 cm^2
Ⓓ 10,000 cm^2

7-5.4

10 During math class, Ms. Patrick drew the shape below on the chalkboard.



What is the area of the parallelogram that Ms. Patrick drew?

Ⓐ 12 cm^2
Ⓑ 24 cm^2
Ⓒ 36 cm^2
Ⓓ 46 cm^2

7-5.3

11 The scale on a map shows that 1 centimeter represents 5 kilometers. If two points on the map are 8.4 centimeters apart, how far apart are the points in real life?

Ⓐ 8.4 kilometers
Ⓑ 21 kilometers
Ⓒ 42 kilometers
Ⓓ 84 kilometers

7-5.1

Name Date

Practice by Standard

Data Analysis and Probability

1 Katie wants to find the probability of rolling two 3s in a row with a standard number cube. Which equation shows how she can find the answer?

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

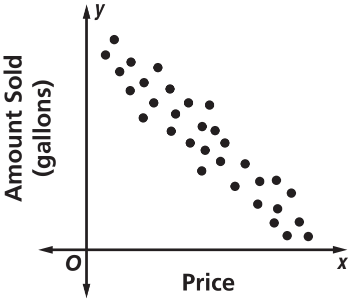
Ⓑ $\frac{1}{6} + \frac{1}{6} = \frac{2}{6}$

Ⓒ $\frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$

Ⓓ $\frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$

7-6.5

2 The following scatter plot shows the relationship between the price of gasoline and the number of gallons sold at a particular gas station.



Which statement best describes the relationship between the price of gasoline and the gallons sold?

Ⓐ As the price increases, the number of gallons sold increases.

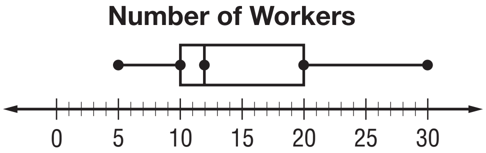
Ⓑ As the price increases, the number of gallons sold stays the same.

Ⓒ As the price increases, the number of gallons sold decreases at first and then increases.

Ⓓ As the price increases, the number of gallons sold decreases.

7-6.1

3 The box-and-whisker plot below shows the number of workers at given times throughout the day.



What is the interquartile range of this data?

Ⓐ 10

Ⓑ 12

Ⓒ 20

Ⓓ 25

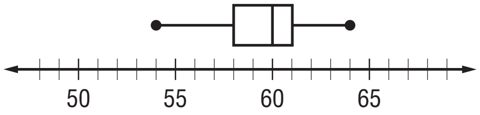
7-6.3

4 Angelina measures the heights in inches of her friends and records the data below:

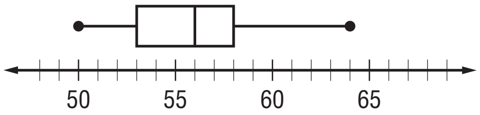
58, 50, 52, 55, 64, 55,
53, 58, 57, 57, 60, 53

Which of the following box-and-whisker plots represents Angelina's data?

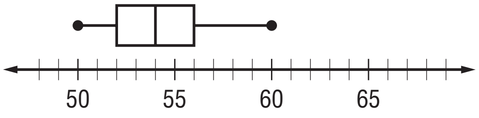
Ⓐ



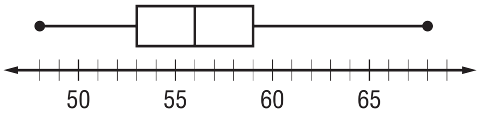
Ⓑ



Ⓒ



Ⓓ



7-6.2

Name Date

Practice by Standard

Data Analysis and Probability (continued)

5 Maurice makes a turkey sandwich for lunch. He can choose either a whole-wheat bun or a white bun. Then he can choose one of four extra toppings. How many different sandwiches can Maurice make?

Bun	Toppings
whole wheat	lettuce
white	tomato
	cucumbers
	sprouts

Ⓐ 4
Ⓑ 6
Ⓒ 8
Ⓓ 16

7-6.8

---

6 Katrina is one of the best free-throw shooters on her basketball team. She makes 4 out of every 5 free throws that she attempts. What is the probability that she will miss her next free throw?

