# Grade 5 Chapter 8

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Teacher’s Guide to Using the  
Chapter 8 Resource Masters

The Chapter 8 Resource Masters includes the core materials needed for Chapter 8. These materials include worksheets, extensions, and assessment options. The answers for these pages appear at the back of this booklet.

All of the materials found in this booklet are included for viewing and printing on the TeacherWorks Plus™ CD-ROM.

Chapter Resources

**Graphic Organizer** (page 1)  This master is a tool designed to assist students with comprehension of grade-level concepts. While the content and layout of these tools vary, their goal is to assist students by providing a visual representation from which they can learn new concepts.

**Student-Built Glossary** (page 2)  This master is a study tool that presents the key vocabulary terms from the chapter. You may suggest that students highlight or star the terms they do not understand. Give this list to students before beginning Lesson 8–1. Remind them to add these pages to their mathematics study notebooks.

**Anticipation Guide** (page 6)  This master is a survey designed for use before beginning the chapter. You can use this survey to highlight what students may or may not know about the concepts in the chapter. There is space for recording how well students answer the questions before they complete the chapter. You may find it helpful to interview students a second time, after completing the chapter, to determine their progress.

**Game** (page 7)  A game is provided to reinforce chapter concepts and may be used at appropriate times throughout the chapter.

Resources for Computational Lessons

**Reteach**  Each lesson has an associated Reteach worksheet. In general, the Reteach worksheet focuses on the same lesson content but uses a different approach, learning style, or modality than that used in the Student Edition. The Reteach worksheet closes with computational practice of the concept.

**Skills Practice**  The Skills Practice worksheet for each lesson focuses on the computational aspect of the lesson. The Skills Practice worksheet may be helpful in providing additional practice of the skill taught in the lesson.

**Homework Practice**  The Homework Practice worksheet provides an opportunity for additional computational practice. The Homework Practice worksheet includes word problems that address the skill taught in the lesson.

**Problem-Solving Practice**  The Problem-Solving Practice worksheet presents additional reinforcement in solving word problems that apply both the concepts of the lesson and some review concepts.

**Enrich**  The Enrich worksheet presents activities that extend the concepts of the lesson. Some Enrich materials are designed to widen students’ perspectives on the mathematics they are learning. These worksheets are written for use with all levels of students.

Resources for Problem-Solving Strategy and Problem-Solving Investigation Lessons  In recognition of the importance of problem-solving strategies, worksheets for problem-solving lessons follow a slightly different format. For problem-solving lessons, a two-page Reteach worksheet offers a complete model for choosing a problem-solving strategy. For each Problem-Solving Homework Strategy lesson, Reteach and Practice worksheets offer reinforcement of the strategy taught in the Student Edition lesson. In contrast, the Problem-Solving
Investigation worksheets include a model strategy on the Reteach worksheets and provide problems requiring several alternate strategies on the Homework Practice and Skills Practice worksheets.

**Assessment Options** The assessment masters in the Chapter 8 Resource Masters offer a wide variety of assessment tools for monitoring progress as well as final assessment.

**Individual Progress Checklist** This checklist explains the chapter's goals or objectives. Teachers can record whether a student's mastery of each objective is beginning (B), developing (D), or mastered (M). The checklist includes space to record notes to parents as well as other pertinent observations.

**Chapter Diagnostic Assessment** This one-page test assesses students' grasp of skills that are needed for success in the chapter.

**Chapter Pretest** This one-page quick check of the chapter's concepts is useful for determining pacing. Performance on the pretest can help you determine which concepts can be covered quickly and which specific concepts may need additional time.

**Quizzes** Three free-response quizzes offer quick assessment opportunities at appropriate intervals in the chapter.

**Mid-Chapter Review** This one-page chapter test provides an option to assess the first half of the chapter. It includes both multiple-choice and free-response questions.

**Vocabulary Test** This one-page test focuses on chapter vocabulary. It is suitable for all students. It includes a list of vocabulary words and questions to assess students' knowledge of the words.

**Oral Assessment** This two-page test consists of one page for teacher directions and questions and a second page for recording responses. Although this assessment is designed to be used with all students, the interview format focuses on assessing chapter content assimilated by ELL students.

**Chapter Project Rubric** This one-page rubric is designed for use in assessing the chapter project. You may want to distribute copies of the rubric when you assign the project and use the rubric to record each student's chapter project score.

**Foldables Rubric** This one-page rubric is designed to assess the Foldables graphic organizer. The rubric is written to the students, telling them what you will be looking for as you evaluate their completed Foldables graphic organizer.

**Leveled Chapter Tests**
- **Form 1** assesses basic chapter concepts through multiple-choice questions.
- **Form 2A** is primarily for those who may have missed the Form 1 test. It may be used as a retest for students who received additional instruction following the Form 1 test.
- **Form 2B** is designed for students with a below-level command of the English language.
- **Form 2C** is a free-response test.
- **Form 2D** is written for students with a below-level command of the English language.
- **Form 3** is a free-response test.
- **Extended-Response Test** is an extended response test.

**Student Recording Sheet** This one-page recording sheet is for the standardized test in the Student Edition.

**Cumulative Standardized Test Practice** This three-page test, aimed at on-level students, offers multiple-choice questions and free-response questions.

**Answers**
The answers for the Anticipation Guide and Lesson Resources are provided as reduced pages with answers appearing in black. Full size line-up answer keys are provided for the Assessment Masters.
Use this graphic organizer to take notes on **Chapter 8: Algebra: Ratios and Functions**.

**Fill in the missing information.**

<table>
<thead>
<tr>
<th>Vocabulary Word</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>ratio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>equivalent ratios</td>
<td></td>
<td></td>
</tr>
<tr>
<td>rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>simplest form</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This is an alphabetical list of new vocabulary terms you will learn in Chapter 8. As you study the chapter, complete each term’s definition or description. Remember to add the page number where you found the term. Add this page to your math study notebook to review vocabulary at the end of the chapter.

<table>
<thead>
<tr>
<th>Vocabulary Term</th>
<th>Found on Page</th>
<th>Definition/Description/Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>arithmetic sequence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>equivalent ratios</td>
<td></td>
<td></td>
</tr>
<tr>
<td>rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ratio</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Student-Built Glossary

(continued)

<table>
<thead>
<tr>
<th>Vocabulary Term</th>
<th>Found on Page</th>
<th>Definition/Description/Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>ratio table</td>
<td></td>
<td></td>
</tr>
<tr>
<td>scaling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sequence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>term</td>
<td></td>
<td></td>
</tr>
<tr>
<td>unit rate</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Dear Family,

Today my class started Chapter 8: Algebra: Ratios and Functions. I will be learning to solve problems involving linear relationships. I will also be learning to use letters to represent an unknown in an equation. Here are my vocabulary words and an activity that we can do together.

Sincerely, ______________________

Key Vocabulary

definition

caption

ratio A comparison of two quantities by division. Ratios also compare parts to the whole.

equivalent ratios Ratios that can be represented by equivalent fractions. 3:5 and 12:20.

rate A ratio of two measurements or amounts with different kinds of units.

unit rate The rate for one unit of a given quantity.

scaling Multiplying or dividing two related quantities by the same number.

sequence A list of numbers in a specific order.

Activity

Place 8 playing cards on a table. Make sure there are some face cards and some number cards. Compare the amount of face cards to the amount of number cards using the word more and then using the word times. Then, compare the amount of number cards to the number of face cards using the word less and a fraction.

Books to Read

100th Day Worries
by Margery Cuyler

Hannah’s Collections
by Marthe Jocelyn

Math Curse
by Scieszka & Smith
Estimada familia:

Hoy mi clase comenzó el Capítulo 8: Las razones, las proporciones álgebra y las funciones. Aprendré a resolver problemas con relaciones directamente proporcionales. También aprenderé a usar letras para representar una incógnita en una ecuación. A continuación, están mis palabras del vocabulario y una actividad que podemos realizar juntos.

Sinceramente, _____________________

Key Vocabulary

razón  Relación entre dos cantidades en que la primera mide cierto número de unidades y la segunda mide otro número de unidades

razones equivalentes  Razones que se pueden representar mediante fracciones equivalentes. 3:5 y 12:20

tasa  Razón de dos cantidades que se miden con distintas unidades en la que la segunda cantidad es 1. 50 millas por hora

tasa unitaria  La tasa de una unidad de una cantidad dada

escalamiento  Multiplicar por o dividir entre el mismo número dos cantidades relacionadas

sucesión  Lista de números en un orden específico

Actividad

Coloquen 8 tarjetas de juego sobre la mesa. Cerciórense de que haya algunas con figuras y otras con números. Usen la palabra más y luego la palabra veces, para comparar la cantidad de tarjetas de figuras con la cantidad de cartas de números. Luego, usen la palabra menos y una fracción, para comparar la cantidad de tarjetas de números con el número de tarjetas de figuras.

Libros recomendados

100th Day Worries  de Margery Cuyler

Hannah’s Collections  de Marthe Jocelyn

Math Curse  de Scieszka & Smith
**Anticipation Guide**

*Algebra: Ratios and Functions*

**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).

<table>
<thead>
<tr>
<th>STEP 1 A, D, or NS</th>
<th>Statement</th>
<th>STEP 2 A or D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. (\frac{7}{8}) and (\frac{28}{32}) are examples of equivalent ratios.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. A ratio is a comparison of two quantities by division. Ratios also compare parts to the whole.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Equivalent ratios are ratios that can be represented by equivalent fractions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Examples of two equivalent ratios are 3:5 and 1:2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. A rate is a ratio of two measurements or amounts with different kinds of units.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. An example of a rate is 50 miles per hour.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. A function is a relationship in which one quantity depends upon another quantity.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. (\frac{3}{5}) is in simplest form.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. (\frac{2}{4}) is in simplest form.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**STEP 2**

*After you complete Chapter 8*

- 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.
Better Buy

You will need:
- Deck of cards
- Paper and pencil

Set

Take the jokers out of the deck of cards. Shuffle the cards. Each card is worth its face value. Jacks are worth 11, queens are worth 12, kings are worth 13, and aces are worth 14.

GO!

1. Deal each player 2 cards face down. Do not show your opponent your cards.

2. Let one card equal a dollar amount and one card equal a number of items.

3. Find the unit price of your items. Remember to round to the nearest cent. The player who has created the better buy is the winner of the round.

4. Deal 2 new cards to each player and continue playing.

5. Play 10 rounds in all. The winner of the most rounds wins the game.
8-1

Reteach

Ratios and Rates

A ratio is used to compare two quantities by division. You can write different ratios to compare these circles and squares in different ways. You can also write each ratio in different ways.

A rate is a ratio comparing two quantities with different kinds of units.

<table>
<thead>
<tr>
<th></th>
<th>Part to Part</th>
<th>Part to Whole</th>
<th>Whole to Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>circles to squares</td>
<td>Using the word to: 4 to 3</td>
<td>Using a colon: 4:3</td>
<td>As a fraction: 4/3</td>
</tr>
<tr>
<td>circles to total shapes</td>
<td>4 to 7</td>
<td>4:7</td>
<td>4/7</td>
</tr>
<tr>
<td>total shapes to squares</td>
<td>7 to 3</td>
<td>7:3</td>
<td>7/3</td>
</tr>
</tbody>
</table>

Write each ratio as a fraction in simplest form.

1. circles : squares
   \[ \frac{5}{5} \]

2. circles to total shapes
   \[ \frac{4}{7} \]

Write each rate as a unit rate.

3. 240 miles in 4 hours
   \[ \frac{240 \text{ miles}}{4 \text{ hours}} = \frac{\_\_\_\_ \text{ miles}}{\_\_\_\_ \text{ hours}} = \_\_\_\_ \text{ mph} \]

4. 161 miles on 7 gallons
   \[ \frac{161 \text{ miles}}{7 \text{ gallons}} = \frac{\_\_\_\_ \text{ miles}}{\_\_\_\_ \text{ gallon}} = \_\_\_\_ \text{ mpg} \]
8-1

Skills Practice
Ratios and Rates

Write each ratio as a fraction in simplest form.