Ⓐ 0.15
Ⓑ 0.20
Ⓒ 0.25
Ⓓ 0.30

7-6.6

---

7 What is the interquartile range of the data below?

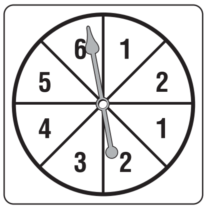
59, 64, 68, 72, 84, 90, 91

Ⓐ 16 Ⓒ 26
Ⓑ 19 Ⓓ 32

7-6.3

---

8 Evelyn spun the spinner below 20 times. It landed on 2 six times.



What is the experimental probability of spinning a 2?

Ⓐ 0.25 Ⓒ 0.4
Ⓑ 0.3 Ⓓ 0.6

7-6.7

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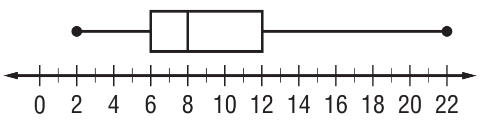
9 The president of a company made the box-and-whisker plot showing worker absences last year.

Worker Absences



Which conclusion can the president interpret from the plot?

Ⓐ Half of the workers were absent between 6 and 8 days last year.
Ⓑ Half of the workers missed 8 days last year.
Ⓒ Half of the workers were absent between 6 and 12 days last year.
Ⓓ No workers were absent more than 12 days last year.

7-6.4

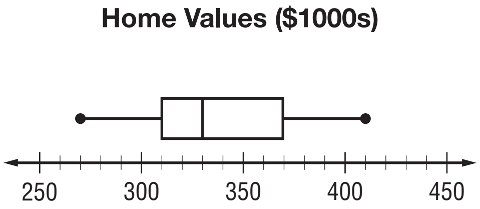
Name Date

Practice Test

1 The square root of 77 is between which two integers?

Ⓐ 5 and 6
Ⓑ 6 and 7
Ⓒ 7 and 8
Ⓓ 8 and 9

2 The box-and-whisker plot below represents the values of houses sold during the month of July.



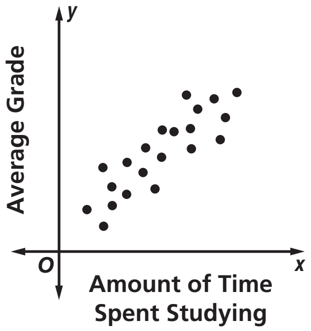
What is the interquartile range of this data?

Ⓐ $20,000
Ⓑ $30,000
Ⓒ $60,000
Ⓓ $140,000

3 Which expression has the greatest value?

Ⓐ $|-27|$
Ⓑ $|-39|$
Ⓒ $|44|$
Ⓓ $|12|$

4 The scatter plot shows the amount of time each student spends studying, as well as each student's average grade.



Which statement best describes the relationship shown on the scatter plot?

Ⓐ As a student's time spent studying increases, his or her average grade decreases.
Ⓑ As a student's time spent studying increases, his or her average grade increases.
Ⓒ As a student's time spent studying increases, his or her average grade increases at first and then decreases.
Ⓓ As a student's time spent studying increases, his or her average grade decreases at first, and then increases.

5 Which of the following shows 1,230,000 in scientific notation?

Ⓐ 1.23×10^4
Ⓑ 1.23×10^5
Ⓒ 1.23×10^6
Ⓓ 1.23×10^7

Go on

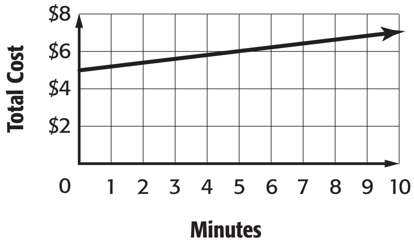
Name Date

Practice Test (continued)

6 Elena buys a box of computer components for $250. She assembles the computer, and then sells it for $550. How much did Elena mark the price up?

Ⓐ 100%
Ⓑ 120%
Ⓒ 150%
Ⓓ 175%

7 The following graph shows the monthly cost of a long-distance calling plan, based on how many minutes are used. What does the slope of the graph represent?

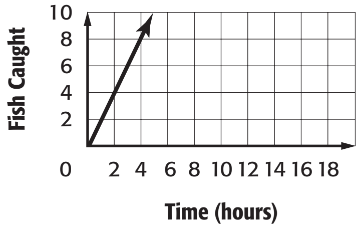


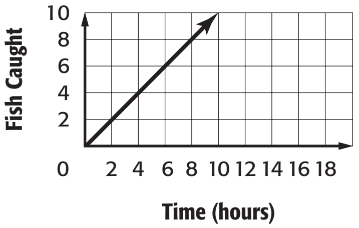
Ⓐ the cost of zero minutes of long-distance calls
Ⓑ the cost per additional minute of long-distance calls
Ⓒ the total cost of long-distance calls
Ⓓ the number of minutes $1 can buy

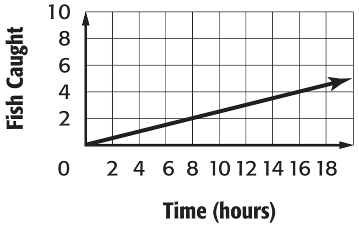
8 Jerome spent the weekend fishing at Lake Jocassee. The table below shows the number of hours he spent fishing and the number of fish that he caught.

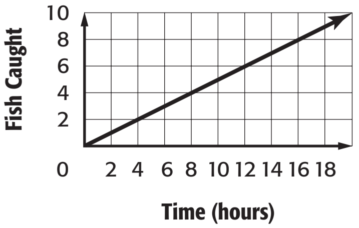
Time (hours)	0	2	6	10	18
Fish	0	1	3	5	9

Which of the following graphs best represents the data?

Ⓐ


Ⓑ


Ⓒ


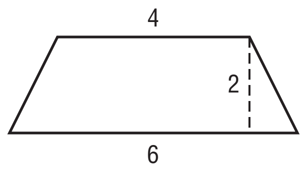
Ⓓ


Go on

Name Date

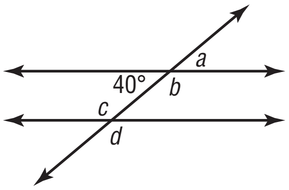
Practice Test (continued)

9 What is the area of the trapezoid?



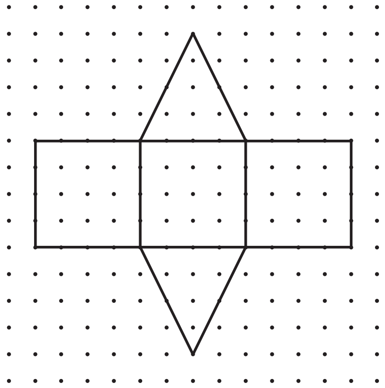
Ⓐ 8 square units
Ⓑ 10 square units
Ⓒ 12 square units
Ⓓ 20 square units

10 Which angle below is congruent to the 40º angle?



Ⓐ ∠*a*
Ⓑ ∠*b*
Ⓒ ∠*c*
Ⓓ ∠*d*

11 Which three-dimensional figure can be formed from the net below?



Ⓐ cube
Ⓑ triangular prism
Ⓒ rectangular prism
Ⓓ triangular pyramid

12 Which measure is equal to 1 inch?

Ⓐ 2.16 centimeters
Ⓑ 2.54 centimeters
Ⓒ 2.78 centimeters
Ⓓ 3.22 centimeters

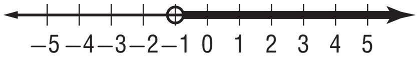
Go on

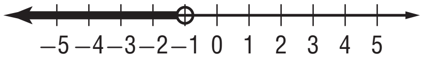
Name Date

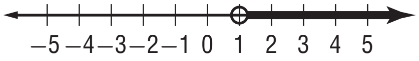
Practice Test (continued)

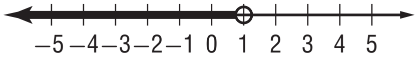
13 Which number line shows the value of x in the inequality below?

$$5 - 2x > 3$$

Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

14 Which expression shows how to solve $\frac{2}{5} \div \frac{3}{4}$?

Ⓐ $\frac{2 \times 4}{5 \times 3} = \frac{8}{15}$

Ⓑ $\frac{2 \times 3}{5 \times 4} = \frac{6}{20}$

Ⓒ $\frac{5 \times 3}{2 \times 4} = \frac{15}{8}$

Ⓓ $\frac{5 \times 4}{2 \times 3} = \frac{20}{6}$

15 What is the value of x below?

$$\frac{x}{2} + 5 = -3$$

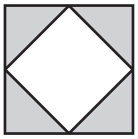
Ⓐ $x = -16$

Ⓑ $x = -4$

Ⓒ $x = 1$

Ⓓ $x = 4$

16 The length of a side of the larger square is 4 meters. What is the area of the shaded portion of the figure?



Ⓐ 5.66 m^2 Ⓒ 11.31 m^2

Ⓑ 8 m^2 Ⓓ 12 m^2

17 $\sqrt{374}$ lies between which two integers on a number line?