1. circles to rectangles
   
2. rectangles : circles
   
3. total : rectangles
   
4. circles to total
   
Write each rate as a unit rate.

5. 120 miles in 3 hours = ____________

6. 27 pages in 2 days = ____________

7. 10 oz for 2 people = ____________

8. 3 books in 2 weeks = ____________

9. 16 people in 4 vans = ____________

10. $15 for 2 tickets = ____________

11. 100 meters in 10 seconds ____________

12. $45 for 3 CDs = ____________

Solve.

13. There are 12 boys and 11 girls in a fifth-grade class. Write a ratio to describe the number of boys to the number of girls in the class.

14. Enough bread for 10 sandwiches costs $1.89. How much will enough bread for 80 sandwiches cost?
Write each ratio as a fraction in simplest form. Then explain its meaning.

1. A teacher has 15 minutes each day to teach handwriting and 40 minutes each day to teach spelling. What is the ratio of time spent teaching handwriting to time spent teaching spelling?

2. A theatre club has 5 boys and 10 girls. What is the ratio of boys to girls?

3. On Saturday, there are 10 trains leaving from a train station, and there are 25 planes leaving from an airport. What is the ratio of trains to planes?

Write each rate as a unit rate.

4. $12 for 4 lunch meals

5. 92 miles in 2 hours

Solve each equation. Check your solution. (Lesson 7–11)

6. \(2x = 24\) 

7. \(-4m = -24\)

8. \(81 = 9x\)

9. \(6t = 12\)

10. \(-5s = -60\)

11. \(56 = 7x\)
Problem-Solving Practice
Ratios and Rates

Solve.

1. The ratio of red marbles to green marbles is 2 to 3. Write this ratio two other ways.

2. Miriam can read 120 pages in 3 hours. How many pages can she read in 1 hour?

3. Darcy exchanged 10 U.S. dollars and received 15 New Zealand dollars. How many New Zealand dollars would she get for 1 U.S. dollar?

4. Alisha and Saundra are playing checkers. There are 7 red checkers and 10 black checkers left on the board. What is the ratio of black checkers to the total?

5. Russ gives Juliana a bag of marbles and tells her that the ratio of red marbles to the total number is 3 to 19. He also tells her there are 3 times as many yellow marbles as red, and that there are 2 more green than red. What is the ratio of yellow marbles to green?

6. When Robbie walks 15 feet, he takes 10 steps. How many feet does he walk if he takes 1 step?

7. Angie spends 10 minutes each day talking on her cell phone and Sandy spends 45 minutes talking on her cell phone. What is the ratio of the time Angie spends talking on her cell phone to the time Sandy spends talking on her cell phone? Write it in simplest form.

8. Joseph ran the marathon in 5 hours. If a marathon is about 25 miles and Joseph ran at a constant rate, how many miles per hour did Joseph run?
Ratios and Rectangles

1. Use a centimeter ruler to measure the width and the length of each rectangle. Then express the ratio of the width to the length as a fraction in simplest form.

2. Similar figures have the same shape, but not necessarily the same size. Two rectangles are similar if the ratio of the width to the length is the same for each. Which rectangles in Exercise 1 are similar?

3. For centuries artists and architects have used a shape called the golden rectangle because people seem to find it most pleasant to look at. In a golden rectangle, the ratio of the width to the length is a little less than \( \frac{5}{8} \). Which rectangle in Exercise 1 is most nearly a golden rectangle?
Reteach

Problem-Solving Strategy

Look for a Pattern

A high school student practices the high jump, starting the bar at 3 feet 4 inches and raising the bar 0.5 inch after each jump. How high will the bar be on the fifth jump?

**Step 1**
Understand

What facts do you know?
- The student starts the bar at ________________.
- The student raises the bar ________________ after each jump.

What do you need to find?
- You need to find how high ________________.

**Step 2**
Make a plan.

Using a pattern will help you solve the problem.
Organize the information in a chart.

**Step 3**
Solve

Carry out your plan.

Make a chart. Look for a pattern in the chart.

<table>
<thead>
<tr>
<th>Jump Number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bar Height</td>
<td>3 feet</td>
<td>3 feet</td>
<td>3 feet</td>
<td>3 feet</td>
<td>3 feet</td>
</tr>
<tr>
<td></td>
<td>4 inches</td>
<td>4.5 inches</td>
<td>5 inches</td>
<td>5.5 inches</td>
<td></td>
</tr>
</tbody>
</table>

Look at the chart to find the pattern.
What is the pattern?

__________________________

Continue the pattern to predict the height for the fifth jump.

Jump 5: 3 feet 5.5 inches + 0.5 inch = _______________________

Using the pattern, you can expect that the bar will be set at ______________________ for the fifth jump.
### Check

**Step 4**

**Is the solution reasonable?**

Look back at the problem.

Have you answered the question? _____

Does your answer make sense? _____

Did you find a pattern and continue it? _____

---

### Solve. Use the look for a pattern strategy.

1. On the first day of the crafts fair, 200 people show up. Each day thereafter, the number of people who attend the fair increases by 150. The crafts fair runs for five days. How many people attend the fair on the last day?

   ________________

   **3. ALGEBRA** Find the next three numbers in the pattern below. Then describe the pattern.

   $-5, 0, 5, 10, \ldots, \ldots, \ldots$

   ________________

2. A pole vaulter raises the bar 1 inch after each successful vault. To begin the bar is at 6 feet 3 inches. How high will the bar be after 4 successful vaults?

   ________________

   **4. ALGEBRA** Describe the pattern below. Then find the missing number.

   $10, 20, 30, \ldots, 50$

   ________________
Skills Practice

Problem-Solving Strategy

Solve. Use the look for a pattern strategy.

1. A student just learning the high jump starts with the bar at 3 feet. The pole is raised 0.25 inch after each successful jump. How high will the bar be after 12 successful jumps?

2. A beginning pole vaulter raises the bar 0.5 inch after each successful vault. On the first jump the bar is at 4 feet 5 inches. How high will the bar be after 3 successful vaults?

3. ART A designer is making a tile mosaic. The first row of the mosaic has 1 red tile in the center. If the designer increases the number of red tiles in the center of each row by 4, how many red tiles will be in the center of the fifth row?

4. HEALTH Brian has started an exercise program in which he walks daily. He plans to increase the distance that he walks by 0.25 mile each week. He walks 2.25 miles everyday the first week. How many miles will he be walking each day during the fifth week?

Mixed Strategy Review

Use any strategy to solve each problem.

5. NUMBER SENSE The sum of two whole numbers between 20 and 40 is 58. The difference of the two numbers is 12. What are the two numbers?

6. Ramon has $3.50. He buys two pens that cost $0.75 each and a pencil that costs $0.40. How much money does Ramon have left?
Solve. Use the look for a pattern strategy.

1. **ALGEBRA** Describe the pattern below. Then, find the missing number. 50, 500, _______ 50,000

2. Joe is stacking cans of fruit in a triangular form for a display. The top row has 2 cans, the second row has 4 cans, and the third row has 8 cans. How many cans will be on the fifth row? ________________

3. Write a problem that can be solved by looking for a pattern. Then solve the problem.

---

**Spiral Review**

Write each ratio as a fraction in simplest form. Then explain its meaning. (Lesson 8–1)

4. A dance class has 8 boys and 16 girls. What is the ratio of boys to girls?

5. On Saturday, there are 5 trains leaving from a station in Philadelphia and going to New York City, and there are 25 buses going from Philadelphia to New York City. What is the ratio of trains to buses leaving Philadelphia and going to New York City?

6. A bookstore has 48 graphic novels and 72 short story collections. What is the ratio of graphic novels and short story collections?
Solve.

1. Diane runs 5 miles in 45 minutes. Claire runs 7 miles in 56 minutes. Who runs at a faster rate? Explain.

2. Lance rides 84 miles in 6 hours. Nathan rides 104 miles in 8 hours. Who rides at a faster rate? Explain.

3. Annie hikes 51 miles in 3 days. Alex hikes 64 miles in 4 days. Who hikes at a faster pace? Explain.

4. Jake’s car uses 5 gallons of gas to drive 115 miles in the city. The car uses 6 gallons of gas to drive 174 miles on the highway. Does Jake’s car get better gas mileage in the city or on the highway? Explain.

5. Oscar’s car uses 8 gallons of gas to drive 256 miles. Randy’s car uses 7 gallons of gas to drive 252 miles. Whose car gets better gas mileage? Explain.

6. Last week Vicky swam 16 laps in 20 minutes. This week she swam 20 laps in 16 minutes. Which week did she swim faster? Explain.
To make one serving of a flavored milk drink, 2 ounces of flavoring is mixed with 1 cup of milk. How many ounces of flavoring and how many cups of milk do you need to mix enough for three servings?

**Step 1**
Understand the exercise and the amounts identified. It may help to draw a picture of the amounts.

1 serving =
2 ounces of flavoring
1 cup of milk

**Step 2**
Make a plan to find the information you need.

How much milk and flavoring is needed for 3 servings?
Create a ratio table and organize quantities within the columns. The columns of a ratio table are filled with pairs of numbers that have the same ratio.

<table>
<thead>
<tr>
<th>Cups of Milk</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ounces of Flavoring</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

\(\frac{1}{2}, \frac{2}{4}, \text{ and } \frac{3}{6}\) are equivalent since each simplifies to a ratio of \(\frac{1}{2}\).

**Step 3**
Solve. Find the ratio in simplest form.

One cup is one serving, so three cups are three servings.
\(\frac{3}{6}\) is the ratio that answers the question. You will need 3 cups of milk and 6 ounces of flavoring.
In simplest terms, the ratio is 1:2.

**Step 4**
Check. Is the solution reasonable? Reread the problem.

Have you answered the question?
Does your answer make sense?

**Use a ratio table to solve the problem.**

1. To make 1 cup of pink icing add 4 drops of red coloring to 1 cup of white icing. How much of each ingredient do you need to make 6 cups of icing that is the same shade of pink?
Use the ratio tables given to solve each problem.

1. To make applesauce, you need 2 cups of sugar for every 16 apples. Use the ratio table to find out how many cups of sugar you need if you have 4 apples.

   | Cups of Sugar | 2 |   |
   | Apples       | 16 |   |
   |              |   | 4 |

2. Monte receives an allowance of $20 each month. How much money will he receive by the end of the year?

   | Allowance | $20 |   |
   | Months    | 1   | 12|

3. When Russ rides his bike to school and back home every day for 5 days, he covers 20 miles. At this rate, how many miles will he cover if he rides his bike for 30 days?

   | Days   | 5   | 30 |
   | Miles  | 20  |    |

4. A certain 10-ounce soft drink contains 12 teaspoons of sugar. Use a ratio table to determine how many teaspoons of sugar you consume if you drink 15 ounces of this soft drink.

   | Ounces of Soft Drink | 10 | 15 |
   | Teaspoons of Sugar   | 12 |    |

5. Sonya purchased 650 beads for $52 to make necklaces. If she needs 50 more beads, how much will she pay if she is charged the same rate?

   | Beads | 650 | 50 |
   | Price | $52 |    |
Use the ratio tables given to solve each problem.

1. To make 2 glasses of orange juice, you need 20 oranges. How many oranges do you need to make 6 glasses of orange juice?

<table>
<thead>
<tr>
<th>Number of Oranges</th>
<th></th>
<th>Number of Glasses</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

2. The science museum requires that 3 adults accompany every 30 students. How many adults must accompany 150 students?

<table>
<thead>
<tr>
<th>Number of Students</th>
<th>30</th>
<th>150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Adults</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

3. Sonya bought 6 cases of bottled water for $24. How much will Sonya pay to buy 4 more cases of bottled water?

<table>
<thead>
<tr>
<th>Cost</th>
<th>$24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases of Bottled Water</td>
<td>6</td>
</tr>
</tbody>
</table>

4. Sherri purchased 500 beads for $25 to make bracelets. If she needs 100 more beads, how much will she pay if she is charged the same rate?