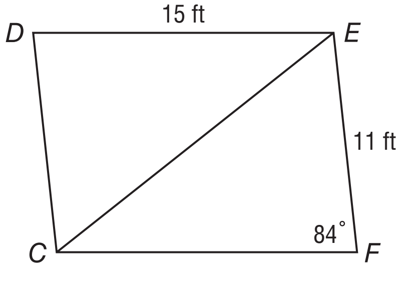
Ⓐ 17 and 18

Ⓑ 18 and 19

Ⓒ 19 and 20

Ⓓ 20 and 21

18 In the figure below, $\triangle CDE \cong \triangle EFC$. What is the length of $\overline{DC}$?



Ⓐ 4 feet Ⓒ 15 feet

Ⓑ 11 feet Ⓓ 26 feet

Go on

Practice Test (continued)

19 Which choice below describes the relationship of x and y in the table below?

x	1	2	3	4
y	4	7	10	13

Ⓐ directly proportional
Ⓑ indirectly proportional
Ⓒ exponentially proportional
Ⓓ nonproportional

---

20 Serena expected 25 people to come to her birthday party, but 30 people came. What percent of 25 is 30?

Ⓐ 105%
Ⓑ 120%
Ⓒ 130%
Ⓓ 150%

---

21 Which number below is equal to 4^4?

Ⓐ 16
Ⓑ 64
Ⓒ 256
Ⓓ 1,024

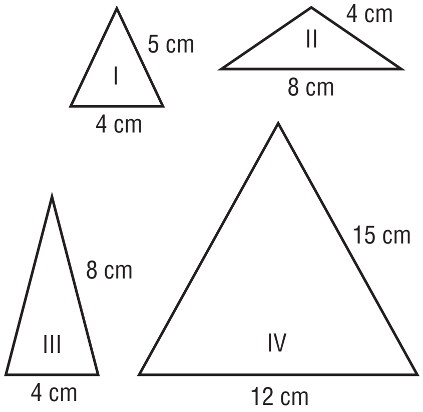
---

22 Which of the following is true of similar figures?

Ⓐ Similar figures always have the same size.
Ⓑ Similar figures always have the same shape.
Ⓒ Similar figures always have corresponding sides that are congruent.
Ⓓ Similar figures always have the same area.

---

23 Sadie draws the 4 figures below.



Which two figures are similar?

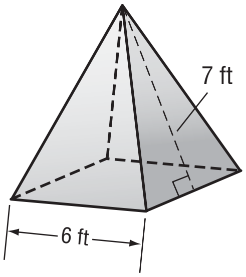
Ⓐ Figure I and Figure II
Ⓑ Figure I and Figure IV
Ⓒ Figure II and Figure III
Ⓓ Figure II and Figure IV

Go on

Name Date

Practice Test (continued)

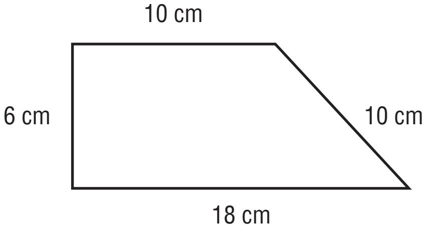
24 Jordan's architecture class builds a square pyramid out of plywood. They paint the outside of the pyramid, including the bottom. The pyramid has the dimensions shown.



What is the total surface area of the pyramid?

- Ⓐ 21 square feet
- Ⓑ 84 square feet
- Ⓒ 120 square feet
- Ⓓ 204 square feet

25 A landscape architect designs a park in the shape of the trapezoid below.



Which procedure can be used to find the area of the park?

- Ⓐ Add 10 and 18, and then multiply the result by 6.
- Ⓑ Add 10 and 18, multiply by 6, and then divide the result by 2.
- Ⓒ Add 6 and 10, and then multiply the result by 18.
- Ⓓ Add 6 and 10, multiply by 18, and then divide the result by 2.

---

26 Which number sentence is correct?

- Ⓐ $60\% > 0.6$
- Ⓑ $0.06 < 60\%$
- Ⓒ $6 = 60\%$
- Ⓓ $60\% = 1.6$

Go on

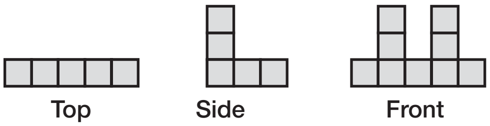
Name Date

Practice Test (continued)

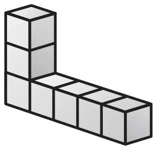
27 While fishing in Marion Lake, Jeff caught a catfish that weighed $2\frac{1}{2}$ pounds. How many ounces did the catfish weigh?

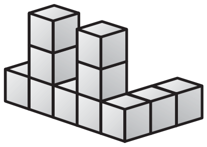
Ⓐ 5 ounces
Ⓑ 25 ounces
Ⓒ 30 ounces
Ⓓ 40 ounces

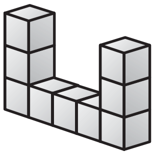
28 The top, side, and front views of a solid figure made of cubes are shown below.

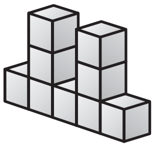


Which solid figure matches the views above?

Ⓐ


Ⓑ


Ⓒ


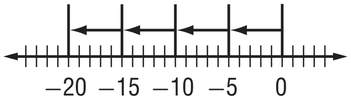
Ⓓ


29 What rule can be used to find the value of a term in the *n*th position in the sequence shown in the table below?

Position	Term
1	1
2	4
3	9
4	16
5	25

Ⓐ Multiply the position number by 2.
Ⓑ Find the square root of the position number.
Ⓒ Square the position number.
Ⓓ Cube the position number.

30 Which equation does the model below show?

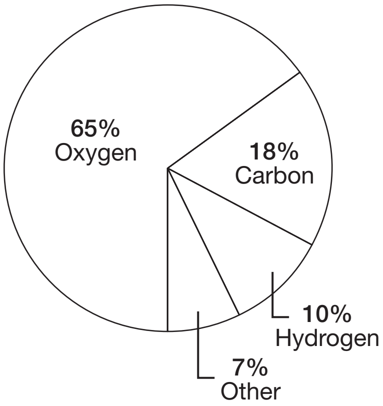


Ⓐ $-20 \div 5 = -4$
Ⓑ $-20 \div -5 = -4$
Ⓒ $20 \div 5 = -4$
Ⓓ $20 \div 5 = 4$

Go on

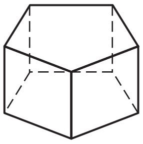
Practice Test (continued)

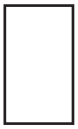
31 The circle graph below shows the three main elements in the human body. If Martin weighs 150 pounds, how many pounds of carbon are in his body?

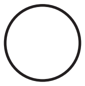


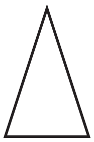
Ⓐ 15 lbs
Ⓑ 19 lbs
Ⓒ 27 lbs
Ⓓ 32 lbs

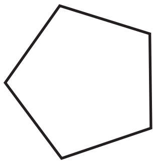
32 Which shape could NOT be a cross section of the prism below?



Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

Go on

Name Date

Practice Test (continued)

33 Casey solves the equation below for x.

$$3x - 6 = 12$$

What is the value of x in Casey's equation?

Ⓐ 2
Ⓑ 4
Ⓒ 6
Ⓓ 9

34 Diego buys palmetto trees to grow in his backyard. He buys 6 palmettos for $192.

$$\frac{\$192}{6 \text{ palmettos}}$$

What is the unit cost?

Ⓐ $24 per palmetto
Ⓑ $32 per palmetto
Ⓒ $36 per palmetto
Ⓓ $48 per palmetto

35 What is $|6 - 10| - |5 - 2|$?

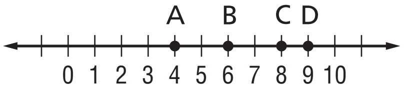
Ⓐ -7
Ⓑ -1
Ⓒ 1
Ⓓ 7

36 The amount of dough a bakery uses to make cookies is proportional to the number of cookies made. If 120 pounds of dough makes 2,880 cookies, how much dough is required to make 4,104 cookies?

$$\frac{2{,}880}{120} = \frac{4{,}104}{x}$$

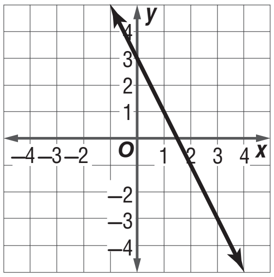
Ⓐ 24 pounds
Ⓑ 34.2 pounds
Ⓒ 171 pounds
Ⓓ 195 pounds

37 Which point is located at $\sqrt{64}$?



Ⓐ A
Ⓑ B
Ⓒ C
Ⓓ D

38 What is the slope of the line below?



Ⓐ -2
Ⓑ $-\frac{1}{2}$
Ⓒ $\frac{1}{2}$
Ⓓ 2

Go on

Name Date

Practice Test (continued)

39 The ages of volunteers at a local hospital are listed below:

19, 34, 19, 19, 20,
44, 21, 48, 55, 57,
59, 44, 74, 69, 72

What conclusion can be drawn from the interquartile range of this data?