<table>
<thead>
<tr>
<th>Cost</th>
<th>$25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Beads</td>
<td>500</td>
</tr>
</tbody>
</table>

Solve. Use the look for a pattern strategy. (Lesson 8–2)

5. ALGEBRA Describe the pattern below. Then find the missing number.

   20, 60, _____, 540

6. Joe is stacking boxes of sneakers in stacks on shelves. The first shelf holds stacks of 8, and the second shelf holds stacks of 6. How many stacks of sneakers will be on the fourth shelf?

7. In 2000, Jack earned $1,200 for the year and Eddie earned $600 for the year. In 2001, Jack earned $1,800 and Eddie earned $1,400. If the amount of money that each earns increases by the same amount, what year will they be earning the same amount of money?
Problem-Solving Practice

Ratio Tables

Use ratio tables to solve each problem.

1. Before leaving for a school trip to Spain, Matt traded 500 American dollars and received 250 euros. When he returned from Spain, he had 50 euros left. How much will he receive when he exchanges these euros for dollars?

2. Apples are on sale at 10 for $2. Find the cost of 36 apples.

3. Before administering a medicine, a veterinarian needs to know an animal’s weight in kilograms. If 20 pounds is about 9 kilograms and a dog weighs 40 pounds, what is the dog’s weight in kilograms? Explain your reasoning.

4. If a hummingbird were to get all of its food from a feeder, then a 16-ounce nectar feeder could feed about 80 hummingbirds a day. How many hummingbirds would you expect to be able to feed with a 4-ounce feeder?

5. A patient receives 2 milliliters of antibiotic every 4 hours. At that rate, how many hours will it take to receive 20 milliliters of antibiotic?

6. Luis won a peanut-eating contest by eating 4,800 peanuts in 4 hours. If he ate at a constant rate, how many peanuts had he eaten after 3 hours?
The Brownie Business

Julie has decided that she wants to start a brownie business to make extra money over the summer. Before she can ask her parents for money to start her business, she needs to have some information about how many batches of brownies she can make in a day and for how much she must sell the brownies to make a profit.

1. Julie can bake 3 batches of brownies in 2 hours. Her goal is to bake 12 batches of brownies each day. Use the table to find how many hours Julie will need to bake to reach her goal.

<table>
<thead>
<tr>
<th>Batches of Brownies</th>
<th>3</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

2. Each batch of brownies will be sold for $2. How much money will Julie make if she sells 6 batches of brownies?

<table>
<thead>
<tr>
<th>Batches of Brownies</th>
<th>1</th>
<th></th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>$2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. If Julie works for 10 hours a day, how many batches of brownies can she bake?

<table>
<thead>
<tr>
<th>Batches of Brownies</th>
<th>3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td>2</td>
<td>10</td>
</tr>
</tbody>
</table>

4. If Julie hires a friend, they can bake 24 batches of brownies in 8 hours. If they both work 40 hours in one week, how many batches of brownies can they bake that week? If Julie still charges $2 a batch, how much money will they make that week?

<table>
<thead>
<tr>
<th>Hours</th>
<th>8</th>
<th></th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Batches of Brownies</td>
<td>24</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Batches of Brownies</th>
<th>1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>$2</td>
<td></td>
</tr>
</tbody>
</table>
Reteach

Equivalent Ratios

Determine if each pair of ratios or rates are equivalent. Explain your reasoning.

Two quantities are equivalent if they have a constant ratio or rate.

\[
\frac{10 \text{ sandwiches}}{\$6} = \frac{5 \text{ sandwiches}}{\$3} \quad \text{and} \quad \frac{20 \text{ sandwiches}}{\$12} = \frac{5 \text{ sandwiches}}{\$3}
\]

So, \( \frac{10 \text{ sandwiches}}{\$6} = \frac{20 \text{ sandwiches}}{\$12} \).

1. eating peanut butter and jelly sandwiches once every 5 days; eating 4 peanut butter and jelly sandwiches every 20 days

2. 2 white kittens per litter; 10 white kittens per 4 litters

3. 1 out of 3 cups of yogurt is strawberry; 4 out of 12 cups of yogurt is strawberry

4. 8 hours of work for $60 pay; 40 hours of work for $300

5. 166 miles driven on 4 gallons of gas; 322 miles driven on 11 gallons of gas

6. 15 prints for $3; 60 prints for $9
Skills Practice

Equivalent Ratios

Determine if each pair of ratios or rates are equivalent. Explain your reasoning.

1. 3 pairs of pants for $60; 4 pairs of pants for $80

2. 18 bagels for $6; 36 bagels for $15

3. You give 12 rings to 4 of your friends. Suzanne gives 24 rings to 8 of her friends.

4. Angelica reads 3 books per month. She reads 36 books in a year.

5. 75 words typed in 5 minutes; 96 words typed in 6 minutes
Determine if each pair of ratios or rates are equivalent. Explain your reasoning.

1. $15 for 5 books; $35 for 7 books

2. $20 for 10 sandwiches; $100 for 50 sandwiches

3. $12 for 4 roses; $30 for 6 roses

4. 950 miles driven on 50 gallons of fuel; 840 miles driven on 24 gallons of fuel

For Exercises 5–6, use the ratio tables given to solve each problem. (Lesson 8–3)

5. To make 6 servings of baked potato skins, you need 18 potatoes. How many potatoes do you need to make 15 servings of baked potato skins?

<table>
<thead>
<tr>
<th>Baked Potato Skins</th>
<th>6</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Potatoes</td>
<td>18</td>
<td></td>
</tr>
</tbody>
</table>

6. The aquarium requires that 5 adults accompany every 50 students. How many adults must accompany 200 students?

<table>
<thead>
<tr>
<th>Students</th>
<th>50</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>
Determine if each pair of ratios or rates are equivalent. Explain your reasoning.

1. Mai spent $2.50 to make 5 prints from her digital camera. Later, she went back to the same store and spent $5 to make 10 more prints.

2. The Drama Club raised $52 by selling 26 fresh muffins. The Chess Club raised $36 by selling 18 fresh muffins.

3. The Exercise Club raised $100 by selling 20 exercise CDs. The Hiking Club raised $200 by selling 20 nature walk CDs.

4. Soto can do 100 push-ups in 5 minutes. Steven can do 120 push-ups in 6 minutes.

5. One school survey showed that 4 out of 5 students take the bus to school. Another survey showed that 6 out of 10 students take the bus to school.

6. Koko enlarged a photograph to 6 inches by 9 inches. Will it fit well in a frame that is 12 inches by 9 inches if she puts 3-inch matting around the photograph?
On July 4, 1889, in gratitude to the French for the gift of the Statue of Liberty, Americans from Paris gave to the French a miniature Statue of Liberty. The statue is made of bronze and is approximately one fourth the size and weight of the original. This smaller-scale copy is found near the Grenelle Bridge on the Île des Cygnes, an island in the Seine River about one mile south of the Eiffel Tower.

1. If the original Statue of Liberty is approximately 150 feet tall, about how tall is the replica?

2. Complete the table. The first one is done for you.

<table>
<thead>
<tr>
<th></th>
<th>Original Statue of Liberty</th>
<th>Replica</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of hand</td>
<td>16 ft</td>
<td>4 ft</td>
</tr>
<tr>
<td>Length of nose</td>
<td>4.5 ft</td>
<td></td>
</tr>
<tr>
<td>Length of right arm</td>
<td>42 ft</td>
<td></td>
</tr>
<tr>
<td>Head thickness from ear to ear</td>
<td>2.5 ft</td>
<td></td>
</tr>
<tr>
<td>Width of mouth</td>
<td></td>
<td>9 in.</td>
</tr>
<tr>
<td>Thickness of waist</td>
<td>35 ft</td>
<td></td>
</tr>
<tr>
<td>Distance from heel to the top of her head</td>
<td>111 ft</td>
<td></td>
</tr>
<tr>
<td>Length of index finger</td>
<td>8 ft</td>
<td></td>
</tr>
<tr>
<td>Circumference of the second joint</td>
<td>3.5 ft</td>
<td></td>
</tr>
</tbody>
</table>

3. The fingernail on the index finger of the original weighs 1.5 kilograms. How much does the fingernail on the replica in France weigh?

4. The dimensions of the tablet that Lady Liberty is holding are 23.6 feet by 13.6 feet by 2 feet. What are the dimensions of the smaller-scale tablet in France?

5. **Challenge** The fingernail on the index finger is 13 inches long and 10 inches wide. What will be the area of the fingernail on the replica in France?
Choose the Best Strategy

There are 4 players and 1 coach on a tennis team. How many coaches are needed for 36 tennis players?

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Make sure you understand the problem.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand</td>
<td>What do you know?</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>What do you need to find out?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 2</th>
<th>Make a plan.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan</td>
<td>You can use the make a table strategy to find the number of coaches.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 3</th>
<th>Solve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Coaches</td>
<td>Number of Players</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>36</td>
</tr>
</tbody>
</table>

To complete the table, find a factor to multiply by 1.

Since \(4 \times 9 = 36\), multiply \(1 \times 9\).

So, 9 coaches are needed.

<table>
<thead>
<tr>
<th>Step 4</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check</td>
<td>Since (\frac{9}{36} = \frac{1}{4}), the answer is correct.</td>
</tr>
</tbody>
</table>
Reteach

Problem-Solving Investigation  (continued)

Use any strategy shown below to solve each problem.

1. Mayumi is driving home from college. She has 510 miles left to go. Her average speed is 52 miles per hour. How long will it take for her to get there?

2. Leo goes on a hot-air balloon ride. The ride covers 70 miles and takes 4 hours. What was the speed of the balloon?

3. The number of goals Dana scored in the first three years of playing hockey are shown. At this rate, how many goals should he expect to score at the end of the fourth year?

<table>
<thead>
<tr>
<th>Year</th>
<th>Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

4. For a class project, Javier has to create a flag to represent his class. The flag must have 2 solid horizontal stripes (one white and one blue) with a silver diamond in the center of one of the stripes. There are several possibilities for the flag that Javier can create. Find how many different flags Javier can make with two stripes and one diamond.

5. Kim has to drive a total of 275 miles to visit her grandfather. If she drives 65 miles per hour for the first 160 miles and then 70 miles per hour for the rest of the trip, how long will it take her to make the trip?

6. To train for a race, you plan to run 1 mile the first week and double the number of miles each week for five weeks. How many miles will you run the 5th week?
Skills Practice

Problem-Solving Investigation

Use any strategy shown below to solve each problem.

- Act it out
- Look for a pattern
- Make a table

1. To train for the bicycle race, Dan plans to ride 10 miles per day the first week, adding 3 miles per week. How many miles will he ride per day the eighth week?

2. A rancher is building a square corral with sides that are 20 feet long. He plans to put a post every 5 feet around the edge of the corral. How many posts will he need?

3. At 5 P.M., the temperature was 3°C. By 8 P.M., the temperature had dropped 6°C. What was the temperature at 8 P.M.?

4. Which is greater for the following data: the mode or the median?
   8, 10, 4, 7, 36, 21, 8, 11, 19

5. Write a problem that you can solve using a problem-solving strategy. What strategy would you use to solve the problem? Explain why you chose that strategy.
Homework Practice

Problem-Solving Investigation

Use any strategy shown below to solve each problem.

- Act it out
- Look for a pattern
- Make a table

1. Frank completed 3 passes the first year that he played football, 5 the second year, and 7 the third year. At this rate, how many passes should he expect to complete during his sixth year playing football?

2. To train for the Math League competition, Janice spent $\frac{1}{2}$ hour each day of the first week reviewing lessons, adding an additional $\frac{1}{2}$ hour each week for 4 weeks. What were the total number of hours she spent reviewing during the fourth week?

3. The table below shows the amount of snow in Maine for 4 weeks during January. What is the mean amount of snow that fell during the month of January?

<table>
<thead>
<tr>
<th>Week</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snow (in.)</td>
<td>21</td>
<td>28</td>
<td>29</td>
<td>22</td>
</tr>
</tbody>
</table>

Spiral Review

Determine if each pair of ratios or rates are equivalent. Explain your reasoning. (Lesson 8–4)

4. $5 for 10 notebooks; $40 for 8 notebooks

5. $9 for 3 rolls of film; $30 for 15 rolls of film
Name ___________________________ Date __________________

8–5

Enrich

More Strategic Challenges

Choose the best strategy to solve the problem. Tell what strategy you used.

1. Helena was making a beaded necklace. She strung one blue bead, three red beads, and two green beads. Then she strung two blue beads, four red beads, and three green beads. What combination of beads will she string next?

2. The Hernandez family is posing for a picture. The family has a mother, father, two children, and a grandmother. They will sit on the sofa in their living room for the picture. How many different ways can the Hernandez family sit on the sofa for the shot?

3. James is studying for the spelling bee championship. The championship takes place in 15 days. The first day, he memorizes 5 words. Each day after that, he memorizes 5 more words. How many words in all will James know on the day before the championship?

4. Kelly swam 15 lengths of the swimming pool. It took her 7\(\frac{1}{2}\) minutes. If her pool is 36 feet long, how long would it take her to swim across a lake that is 48 yards wide?

5. An elevator can safely carry 500 pounds. On the first floor, two 125-pound women got on the elevator. On the second floor, one of the women got off, and a 215-pound man got on. On the third floor, a 140-pound woman got on with her 12-pound baby. On the fourth floor, the 125-pound woman got off, but another woman wanted to get on. What is the most the woman can weigh for her to safely board the elevator?
The animal shelter has 5 cats for every 2 dogs. The shelter has 6 dogs. How many cats are in the shelter?

**Step 1**
Write an equation using a variable.

<table>
<thead>
<tr>
<th>Cats</th>
<th>Dogs</th>
<th>Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>2</td>
<td>$\frac{5}{2} = \frac{c}{6}$</td>
</tr>
</tbody>
</table>

**Step 2**
Find a value for $c$ so the fractions are equivalent.

$\frac{5}{2} = \frac{c}{6}$

**Step 3**
Solve using equivalent fractions.

$\frac{5}{2} = \frac{15}{6}$

$c = 15$

**Solve.**

1. $\frac{3}{5} = \frac{12}{n}$

2. $\frac{n}{24} = \frac{5}{8}$

3. $\frac{3}{r} = \frac{18}{24}$

4. $\frac{2}{3} = \frac{14}{t}$

5. $\frac{2}{x} = \frac{6}{9}$

6. $\frac{5}{6} = \frac{15}{n}$

7. $\frac{x}{10} = \frac{9}{30}$

8. $\frac{16}{m} = \frac{24}{15}$

9. $\frac{28}{40} = \frac{35}{d}$

10. $\frac{15}{3} = \frac{x}{8}$

11. $\frac{x}{12} = \frac{60}{72}$

12. $\frac{4}{7} = \frac{12}{p}$

13. $\frac{4}{t} = \frac{8}{36}$

14. $\frac{2}{7} = \frac{s}{42}$

15. $\frac{3}{8} = \frac{x}{24}$

16. $\frac{4}{v} = \frac{36}{81}$
Skills Practice

Algebra: Ratios and Equations

Solve.

1. \( \frac{n}{6} = \frac{6}{9} \)

2. \( \frac{10}{n} = \frac{4}{8} \)

3. \( \frac{4}{8} = \frac{2}{n} \)

4. \( \frac{n}{3} = \frac{15}{45} \)

5. \( \frac{2}{10} = \frac{n}{35} \)

6. \( \frac{15}{7} = \frac{n}{105} \)

7. \( \frac{12}{13} = \frac{n}{130} \)

8. \( \frac{21}{6} = \frac{35}{n} \)

9. \( \frac{n}{8} = \frac{3}{4} \)

10. \( \frac{n}{10} = \frac{40}{25} \)

11. \( \frac{48}{n} = \frac{3}{4} \)

12. \( \frac{9}{100} = \frac{n}{50} \)

13. \( \frac{9}{n} = \frac{54}{12} \)

14. \( \frac{5}{34} = \frac{25}{n} \)

15. \( \frac{n}{4} = \frac{26}{52} \)

16. \( \frac{n}{8} = \frac{36}{6} \)

17. \( \frac{25}{5} = \frac{n}{10} \)

18. \( \frac{n}{2} = \frac{11}{6} \)

19. \( \frac{3}{n} = \frac{36}{48} \)

20. \( \frac{n}{4} = \frac{24}{32} \)

21. \( \frac{6}{100} = \frac{n}{50} \)

22. \( \frac{35}{42} = \frac{5}{n} \)

23. For every 7 girls on a swim team, there are 9 boys. If there are 18 boys on the swim team, how many girls are there?

24. In a box of marbles, there are 4 red marbles for every 9 blue marbles. If the box has 81 blue marbles, how many red marbles are in the box?
Solve.

1. \( \frac{2}{3} = \frac{x}{9} \)

2. \( \frac{1}{5} = \frac{x}{10} \)

3. \( \frac{y}{4} = \frac{1}{2} \)

4. \( \frac{6}{8} = \frac{x}{48} \)

5. \( \frac{5}{25} = \frac{x}{5} \)

6. \( \frac{15}{45} = \frac{1}{t} \)

7. \( \frac{20}{4} = \frac{5}{p} \)

8. \( \frac{1}{7} = \frac{x}{49} \)

Spiral Review

Use any strategy shown below to solve each problem.  (Lesson 8–5)

- Look for a pattern
- Act it out
- Make a table

9. Andrew is taking a picture of the group of 5 crossing guards. The group leader must be in the middle of the group with 2 crossing guards on either side of him. How many different ways can Andrew arrange the crossing guards for the picture?

10. Tonya took a survey of the amount of pencils students bring to school each week. Which is greater for this set of data, the mode or the median?

   **Amount of Pencils**
   
   6, 4, 2, 3, 1, 6, 0, 7, 5, 1, 1, 0, 7, 4, 4, 2, 1, 3, 7, 6

11. Trina and her mother drove 110 miles to visit her grandmother. They drove 30 miles an hour for the first 60 miles and then 50 miles an hour for the rest of the trip. How many hours did it take them to complete the trip?
Solve.

1. A florist is using carnations to make bouquets for each table in a restaurant. He has used 24 carnations for 3 bouquets. There are 27 tables in the restaurant. Write an equation to express the relationship between the 24 carnations for 3 bouquets and the number of carnations \(c\) needed for 27 tables. Then solve.

2. A recent survey reported that out of 200 middle school students, 120 said that they read at least one news story in the newspaper every day. At this rate, how many out of 600 middle school students would you expect to read at least one news story in the newspaper every day?

3. Jim spent $51 on 3 CDs. At this rate, how much would 8 CDs cost?

4. Suppose 5 out of every 30 students get on the honor roll. Predict how many students will get on the honor roll in a school system of 1,200 students.

5. This past Saturday, a free ticket to the circus was placed on the back of every fifth sales receipt. If there were 7,200 sales receipts given out, how many people got a free ticket to the circus?

6. After selling tickets for 2 hours, the circus company had already sold 450 tickets. If tickets continue to sell at this rate for the next 3 hours, how many more tickets will the circus company sell?
Enrich

All About Ada

Did you know that a woman wrote the first description of a computer programming language? She was the daughter of a famous English lord and was born in 1815. She had a deep understanding of mathematics and was fascinated by calculating machines. Her interests led her to create the first algorithm. In 1843, she translated a French version of a lecture by Charles Babbage. In her notes to the translation, she outlined the fundamental concepts of computer programming. She died in 1852. In 1979, the U.S. Department of Defense named the computer language *Ada* after her.

To find out this woman’s full name, solve the equation for each letter.

1. \( \frac{7}{A} = \frac{28}{40} \)

2. \( \frac{5}{4} = \frac{B}{36} \)

3. \( \frac{1}{3} = \frac{C}{15} \)

4. \( \frac{5}{D} = \frac{35}{63} \)

5. \( \frac{2}{5} = \frac{E}{20} \)

6. \( \frac{2}{18} = \frac{L}{27} \)

7. \( \frac{6}{N} = \frac{12}{14} \)

8. \( \frac{9}{11} = \frac{O}{44} \)

9. \( \frac{2}{8} = \frac{R}{4} \)

10. \( \frac{5}{V} = \frac{25}{30} \)

11. \( \frac{7}{4} = \frac{Y}{28} \)

Now look for each solution below. Write the corresponding letter on the line above the solution. If you have calculated correctly, the letters will spell her name.

10 9 10 45 49 1 36 7

3 36 6 8 3 10 5 8
A sequence is a list of numbers in a specific order. Sequences can be shown as lists or in a table.

List → 4, 8, 12, 16, . . .

<table>
<thead>
<tr>
<th>Position</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Term</td>
<td>4</td>
<td>8</td>
<td>12</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

You can write an algebraic expression to describe a sequence. The value of each term can be described as a function of its position in the sequence.

In the example above, notice that the value of each term is 4 times its position number. So, the value of the term in position \( n \) is \( 4n \).

<table>
<thead>
<tr>
<th>Position</th>
<th>Multiply by 4</th>
<th>Value of Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>( 1 \times 4 )</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>( 2 \times 4 )</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>( 3 \times 4 )</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>( 4 \times 4 )</td>
<td>16</td>
</tr>
<tr>
<td>( n )</td>
<td>( n \times 4 )</td>
<td>( 4n )</td>
</tr>
</tbody>
</table>

Use words and symbols to describe the value of each term as a function of its position. Then find the value of the tenth term in the sequence.

1. | Position | 2 | 3 | 5 | 6 | \( n \) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Term</td>
<td>4</td>
<td>5</td>
<td>7</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>
Skills Practice

Algebra: Sequences and Expressions

Use words and symbols to describe the value of each term as a function of its position. Then find the value of the twelfth term in the sequence.

1. Position & 1 & 2 & 3 & 4 & n \\
Value of Term & 7 & 8 & 9 & 10 & \\

2. Position & 3 & 4 & 5 & 6 & n \\
Value of Term & 15 & 20 & 25 & 30 & \\

3. Position & 6 & 7 & 8 & 9 & n \\
Value of Term & 11 & 13 & 15 & 17 & \\

4. There are 12 inches in 1 foot. Make a table and write an algebraic expression relating the number of inches to the number of feet. Then find Reese’s height in inches if he is 4 feet tall.

| Feet | | | | |
|---|---|---|---|
| Inches | | | | |
Use words and symbols to describe the value of each term as a function of its position. Then find the value of the tenth term in the sequence.

1. 

<table>
<thead>
<tr>
<th>Position</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Term</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>

2. There are 60 minutes in 1 hour. Make a table and write an algebraic expression relating the number of hours to the number of minutes. Then find the number of minutes Lucas spent exercising if he exercised 6 hours.

<table>
<thead>
<tr>
<th>Hours</th>
<th>Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Solve. (Lesson 8–6)

3. \( \frac{6}{12} = \frac{x}{2} \)  
4. \( \frac{3}{24} = \frac{1}{y} \)  
5. \( \frac{y}{16} = \frac{2}{32} \)  
6. \( \frac{5}{8} = \frac{x}{40} \)  
7. \( \frac{5}{45} = \frac{x}{9} \)  
8. \( \frac{18}{72} = \frac{1}{t} \)  
9. \( \frac{30}{6} = \frac{5}{p} \)  
10. \( \frac{21}{7} = \frac{x}{1} \)
Write an algebraic expression to solve.

1. There are 3 feet in 1 yard. Write an algebraic expression relating the number of feet in a yard. Then find the length of a field in yards if it is 60 feet long.

2. There are 24 hours in 1 day. Write an algebraic expression relating the number of hours to the number of days. Then find the number of hours in 5 days.

3. It costs $12 an hour to rent a colonial costume. Write an expression to find the amount charged for renting a costume for \( n \) hours. Then use the expression to find out how much it would cost to rent a costume for 5 hours.

4. A student is charged $0.50 for every day a library book is overdue. Write an expression to find the amount charged for returning a book \( n \) days overdue. Then use the expression to find out how much it would cost to return a book 10 days overdue.

5. The label says there are 6 grams of protein in one cup of ice cream. Write an algebraic expression relating the grams of protein to the number of cups. Then find the amount of protein in 3 cups of ice cream.
A geometric sequence is one in which the ratio between the two terms is constant.

1. **SQUARE NUMBERS** A square number can be modeled by using an area model to create an actual square.
   
a. Draw the next two terms in the sequence.