Ⓐ Half of the volunteers are between the ages of 44 and 59.

Ⓑ Half of the volunteers are over the age of 59.

Ⓒ All of the volunteers are over the age of 20.

Ⓓ Half of the volunteers are between the ages of 20 and 59.

40 Ryan flips a coin 20 times. Out of those 20, the coin lands on heads 8 times. What is the theoretical probability of the coin landing on heads?

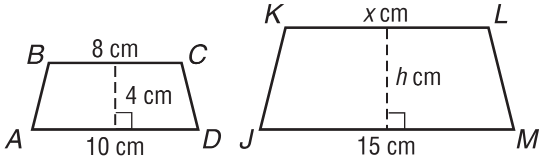
Ⓐ 0.2

Ⓑ 0.4

Ⓒ 0.5

Ⓓ 0.6

41 Quadrilateral *ABCD* is similar to quadrilateral *JKLM*.



Which choice shows how to find the area of quadrilateral *JKLM*?

Ⓐ First use $\frac{x}{8} = \frac{10}{15}$ and $\frac{4}{h} = \frac{10}{15}$. Then use the formula, $A = 15h$.

Ⓑ First use $\frac{8}{x} = \frac{10}{15}$ and $\frac{4}{h} = \frac{10}{15}$. Then use the formula, $A = \frac{1}{2}(15 + x)h$.

Ⓒ First use $\frac{8}{x} = \frac{10}{15}$ and $\frac{4}{h} = \frac{10}{15}$. Then use the formula, $A = \frac{1}{2}(15 + x)h$.

Ⓓ First use $\frac{8}{x} = \frac{10}{15}$ and $\frac{4}{h} = \frac{10}{15}$. Then use the formula, $A = 15h$.

42 Carlos can choose from 3 shirts, 4 ties, 2 pairs of pants, and 2 pairs of shoes for his job interview tomorrow. How many different combinations can he choose from?

Ⓐ 11

Ⓑ 24

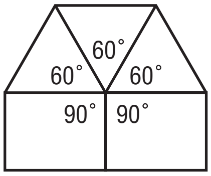
Ⓒ 36

Ⓓ 48

Go on

Practice Test (continued)

43 What is the sum of the angles at the point where the vertices meet in a tessellation?



Ⓐ 90°
Ⓑ 180°
Ⓒ 270°
Ⓓ 360°

---

44 What is 260,000 in scientific notation?

Ⓐ 2.6×10^5
Ⓑ 2.6×10^6
Ⓒ 26×10^5
Ⓓ 0.26×10^6

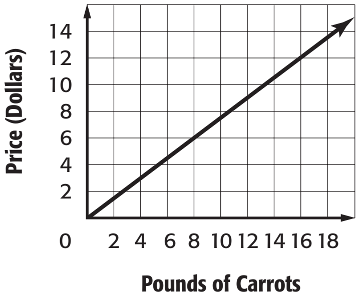
---

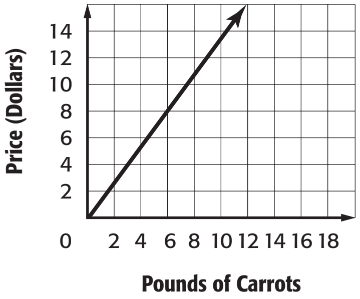
45 Melissa drove a total of 137.5 miles in 2.5 hours to go from Clemson to Columbia. Solve the proportion below to find her average rate of speed.