   ![Diagram of square numbers]

   1 4 16

   b. The function that describes square numbers is \( n^2 \). Complete the table by finding the missing position and the missing value of the term for square numbers.

<table>
<thead>
<tr>
<th>Position</th>
<th>3</th>
<th>11</th>
<th>13</th>
<th>15</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Term</td>
<td>9</td>
<td>64</td>
<td>100</td>
<td></td>
<td>225</td>
</tr>
</tbody>
</table>

2. **TRIANGULAR NUMBERS** A triangular number can be modeled by using symbols to create triangles. The first three triangular numbers are 1, 3, and 6.

   ![Diagram of triangular numbers]

   1 3 6

   a. Draw the next two terms in the sequence.

   b. The function that describes the triangular number sequence is \( n \times \frac{(n + 1)}{2} \). Complete the table for triangular numbers.

<table>
<thead>
<tr>
<th>Position</th>
<th>3</th>
<th>8</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Term</td>
<td>6</td>
<td>10</td>
<td></td>
<td>120</td>
<td>210</td>
<td></td>
</tr>
</tbody>
</table>
A function is a relationship in which one quantity depends on another quantity. You can use an equation to represent a function. An equation is a mathematical statement that contains an equal sign.

A poster of Lake Tahoe comes in several sizes. However, for every poster, the length is 3 times its width.

You can make a table to show the function.

<table>
<thead>
<tr>
<th>Width (in inches), ( w )</th>
<th>6</th>
<th>12</th>
<th>18</th>
<th>24</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (in inches), ( \ell )</td>
<td>18</td>
<td>36</td>
<td>54</td>
<td>72</td>
<td>90</td>
</tr>
</tbody>
</table>

You can describe a function in words or you can write an equation.

Words: The length is 3 times the width.

Equation: Let \( \ell \) represent the length of the rectangle.
Let \( w \) represent the width.
Write \( \ell = 3w \).

Complete the table for the function.

1. The cost of shipping an item is $1.50 per pound.
Let \( w \) represent the weight in pounds.
Let \( c \) represent the shipping cost in dollars.
\[ c = 1.5w \]

<table>
<thead>
<tr>
<th>Weight in pounds, ( w )</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping cost in dollars, ( c )</td>
<td>$1.50</td>
<td>$3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Graph the results from Exercise 1 on a coordinate grid.
### Skills Practice

**Algebra: Equations and Graphs**

Complete the table. Write an equation to represent the function displayed in each table.

1. | Input, $x$ | 0 | 1 | 2 | 3 | 4 | 5 |
   | Output, $y$ | 1 | 3 | 5 | 7 |  |  |

2. | Input, $x$ | 0 | 1 | 2 | 3 | 4 | 5 |
   | Output, $y$ | 4 | 5 | 6 | 7 |  |  |

3. | Input, $x$ | 0 | 1 | 2 | 3 | 4 | 5 |
   | Output, $y$ | 5 | 7 | 9 | 11 |  |  |

4. The student admission to a local theatre is shown in the table. Write a sentence and an equation to describe the data. Then find the total cost of admission for 7 people, 8 people, and 9 people. Graph the results on a coordinate grid.

<table>
<thead>
<tr>
<th>Number of People, $n$</th>
<th>Total Admission ($), t</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
</tr>
</tbody>
</table>

---

**Graph of the results on a coordinate grid.**
Write an equation to represent the function displayed in the table.

1. 

<table>
<thead>
<tr>
<th>Input, x</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output, y</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
</tr>
</tbody>
</table>

Use the following information for Exercises 2–4.

In a video game, each player earns 10 points for every coin he or she collects.

2. Make a table to show the relationship between the number of coins collected, c and the total points, p. Graph the results on a coordinate grid.

<table>
<thead>
<tr>
<th>Number of coins, c</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total points, p</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Write an equation to find p.

4. How many points will a player earn if he or she collects 9 coins?

Solve. (Lesson 8–7)

5. There are 60 minutes in 1 hour. Write an algebraic equation relating the number of hours to the number of minutes. Then find the duration of the movies in hours if Liz and her friends watched two movies that together were 270 minutes long.
Write an equation to represent the function displayed in the table.

1. The table shows the amount of money Yvonne earns based on the number of hours she walks dogs. Write a sentence and an equation to describe the data. Then find the total earnings for 6 hours, 7 hours, and 8 hours. Graph the results on a coordinate grid.

<table>
<thead>
<tr>
<th>Hours Walking Dogs</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earnings ($)</td>
<td>$2</td>
<td>$4</td>
<td>$6</td>
<td>$8</td>
</tr>
</tbody>
</table>

2. The basketball team is holding a car wash to raise money. They are charging $8 for each car they wash. Make a table to show the relationship between the number of cars washed, \(c\) and the total amount earned, \(t\). Graph the results on a coordinate grid. Then, write an equation to find the total amount earned, \(t\) for washing cars, \(c\).

<table>
<thead>
<tr>
<th>Cars Washed, (c)</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount Earned, (t)</td>
<td>$8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. While in normal flight, a hawk flies at an average speed of 10 miles an hour. Make a table to show the relationship between the total distance, \(d\) that a hawk can travel in, \(h\) hours. Then, write an equation to find the total distance, \(d\) that a hawk can travel in, \(h\) hours while in normal flight. Graph the results on a coordinate grid.

<table>
<thead>
<tr>
<th>Hours, (h)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance, (d)</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Enchanted Rock is a pink granite dome located in Enchanted Rock State Natural Area in Central Texas. It is one of the largest batholiths in the United States. A batholith is made of igneous rock and is the result of volcanic activity. The Enchanted Rock dome rises 425 feet above the ground and is 1,825 feet above sea level.

The entrance fee to Enchanted Rock State Natural Area is $5 per person.

1. Complete the table to find the entrance cost for groups of different sizes.

<table>
<thead>
<tr>
<th>Input, x</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output, y</td>
<td>$5</td>
<td>$10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Write and graph an equation to represent the function displayed in the table. ____________

3. If the park has 290 visitors, how much money did they collect in entrance fees? ____________

4. A local environmental group is planning to hike up Enchanted Rock. The group will cover each member’s entrance fee and will provide lunch for its members. The group budgets $75 for lunch, regardless of the number of people on the hike. Complete the table to show the total expenses of the group based on the number of people on the hike.

<table>
<thead>
<tr>
<th>Input, x</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output, y</td>
<td>$100</td>
<td>$125</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Write and graph an equation to represent the function displayed in the table. ____________

6. The group will hike up the dome at a rate of 1,500 feet per hour. What is their hiking speed per minute? ____________
# Individual Progress Checklist

<table>
<thead>
<tr>
<th>B</th>
<th>D</th>
<th>M</th>
<th>Goal</th>
<th>Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Express ratios and rates in fraction form</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Use ratio tables to represent and solve problems involving equivalent ratios</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Solve equations using equivalent fractions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Extend and describe arithmetic sequences using algebraic expressions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Solve problems by looking for a pattern</td>
<td></td>
</tr>
</tbody>
</table>

## Notes

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Write each fraction in simplest form.

1. \( \frac{4}{16} \)  
2. \( \frac{12}{24} \)  
3. \( \frac{9}{27} \)  
4. \( \frac{10}{90} \)

5. Marilise has read 200 of 400 pages of her book. What fraction, in simplest form, of the book has she read?

Solve each equation.

6. \( 15x = 45 \)  
7. \( 16b = 96 \)  
8. \( 14y = 98 \)  
9. \( 11a = 88 \)  
10. \( 6y = 24 \)  
11. \( 8x = 64 \)  
12. \( 3n = 21 \)  
13. \( 4m = 48 \)

Find the next three values in each pattern.

14. 2, 4, 6, 
15. 5, 10, 15, 
16. 64, 68, 72, 
17. Cassie practiced her dance routine for 20 minutes on Tuesday, 35 minutes on Wednesday, and 50 minutes on Thursday. At this rate, how many minutes will she practice on Friday?
Chapter Pretest

Write each ratio as a fraction in simplest form.
1. 10 pennies out of 50 coins
2. 18 pink roses out of 27 roses
3. 100 ants out of 120 insects

Write each rate as a unit rate.
4. 15 inches of rain in 5 hours
5. 75 envelopes of instant oatmeal in 3 boxes
6. 201 tons of coal in 15 days

Solve.
7. \( \frac{5}{55} = \frac{a}{11} \)
8. \( \frac{h}{20} = \frac{5}{4} \)

Use symbols to describe the value of each term as a function of its position. Then find the value of the 14th term in the sequence.
9. | Rule: |
   | Position | 2 | 3 | 4 | 5 | n |
   | Value of Term | 26 | 39 | 52 | 65 | ? |
10. | Rule: |
    | Position | 7 | 8 | 9 | 10 | n |
    | Value of Term | 4 | 5 | 6 | 7 | ? |

Write an equation to represent the function displayed in the table.
11. | Rule: |
    | Input (x) | 1 | 2 | 3 | 4 | 5 |
    | Output (y) | 5 | 10 | 15 | 20 | 25 |
Write each ratio as a fraction in simplest form. Then explain its meaning.

1. A teacher has 45 minutes each day to teach math and 50 minutes each day to teach language arts. What is the ratio of time spent teaching math to time spent teaching language arts?

2. A math club has 8 fourth-graders and 10 fifth-graders. What is the ratio of fourth-graders to fifth-graders?

Solve. Use the look for a pattern strategy.

3. ALGEBRA Describe the pattern below. Then, find the missing number.

6.1, 14.64, _____ 84.3264

4. Joe is arranging books on four shelves. The top shelf has 20 books, the second shelf from the top has 40 books, and the bottom shelf has 80 books. How many books will be on the third shelf from the top?

Use the ratio tables given to solve each problem.

5. To make 2 gallons of lemonade, you need the juice of 15 lemons. How many lemons do you need to make 8 gallons of lemonade?

<table>
<thead>
<tr>
<th>Lemonade (gallons)</th>
<th>2</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lemons</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

6. Martin receives an allowance of $6 each week. How much money will he receive after 6 weeks?

<table>
<thead>
<tr>
<th>Allowance</th>
<th>$6</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Weeks</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>
Determine if each pair of ratios or rates are equivalent. Explain your reasoning.

1. $25 for 5 books; $75 for 15 books
2. $10 for 5 sandwiches; $15 for 3 sandwiches
3. $16 for 8 daisies; $60 for 12 daisies
4. $6 for 20 mini-muffins; $1.50 for 5 mini-muffins

Solve.

5. \( \frac{4}{5} = \frac{x}{15} \)
6. \( \frac{3}{5} = \frac{24}{n} \)
7. \( \frac{7}{9} = \frac{a}{18} \)
8. \( \frac{11}{20} = \frac{33}{y} \)

Use any strategy to solve.

9. To prepare for the band concert, Jenny plans to practice 1 hour each day for the first week, \(1 \frac{1}{2}\) hours each day for the second week, and 2 hours each day for the third week.

How many hours will she practice each day for the fourth week?
Use symbols to describe the value of each term as a function of its position. Then find the value of the tenth term in the sequence.

1. | Position | 3 | 4 | 5 | 6 | n |
   | Value of Term | 8 | 9 | 10 | 11 |

2. | Position | 3 | 4 | 5 | 6 | n |
   | Value of Term | 1 | 2 | 3 | 4 |

3. | Position | 1 | 2 | 3 | 4 | n |
   | Value of Term | 8 | 9 | 10 | 11 |

4. | Position | 2 | 3 | 4 | 5 | n |
   | Value of Term | 1 | 2 | 3 | 4 |

Use the following information for Exercises 5–7.

An online movie rental company charges $6 a month for movie rentals.

5. Make a table to show the relationship between the number of months \( m \) and the total cost \( t \).

<table>
<thead>
<tr>
<th>Number of months, ( m )</th>
<th>Total cost ($), ( t )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Graph the results from Exercise 5 on a coordinate grid.

7. Write an equation to describe the data. If Olivia is a member of the movie rental company for 7 months, how much will she pay?
Mid-Chapter Review (Lessons 8–1 through 8–4)

Read each question carefully. Write your answer on the line provided.

1. What is a ratio?
   A. a comparison of an even number and an odd number
   B. a comparison of two numbers by division
   C. a list of numbers in a sequence
   D. a list of numbers in groups of two

2. What makes two ratios equivalent?
   F. They have a constant rate or ratio.
   G. They have the same numbers.
   H. They add up to the same amount.
   J. They are not equal.

3. What is a fraction in simplest form for the ratio “10 goldfish out of 15 fish”?
   A. $\frac{2}{3}$  B. $\frac{10}{15}$  C. $\frac{6}{10}$  D. $\frac{15}{10}$

4. If Will spends $2 on 2 notebooks, how much will he spend on 5 notebooks?
   F. $10$  G. $2$  H. $5$  J. $3$

5. How do you determine if the quantities in a pair of ratios are equivalent?

6. Use words and symbols to describe the value of each term as a function of its position.

<table>
<thead>
<tr>
<th>Position</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>$n$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Term</td>
<td>4</td>
<td>8</td>
<td>12</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

7. What would be the value of the term in position 10?
## Vocabulary Test

Match each word to its definition. Write your answers on the line provided.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ratio</td>
<td>A. A ratio of two measurements or amounts made with different units in which the second amount is 1.</td>
</tr>
<tr>
<td>2. equivalent ratios</td>
<td>B. A relationship in which one quantity depends upon another quantity.</td>
</tr>
<tr>
<td>3. rate</td>
<td>C. A relationship between two quantities in which the first measures a certain number of units and the second measures another number of units.</td>
</tr>
<tr>
<td>4. function</td>
<td>D. Ratios that can be represented by equivalent fractions.</td>
</tr>
<tr>
<td>5. simplest form</td>
<td>E. A fraction in which the numerator and the denominator have no common factor greater than 1.</td>
</tr>
<tr>
<td>6. ratio table</td>
<td>F. A list of numbers in a specific order.</td>
</tr>
<tr>
<td>7. sequence</td>
<td>G. A table with columns filled with pairs of numbers that have the same ratio.</td>
</tr>
</tbody>
</table>
Oral Assessment

Place 8 playing cards face up on a table. Make sure there are some face cards and some number cards. Read each question aloud to the student. Then write the student’s answers on the lines below the question.

1. How many face cards are there compared to number cards?

2. Can you compare the number of face cards to the amount of number cards using the word *more* and then using the word *times*?

3. Can you compare the amount of number cards to the number of faces cards using the word *less* and then using a fraction?

4. Tell how you got your answer.

5. What is the ratio of face cards to number cards?

6. Tell how you got your answer.
7. Several students were surveyed to find out their favorite breakfast drink. What ratio compares the number of students who chose apple juice to the total number of students who responded?

<table>
<thead>
<tr>
<th>Beverage</th>
<th>Apple Juice</th>
<th>Orange Juice</th>
<th>Milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Responses</td>
<td>6</td>
<td>9</td>
<td>3</td>
</tr>
</tbody>
</table>

8. What ratio compares the number of students who chose milk to the total number of students who responded?

9. Tell how you got your answer.

10. What ratio compares the number of students who chose orange juice to the total number of students who responded?

11. What ratio compares the number of students who chose milk to the number of students who chose orange juice?

12. Tell how you got your answer.
# Chapter Project Rubric

<table>
<thead>
<tr>
<th>Score</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| **3** | Student successfully completed the chapter project.  
     Student demonstrated appropriate use of chapter information in completing the chapter project. |
| **2** | Student completed the chapter project with partial success.  
     Student partially demonstrated appropriate use of chapter information in completing the chapter project. |
| **1** | Student did not complete the chapter project or completed it with little success.  
     Student demonstrated very little appropriate use of chapter information in completing the chapter project. |
| **0** | Student did not complete the chapter project.  
     Student demonstrated inappropriate use of chapter information in completing the chapter project. |
## Algebra: Ratios and Functions

### Folded Table Foldable

<table>
<thead>
<tr>
<th>Score</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| **3** | Student properly assembled Foldables graphic organizer according to instructions.  
Student recorded information related to the chapter in the manner directed by the Foldables graphic organizer.  
Student used the Foldables graphic organizer as a study guide and organizational tool. |
| **2** | Student exhibited partial understanding of proper Foldables graphic organizer assembly.  
Student recorded most but not all information related to the chapter in the manner directed by the Foldables graphic organizer.  
Student demonstrated partial use of the Foldables graphic organizer as a study guide and organizational tool. |
| **1** | Student showed little understanding of proper Foldables graphic organizer assembly.  
Student recorded only some information related to the chapter in the manner directed by the Foldables graphic organizer.  
Student demonstrated little use of the Foldables graphic organizer as a study guide and organizational tool. |
| **0** | Student did not assemble Foldables graphic organizer according to instructions.  
Student recorded little or no information related to the chapter in the manner directed by the Foldables graphic organizer.  
Student did not use the Foldables graphic organizer as a study guide and organizational tool. |
Write each ratio as a fraction in simplest form.

1. Sonia has 2 dogs and 8 fish. Find the ratio of dogs to fish.
   A. $\frac{1}{3}$  
   B. $\frac{2}{8}$  
   C. $\frac{2}{6}$  
   D. $\frac{1}{4}$  
   1. _____

2. A jar holds 10 pens and 12 pencils. Find the ratio of pencils to pens in simplest form.
   F. $\frac{12}{10}$  
   G. $\frac{6}{5}$  
   H. $\frac{10}{12}$  
   J. $\frac{5}{6}$  
   2. _____

Write each rate as a unit rate.

3. $360 in 12 months
   A. $\frac{24}{1 \text{ mo}}$  
   B. $\frac{30}{1 \text{ mo}}$  
   C. $\frac{32}{1 \text{ mo}}$  
   D. $\frac{36}{1 \text{ mo}}$  
   3. _____

4. 180 miles on 5 gallons of gas
   F. $\frac{60 \text{ mi}}{1 \text{ gal}}$  
   G. $\frac{56 \text{ mi}}{1 \text{ gal}}$  
   H. $\frac{36 \text{ mi}}{1 \text{ gal}}$  
   J. $\frac{30 \text{ mi}}{1 \text{ gal}}$  
   4. _____

5. Brian can read 15 pages in 30 minutes. At this rate, how many pages can he read in 90 minutes?

<table>
<thead>
<tr>
<th>Number of Pages</th>
<th>15</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Minutes</td>
<td>30</td>
<td>90</td>
<td></td>
</tr>
</tbody>
</table>

   A. 15 pages  
   B. 45 pages  
   C. 30 pages  
   D. 60 pages  
   5. _____

Determine the quantity that is equivalent to the given ratio or rate.

6. 17 minutes to run 2 miles
   F. 8 minutes to run 1 mile  
   G. 32 minutes to run 4 miles  
   H. 34 minutes to run 3 miles  
   J. 34 minutes to run 4 miles  
   6. _____
Solve.

7. \( \frac{8}{20} = \frac{n}{5} \)
   A. 1  B. 2  C. 3  D. 4  7. _____

8. \( \frac{x}{10} = \frac{6}{30} \)
   F. 6  G. 5  H. 3  J. 2  8. _____

Use symbols to describe the value of each term as a function of its position. Then find the value of the tenth term in the sequence.

9. | Position | 1 | 2 | 3 | 4 | \( n \) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Term</td>
<td>7</td>
<td>14</td>
<td>21</td>
<td>28</td>
<td>( \blacksquare )</td>
</tr>
</tbody>
</table>
A. \( n + 7; 17 \)  B. \( n - 7; 3 \)  C. \( 7n; 70 \)  D. \( 7 - n; 3 \)  9. _____

Write an equation to represent the function displayed in the table.

10. | Input, \( x \) | 0 | 1 | 2 | 3 | 4 |
    |-----------|---|---|---|---|---|
    | Output, \( y \) | 0 | 3 | 6 | 9 | 12 |
F. \( y = x + 3 \)  G. \( y = 2x \)  H. \( y = 3x \)  J. \( y = x + 2 \)  10. _____

Use the following information for Exercises 11 and 12.

In football, teams earn 6 points every time they score a touchdown.

11. Write an equation to find \( p \), the total points for scoring \( t \) touchdowns.
    A. \( t = 6 + p \)  B. \( t = 6p \)  C. \( p = 6 + t \)  D. \( p = 6t \)  11. _____

12. How many points will a team earn if it scores 9 touchdowns?
    F. 15  G. 54  H. 56  J. 27  12. _____
Read each question carefully. Write your answer on the line provided.

Write each ratio as a fraction in simplest form.

1. Elana has 3 hamsters and 9 hermit crabs. Find the ratio of hamsters to hermit crabs.
   A. \( \frac{1}{9} \)  
   B. \( \frac{3}{9} \)  
   C. \( \frac{2}{3} \)  
   D. \( \frac{1}{3} \)  

2. A class has 8 boys and 14 girls. Find the ratio of girls to boys.
   F. \( \frac{7}{4} \)  
   G. \( \frac{14}{8} \)  
   H. \( \frac{8}{14} \)  
   J. \( \frac{4}{7} \)

Write each rate as a unit rate.

3. 72 miles in 8 days
   A. \( \frac{16 \text{ mi}}{1 \text{ d}} \)  
   B. \( \frac{12 \text{ mi}}{1 \text{ d}} \)  
   C. \( \frac{9 \text{ mi}}{1 \text{ d}} \)  
   D. \( \frac{8 \text{ mi}}{1 \text{ d}} \)

4. $64 in 4 hours
   F. \( \frac{$16}{1 \text{ h}} \)  
   G. \( \frac{$20}{1 \text{ h}} \)  
   H. \( \frac{$22}{1 \text{ h}} \)  
   J. \( \frac{$24}{1 \text{ h}} \)

5. Allie can type 50 words in 5 minutes. At this rate, how many words can she type in 20 minutes?
   
   \[
   \begin{array}{|c|c|}
   \hline
   \text{Words} & 50 \\
   \text{Minutes} & 5 \\
   \hline
   \text{Words} & 100 \\
   \text{Minutes} & 20 \\
   \hline
   \end{array}
   
   \]
   A. 25  
   B. 50  
   C. 100  
   D. 200

Determine the quantity that is equivalent to the given ratio or rate.

6. $16 for 6 comic books
   F. $4 for 1 comic book  
   G. $8 for 4 comic books  
   H. $8 for 3 comic books  
   J. $20 for 10 comic books

Solve.

7. \( \frac{1}{5} = \frac{n}{20} \)
   A. 4  
   B. 5  
   C. 10  
   D. 15

Grade 5  
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8. \( \frac{x}{7} = \frac{12}{28} \)

F. 6  G. 4  H. 3  J. 2  8. _____

Use symbols to describe the value of each term as a function of its position. Then find the value of the eleventh term in the sequence.

9. 

<table>
<thead>
<tr>
<th>Position</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>( n )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Term</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td></td>
</tr>
</tbody>
</table>

A. \( n + 15; 26 \)  C. \( 15n; 165 \)  
B. \( n - 15; -4 \)  D. \( 15 - n; 4 \)  9. _____

Write an equation to represent the function displayed in the table.

10. 

<table>
<thead>
<tr>
<th>Input ((x))</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output ((y))</td>
<td>0</td>
<td>6</td>
<td>12</td>
<td>18</td>
<td>24</td>
</tr>
</tbody>
</table>

F. \( y = x + 4 \)  H. \( y = 6x \)  
G. \( y = 4x \)  J. \( y = x + 6 \)  10. _____

Use the following information for Exercises 11 and 12.

A pizza has 8 slices.

11. Write an equation to find \( s \), the total number of slices in \( p \) pizzas.

A. \( p = 8 + s \)  B. \( p = 8s \)  C. \( s = 8 + p \)  D. \( s = 8p \)  11. _____

12. How many slices are there in 11 pizzas?

F. 19  G. 98  H. 88  J. 121  12. _____
Chapter Test, Form 2B

Read each question carefully. Write your answer on the line provided.

Write each ratio as a fraction in simplest form.