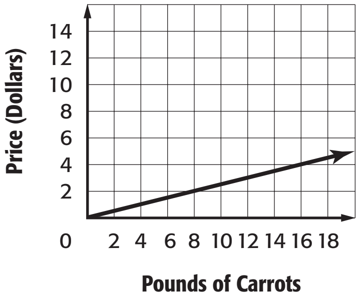
$$\frac{137.5 \text{ miles}}{2.5 \text{ hours}} = \frac{x \text{ miles}}{1 \text{ hour}}$$

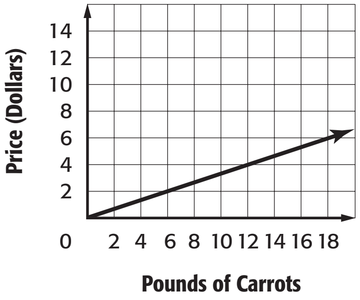
Ⓐ 50 miles per hour
Ⓑ 55 miles per hour
Ⓒ 60 miles per hour
Ⓓ 65 miles per hour

46 Lita pays $3 for 4 pounds of carrots. Which graph best displays this relationship?

Ⓐ


Ⓑ


Ⓒ


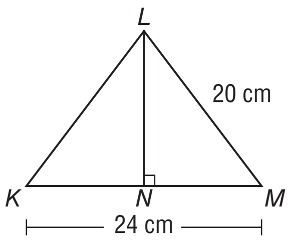
Ⓓ


Go on

Name Date

Practice Test (continued)

47 In the figure below, N is the midpoint of $\overline{KM}$.



What is the length of $\overline{LN}$?

Ⓐ 8 centimeters
Ⓑ 12 centimeters
Ⓒ 16 centimeters
Ⓓ 20 centimeters

---

48 The scale on a map states that 1 inch represents 5 miles. If two towns on the map are 8.5 inches apart, how far apart are the towns in real life?

$$\frac{1 \text{ inch}}{5 \text{ miles}} = \frac{8.5 \text{ inches}}{x \text{ miles}}$$

Ⓐ 13.5 miles
Ⓑ 42.5 miles
Ⓒ 135 miles
Ⓓ 425 miles

49 Di puts 2 blue chips, 5 green chips, and 3 red chips into a bag. If she draws one chip out, what is the probability that the chip she selects will be red?

Ⓐ 0.20
Ⓑ 0.30
Ⓒ 0.40
Ⓓ 0.50

---

50 What is $2.1 \times 4.5 =$ _____?

Ⓐ 6.6
Ⓑ 8.65
Ⓒ 9.45
Ⓓ 9.5

Go on

Name Date

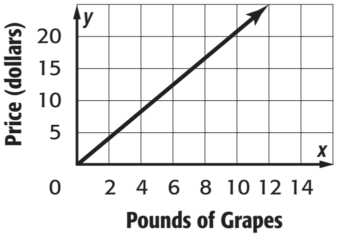
Practice Test (continued)

51 The table below shows prices for buying various amounts of grapes at a grocery store.

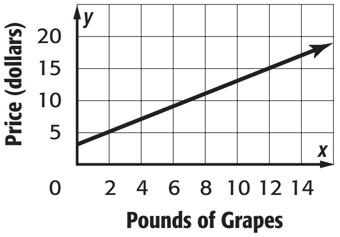
Pounds	1	5	12	14
Price (dollars)	1.50	7.50	18.00	21.00

Which of the following graphs best represents these prices?

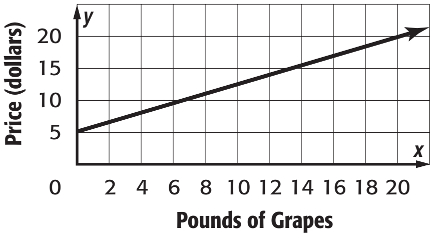
Ⓐ



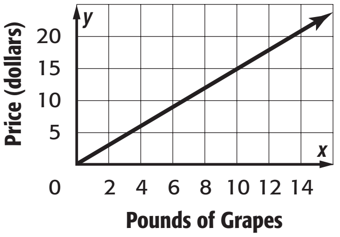
Ⓑ



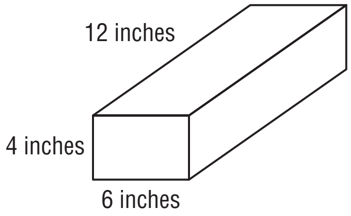
Ⓒ



Ⓓ



52 What is the surface area of the rectangular solid shown below?



Ⓐ 88 in^2
Ⓑ 144 in^2
Ⓒ 178 in^2
Ⓓ 288 in^2

53 Which measure is closest to 1 kilometer?

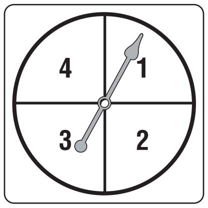
Ⓐ 0.62 mi
Ⓑ 1.09 mi
Ⓒ 3.28 mi
Ⓓ 3.93 mi

Go on

Name Date

Practice Test (continued)

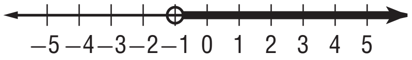
54 Which equation shows how to calculate the probability of spinning a 1 twice in a row on the spinner below?