1. A class has 8 boys and 14 girls.
   girls : boys =
   
   A. \( \frac{14}{8} \)  
   B. \( \frac{7}{4} \)  
   C. \( \frac{4}{7} \)  

2. Elana has 3 cats and 9 fish.
   cats : fish =
   
   F. \( \frac{1}{3} \)  
   G. \( \frac{3}{9} \)  
   H. \( \frac{2}{3} \)  

Write each rate as a unit rate.

3. 90 meters in 5 minutes
   
   A. \( \frac{15 \text{ m}}{1 \text{ min}} \)  
   B. \( \frac{18 \text{ m}}{1 \text{ min}} \)  
   C. \( \frac{30 \text{ m}}{1 \text{ min}} \)  

4. $64 in 4 hours
   
   F. \( \frac{16 \text{ }}{1 \text{ h}} \)  
   G. \( \frac{20 \text{ }}{1 \text{ h}} \)  
   H. \( \frac{22 \text{ }}{1 \text{ h}} \)  

5. Tyler bought 6 books for $18. At this rate, how many books can he buy for $36?

<table>
<thead>
<tr>
<th>Books</th>
<th>6</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost ($)</td>
<td>18</td>
<td>$36</td>
<td></td>
</tr>
</tbody>
</table>

   A. 6  
   B. 12  
   C. 18  

Choose the one that is equivalent.

6. 4 minutes to type 70 words
   
   F. 2 minutes to type 18 words  
   G. 3 minutes to type 35 words  
   H. 8 minutes to type 140 words  

6. ______
Solve.

7. $\frac{3}{4} = \frac{y}{44}$
   A. 30  B. 11  C. 33

8. $\frac{x}{7} = \frac{12}{28}$
   F. 4  G. 3  H. 6

Use symbols to describe the value of each term as a function of its position. Then find the value of the term when the position is eleven in the sequence.

<table>
<thead>
<tr>
<th>Position</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>$n$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Term</td>
<td>15</td>
<td>18</td>
<td>21</td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>

A. $n + 3$; 14  B. $n - 3$; 8  C. $3n$; 33  D. $3 - n$; $-8$

Write an equation for the function in the table.

<table>
<thead>
<tr>
<th>Input ($x$)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output ($y$)</td>
<td>0</td>
<td>6</td>
<td>12</td>
<td>18</td>
<td>24</td>
</tr>
</tbody>
</table>

F. $y = x + 6$  G. $y = 4x$  H. $y = 6x$  J. $y = 4 + x$

Use the following information for problem 13.

A pizza has 8 slices.

11. Write an equation to find $s$, the number of slices in $p$ pizzas.
   A. $s = 8p$  B. $p = 8s$  C. $s = 8 + p$  D. $p = 8 + s$

12. How many slices are there in 11 pizzas?
   F. 88  G. 98  H. 121  J. 132
Read each question carefully. Write your answer on the line provided.

Write each ratio as a fraction in simplest form.

1. A class has 8 boys and 14 girls. Find the ratio of girls to boys.  
   \[ \frac{\text{girls}}{\text{boys}} = \frac{14}{8} \]

2. Elana has 3 hamsters and 9 hermit crabs. Find the ratio of hamsters to hermit crabs.  
   \[ \frac{\text{hamsters}}{\text{hermit crabs}} = \frac{3}{9} \]

Write each rate as a unit rate.

3. 72 miles in 8 days  
   \[ \text{rate} = \frac{72 \text{ miles}}{8 \text{ days}} = 9 \text{ miles/day} \]

4. 90 meters in 5 minutes  
   \[ \text{rate} = \frac{90 \text{ meters}}{5 \text{ minutes}} = 18 \text{ meters/minute} \]

5. $64 in 4 hours  
   \[ \text{rate} = \frac{\$64}{4 \text{ hours}} = 16 \text{ dollars/hour} \]

6. Tanya receives $20 for mowing one lawn. Use a ratio table to determine how much Tanya will earn if she mows 6 lawns.  
   \[ \frac{1 \text{ lawn}}{\$20} = \frac{6 \text{ lawns}}{x} \]
   \[ x = \frac{6 \times 20}{1} = 120 \]

Determine if the quantities in each pair of ratios or rates are equivalent.

7. $16 for 6 comic books; $8 for 3 comic books  
   \[ \frac{\$16}{6 \text{ books}} \neq \frac{\$8}{3 \text{ books}} \]

8. 4 minutes to type 70 words; 12 minutes to type 240 words  
   \[ \frac{4 \text{ minutes}}{70 \text{ words}} \neq \frac{12 \text{ minutes}}{240 \text{ words}} \]

Solve.

9. \[ \frac{3}{4} = \frac{y}{44} \]
   \[ y = 33 \]

10. \[ \frac{1}{5} = \frac{n}{20} \]
    \[ n = 4 \]

11. \[ \frac{x}{7} = \frac{12}{28} \]
    \[ x = 6 \]
Use words and symbols to describe the value of each term as a function of its position. Then find the value of the tenth term in the sequence.

12. Use the following information for Exercises 13 and 14.

A pizza has 8 slices.

13. Write an equation to find \( s \), the total number of slices in \( p \) pizzas.

14. How many slices are there in 11 pizzas?

15. Write an equation for the function in the table.

16. Graph the ordered pairs from Exercise 15 on a coordinate grid.

17. Lexi bikes 2 miles in 10 minutes. She bikes 4 miles in 20 minutes, and 6 miles in 30 minutes. How long does it take Lexi to bike 8 miles?
Read each question carefully. Write your answer on the line provided.

Write each ratio a fraction in simplest form.

1. Elana has 3 cats and 9 fish.
   cats : fish =

2. A class has 8 boys and 14 girls.
   girls : boys =

Write each rate as a unit rate.

3. 90 meters in 5 minutes

4. 72 miles in 8 days

5. $64 in 4 hours

6. Tanya receives $15 for mowing one lawn. Use a ratio table to determine how much Tanya will earn if she mows 6 lawns.

Determine if each pair of ratios or rates are equivalent.

7. 4 minutes to type 70 words; 12 minutes to type 240 words

8. $16 for 6 books; $8 for 3 books

Solve.

9. \( \frac{1}{5} = \frac{n}{20} \)

10. \( \frac{x}{7} = \frac{12}{28} \)
Use words and symbols to describe the value of each term as a function of its position. Then find the value of the twelfth term in the sequence.

11. Use the following information for Exercises 12 and 13.

A pizza has 8 slices.

12. Write an equation to find \( s \), the total number of slices in \( p \) pizzas.

13. How many slices are there in 11 pizzas?

14. Write an equation for the function in the table.

<table>
<thead>
<tr>
<th>Input, ( x )</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output, ( y )</td>
<td>7</td>
<td>10</td>
<td>13</td>
<td>16</td>
</tr>
</tbody>
</table>

15. Write an equation for the function in the table.

<table>
<thead>
<tr>
<th>Input, ( x )</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output, ( y )</td>
<td>0</td>
<td>4</td>
<td>8</td>
<td>12</td>
<td>16</td>
</tr>
</tbody>
</table>

16. Graph the ordered pairs from Exercise 15 on a coordinate grid.
Read each question carefully. Write your answer on the line provided.

Write each ratio as a fraction in simplest form.
1. A recipe calls for 4 onions and 10 carrots. Find the ratio of onions to carrots.
2. A bookshelf has 6 science books and 15 novels. Find the ratio of novels to comic books.

Write each rate to a unit rate.
3. 270 centimeters in 15 minutes
4. 78 miles in 13 days
5. $88 in 8 hours
6. For a field trip to the museum, 1 adult is needed for every 12 students. Use a ratio table to determine the number of adults needed for 60 students.

Create two ratios that are both equivalent to the given ratio or rate.
7. 12 minutes to write 4 paragraphs
8. $2.50 for 6 apples

Solve.
9. $\frac{3}{y} = \frac{39}{13}$
10. $\frac{3}{4} = \frac{n}{20}$
11. $\frac{3}{8} = \frac{51}{x}$
12. The table below shows the number of Calories in a muffin based on the number of muffins. Write an expression to find the number of Calories in \( n \) muffins.

<table>
<thead>
<tr>
<th>Number of Muffins</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>( n )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>130</td>
<td>260</td>
<td>390</td>
<td>520</td>
<td></td>
</tr>
</tbody>
</table>

Use the following information for Exercises 13 and 14.

Carolina earns $2.50 every time she walks her neighbor’s poodle.

13. Write an equation to find \( m \), the total amount of money Carolina earns for \( w \) walks.

14. Carolina’s neighbor is going to the beach for 3 days. If Carolina walks the poodle 3 times a day, how much money will she earn while her neighbor is at the beach?

15. Write an equation to represent the function displayed in the table. Then graph the ordered pairs on a coordinate grid.

<table>
<thead>
<tr>
<th>Input, ( x )</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output, ( y )</td>
<td>0</td>
<td>7</td>
<td>14</td>
<td>21</td>
<td>28</td>
</tr>
</tbody>
</table>

16. An office supply store sells a package of 12 small notepads for $4.00. Another office supply store has a special of 3 small notepads for $1.05. William believes that 3 small notepads for $1.05 is the better buy. Is William’s answer reasonable? Explain why or why not.
Demonstrate your knowledge by giving a clear, concise solution to each problem. Be sure to include all relevant drawings and justify your answers. You may show your solution in more than one way or investigate beyond the requirements of the problem. If necessary, record your answer on another piece of paper.

1. Belinda’s garden has 9 sunflowers, 18 daffodils, and 27 tulips. Dee’s garden has 8 sunflowers, 12 daffodils, and 28 tulips.

   a. What is the ratio of sunflowers to flowers in Belinda’s garden? Write the ratio in three ways and explain what the ratio means. Explain how you found your answer.

   b. What is the ratio of sunflowers to flowers in Dee’s garden? Write the ratio in three ways and explain what the ratio means. Explain how you found your answer.

   c. Are the ratios equivalent? Why or why not?

2. a. What is the meaning of equivalent ratios? Tell in your own words.

   b. Josh delivered 21 newspapers in 7 days. Jake delivered 50 newspapers in 10 days. Express each rate as a unit rate. Are these rates equivalent? Explain why or why not.

3. The table below shows how much money Susan can make by bringing empty glass bottles to the recycling center.

<table>
<thead>
<tr>
<th>Bottles</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cents</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
</tr>
</tbody>
</table>

   a. Use words to describe the amount of money Susan can make as a function of the number of bottles she brings to the recycling center.

   b. Write an equation to represent the function displayed in the table. Define all variables.

   c. Find the number of cents Susan can make by recycling 7 bottles, 8 bottles, and 9 bottles. Graph the results on a coordinate grid.

   d. If Susan wants to buy a new pair of sunglasses for $5, how many bottles will she have to bring to the recycling center? Use the equation you wrote above to find an answer. Show your work.
Use this recording sheet with pages 460–461 of the Student Edition.

Read each question. Then fill in the correct answer.

1. A B C D

2. F G H J

3. A B C D

4. F G H J

5. A B C D

6. F G H J

7. A B C D

8. F G H J

9. A B C D

10. F G H J

11. A B C D
Cumulative Standardized Test Practice

Example question

Which expression could have been used to create the table below?

<table>
<thead>
<tr>
<th>Position</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>k</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Term</td>
<td>6</td>
<td>10</td>
<td>14</td>
<td>18</td>
<td>?</td>
</tr>
</tbody>
</table>

A. $k + 1$  
B. $4k$  
C. $4k + 2$  
D. $k + 4$

Read the Question

To find the expression, determine the function.

Solve the Question

Notice that values 6, 10, 14, 18 … increase by 4, so the rule contains $4k$. Therefore, choices A and D can be eliminated.

If the rule were simply $4k$, then the value for the position 1 would be $4 \times 1$ or 4. But this value is 6. So, choice B can be eliminated.

So, the answer is C.

Read each question carefully. Write your answer on the line provided.

1. Which expression could have been used to create the table below?

<table>
<thead>
<tr>
<th>Position</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Term</td>
<td>2</td>
<td>5</td>
<td>8</td>
<td>11</td>
<td>?</td>
</tr>
</tbody>
</table>

A. $m + 1$  
B. $3m - 1$  
C. $3m$  
D. $3m + 1$  
1. _______
2. There were 300 cans of soda and 75 people signed up for the art reception. What is the ratio of people to cans of soda?