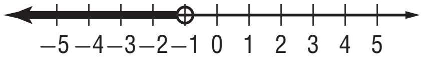


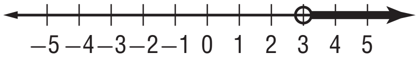
Ⓐ $0.25 \times 0.25 = 0.125$
Ⓑ $0.5 \times 0.5 = 0.25$
Ⓒ $0.25 + 0.25 = 0.5$
Ⓓ $0.5 + 0.5 = 1$

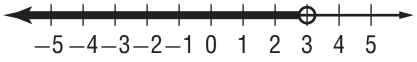
55 Which number line shows the value of x in the inequality below?

$$2x + 4 > 2$$

Ⓐ


Ⓑ


Ⓒ


Ⓓ


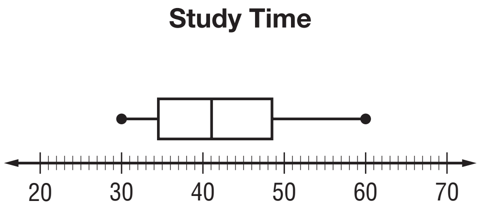
56 A garden measures 180 square feet. How many square inches is the garden?

Ⓐ 1.25
Ⓑ 15
Ⓒ 2,160
Ⓓ 25,920

57 A total of 830,000 people went to rock concerts last year. Which of the following shows this number in scientific notation?

Ⓐ 8.3×10^3
Ⓑ 8.3×10^4
Ⓒ 8.3×10^5
Ⓓ 8.3×10^6

58 The box-and-whisker plot below represents the amount of time a group of 7th graders spent studying.


Study Time

What is the interquartile range of the data?

Ⓐ 15
Ⓑ 20
Ⓒ 30
Ⓓ 34

Go on

Name Date

Practice Test (continued)

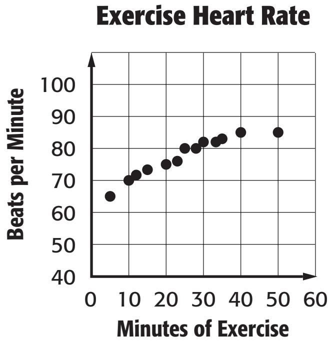
59 How many feet are in 3 miles?

Ⓐ 3,000
Ⓑ 9,000
Ⓒ 15,840
Ⓓ 21,120

60 $\triangle ABC$ and $\triangle DEF$ are congruent. If the area of $\triangle ABC$ is 80 square units, what is the area of $\triangle DEF$?

Ⓐ 40 square units
Ⓑ 80 square units
Ⓒ 120 square units
Ⓓ 160 square units

61 The scatter plot below shows heart rates recorded after exercising for different amounts of time.



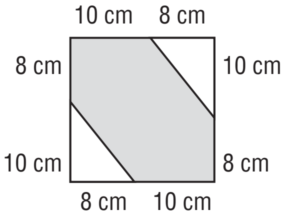
Which of the following statements best describes the relationship between minutes of exercise and heart rate as shown on the scatter plot?

Ⓐ As exercise time increases, the heart rate decreases.
Ⓑ As exercise time increases, the heart rate decreases at first, then increases.
Ⓒ As exercise time increases, the heart rate stays about the same.
Ⓓ As exercise time increases, the heart rate increases.

Go on

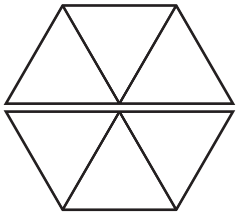
Practice Test (continued)

62 What is the area of the shaded area inside the square?



Ⓐ 12 cm^2
Ⓑ 80 cm^2
Ⓒ 244 cm^2
Ⓓ 324 cm^2

63 Each triangle in the tessellation below is congruent.



What type of transformation was used to create this tessellation?

____

64 Listed below are the ages of students being tutored.

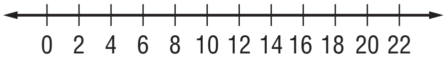
11, 13, 9, 18, 16, 16,
12, 14, 13, 12, 15

Find the quartiles and median for the data and use these values to display this data in a box plot on the number line below.

Median ________________

Lower Quartile ________________

Upper Quartile ________________



STOP