F. 75:300  G. 300:75  H. 1:3  J. 3:1  2. _____

3. The cost of renting a bicycle is $15, plus an additional $5 for each hour that the bike is rented. Which equation can be used to find c, the cost in dollars for the rental for h hours?

A. \(c = 15h + 5\)  B. \(c = 5(h + 15)\)
C. \(c = 5h + 15\)  D. \(c = 15(h + 5)\)  3. _____

4. At Digna’s school, there is 1 teacher for every 22 students. If there are 528 students in Digna’s school, which equation can be used to find x, the number of teachers?

F. \(\frac{1}{22} = \frac{x}{528}\)  G. \(\frac{x}{22} = \frac{1}{528}\)
H. \(\frac{x}{1} = \frac{22}{528}\)  J. \(\frac{22}{1} = \frac{x}{528}\)  4. _____

5. Ling is typing a story. He types 60 words in 2 minutes. If Ling continues at this rate, how long will it take him to type 240 words?

A. 4 minutes  B. 6 minutes  C. 7 minutes  D. 8 minutes  5. _____

6. The temperature at seven o’clock was 13 degrees below zero Celsius. The temperature at noon was 5 degrees below zero Celsius. Which integer represents the temperature at noon?

F. \(5°C\)  G. \(13°C\)  H. \(-5°C\)  J. \(-13°C\)  6. _____

7. At a raffle, the winning ticket number was the least common multiple of 6, 20, and 24. Find the number of the winning raffle ticket.

A. 60  B. 120  C. 180  D. 240  7. _____

8. \(16.38 ÷ 2.4\)

9. Which letter on the number line best identifies the location of 2.78?

A. Point A  
B. Point B  
C. Point C  
D. Point D

10. In Chelsea’s school orchestra, 11 students play the viola and 4 students play the cello. What is the ratio of students who play the cello to students who play the viola?

11. At three o’clock, it was 3 degrees below zero Celsius. At five o’clock it was 2 degrees below zero Celsius, and at seven o’clock it was 7 degrees below zero Celsius. Which time had the lowest temperature?

12. There are 5,280 feet in a mile. Lawan walked 6 miles in a charity event. Write an equation using ratios that can be used to find \( f \), the number of feet Lawan walked.

13. The cost of making a long-distance phone call is $1.75 for the first minute and $0.50 for each additional minute. Write an equation that can be used to find \( c \), the cost in dollars of making a long-distance phone call for \( m \) minutes.

14. \( 3.05 \times 16.9 \)

15. Write an equation to show the relationship of all the values in the table below.

<table>
<thead>
<tr>
<th>( x )</th>
<th>6</th>
<th>12</th>
<th>18</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Use this graphic organizer to take notes on Chapter 8: Algebra: Ratios and Functions.

Fill in the missing information.

<table>
<thead>
<tr>
<th>Vocabulary Word</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>ratio</td>
<td>A comparison of two quantities by division. Ratios also compare parts to the whole.</td>
<td>2 to 6</td>
</tr>
<tr>
<td>equivalent ratios</td>
<td>Ratios that can be represented by equivalent fractions.</td>
<td>3:5 and 12:20</td>
</tr>
<tr>
<td>rate</td>
<td>A ratio of two measurements or amounts with different kinds of units.</td>
<td>50 miles per hour</td>
</tr>
<tr>
<td>simplest form</td>
<td>A fraction in which the numerator and the denominator have no common factor greater than 1.</td>
<td>$\frac{3}{5}$ is the simplest form of $\frac{6}{10}$</td>
</tr>
</tbody>
</table>
Reteach

**Ratios and Rates**

A **ratio** is used to compare two quantities by division. You can write different ratios to compare these circles and squares in different ways. You can also write each ratio in different ways.

A **rate** is a ratio comparing two quantities with different kinds of units.

**Part to Part**
- circles to squares
- circles : total shapes
- whole to part
- total shapes to squares

<table>
<thead>
<tr>
<th>Ratio Type</th>
<th>Expressions</th>
<th>Simplified Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using the word &quot;to&quot;</td>
<td>4 to 3</td>
<td>4 : 3</td>
</tr>
<tr>
<td>Using a colon</td>
<td>4 : 3</td>
<td>4 : 7</td>
</tr>
<tr>
<td>As a fraction</td>
<td>4/3</td>
<td>4/7</td>
</tr>
<tr>
<td>In words</td>
<td>four to three</td>
<td>four to seven</td>
</tr>
</tbody>
</table>

**Part to Whole**
- circles to total shapes
- total shapes to squares

<table>
<thead>
<tr>
<th>Ratio Type</th>
<th>Expressions</th>
<th>Simplified Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using the word &quot;to&quot;</td>
<td>4 to 3</td>
<td>4 : 3</td>
</tr>
<tr>
<td>Using a colon</td>
<td>4 : 3</td>
<td>4 : 7</td>
</tr>
<tr>
<td>As a fraction</td>
<td>4/3</td>
<td>4/7</td>
</tr>
<tr>
<td>In words</td>
<td>four to seven</td>
<td>seven to three</td>
</tr>
</tbody>
</table>

**Write each ratio as a fraction in simplest form.**

1. circles : squares = \( \frac{5}{7} \)
2. circles to total shapes = \( \frac{5}{12} \)

**Write each rate as a unit rate.**

3. 240 miles in 4 hours = \( \frac{60 \text{ miles}}{1 \text{ hour}} = 60 \text{ mph} \)
4. 161 miles on 7 gallons = \( \frac{23 \text{ miles}}{1 \text{ gallon}} = 23 \text{ mpg} \)

**Solve.**

13. There are 12 boys and 11 girls in a fifth-grade class. Write a ratio to describe the number of boys to the number of girls in the class.

14. Enough bread for 10 sandwiches costs $1.89. How much will enough bread for 80 sandwiches cost?

**Answers (Lesson 8-1)**

**Skills Practice**

**Ratios and Rates**

Write each ratio as a fraction in simplest form.

1. circles to rectangles = \( \frac{6}{7} \)
2. rectangles : circles = \( \frac{7}{6} \)
3. total : rectangles = \( \frac{13}{7} \)
4. circles to total = \( \frac{6}{13} \)

Write each rate as a unit rate.

5. 120 miles in 3 hours = \( \frac{40 \text{ mph}}{1 \text{ hour}} = 40 \text{ mph} \)
6. 27 pages in 2 days = \( \frac{13.5 \text{ pages}}{1 \text{ day}} = 13.5 \text{ pages per day} \)
7. 10 oz for 2 people = \( \frac{5 \text{ oz}}{1 \text{ person}} = 5 \text{ oz per person} \)
8. 3 books in 2 weeks = \( \frac{1.5 \text{ books}}{1 \text{ week}} = 1.5 \text{ books per week} \)
9. 16 people in 4 vans = \( \frac{4 \text{ people}}{1 \text{ van}} = 4 \text{ people per van} \)
10. $15 for 2 tickets = \( \frac{7.5 \text{ dollars}}{1 \text{ ticket}} = 7.5 \text{ dollars per ticket} \)
11. 100 meters in 10 seconds = \( \frac{10 \text{ meters}}{1 \text{ second}} = 10 \text{ meters per second} \)
12. $45 for 3 CDs = \( \frac{15 \text{ dollars}}{1 \text{ CD}} = 15 \text{ dollars per CD} \)

Solve.

13. There are 12 boys and 11 girls in a fifth-grade class. Write a ratio to describe the number of boys to the number of girls in the class.

14. Enough bread for 10 sandwiches costs $1.89. How much will enough bread for 80 sandwiches cost?

**12:11**

**$15.12**
Name __________________________ Date ____________

**6NS1.2**

**Homework Practice**

Ratios and Rates

Write each ratio as a fraction in simplest form. Then explain its meaning.

1. A teacher has 15 minutes each day to teach handwriting and 40 minutes each day to teach spelling. What is the ratio of time spent teaching handwriting to time spent teaching spelling?
   \[
   \frac{3}{8}; \text{ for every 3 minutes each day teaching handwriting there are 8 minutes each day teaching spelling}
   \]

2. A theatre club has 5 boys and 10 girls. What is the ratio of boys to girls?
   \[
   \frac{1}{2}; \text{ for every 1 boy, there are 2 girls.}
   \]

3. On Saturday, there are 10 trains leaving from a train station, and there are 25 planes leaving from an airport. What is the ratio of trains to planes?
   \[
   \frac{2}{5}; \text{ for every 2 trains, there are 5 planes.}
   \]

Write each rate as a unit rate.

4. $12 for 4 lunch meals
   \[
   $3 \text{ per lunch meal}
   \]

5. 92 miles in 2 hours
   \[
   46 \text{ miles an hour}
   \]

**Spiral Review**

Solve each equation. Check your solution. (Lesson 7–11)

6. \(2x = 24\) \[
   x = 12
   \]

7. \(-4m = -24\) \[
   m = 6
   \]

8. \(81 = 9t\) \[
   t = 9
   \]

9. \(6t = 12\) \[
   t = 2
   \]

10. \(-5s = -60\) \[
    s = 12
   \]

11. \(56 = 7x\) \[
    x = 8
   \]

---

**Problem-Solving Practice**

Ratios and Rates

Solve.

1. The ratio of red marbles to green marbles is 2 to 3. Write this ratio two other ways.
   \[
   2:3, \frac{2}{3}
   \]

2. Miriam can read 120 pages in 3 hours. How many pages can she read in 1 hour?
   \[
   40 \text{ pages}
   \]

3. Darcy exchanged 10 U.S. dollars and received 15 New Zealand dollars. How many New Zealand dollars would she get for 1 U.S. dollar?
   \[
   1.5 \text{ New Zealand dollars}
   \]

4. Alisha and Saundra are playing checkers. There are 7 red checkers and 10 black checkers left on the board. What is the ratio of black checkers to the total?
   \[
   10 \text{ to } 17
   \]

5. Russ gives Juliana a bag of marbles and tells her that the ratio of red marbles to the total number is 3 to 19. He also tells her there are 3 times as many yellow marbles as red, and that there are 2 more green than red. What is the ratio of yellow marbles to green?
   \[
   9 \text{ to } 5
   \]

6. When Robbie walks 15 feet, he takes 10 steps. How many feet does he walk if he takes 1 step?
   \[
   1.5 \text{ feet}
   \]

7. Angie spends 10 minutes each day talking on her cell phone and Sandy spends 45 minutes talking on her cell phone. What is the ratio of the time Angie spends talking on her cell phone to the time Sandy spends talking on her cell phone? Write it in simplest form.
   \[
   \frac{2}{9}
   \]

8. Joseph ran the marathon in 5 hours. If a marathon is about 25 miles and Joseph ran at a constant rate, how many miles per hour did Joseph run?
   \[
   5 \text{ miles per hour}
   \]
Reteach

Problem-Solving Strategy

Look for a Pattern

A high school student practices the high jump, starting the bar at 3 feet 4 inches and raising the bar 0.5 inch after each jump. How high will the bar be on the fifth jump?

Step 1

Understand

What facts do you know?
- The student starts the bar at ___________.
- The student raises the bar _______ after each jump.

What do you need to find?
- You need to find how high the bar will be on the fifth jump.

Step 2

Make a plan.

Using a pattern will help you solve the problem.
Organize the information in a chart.

Step 3

Carry out your plan.

Make a chart. Look for a pattern in the chart.

<table>
<thead>
<tr>
<th>Jump Number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bar Height</td>
<td>3 feet 4 inches</td>
<td>3 feet 4.5 inches</td>
<td>3 feet 5 inches</td>
<td>3 feet 5.5 inches</td>
<td></td>
</tr>
</tbody>
</table>

Look at the chart to find the pattern.
What is the pattern?

The height increases by 0.5 inch.

Continue the pattern to predict the height for the fifth jump.

Jump 5: 3 feet 5.5 inches + 0.5 inch = ___________.

Using the pattern, you can expect that the bar will be set at _______ for the fifth jump.

C and D

For centuries artists and architects have used a shape called the golden rectangle because people seem to find it most pleasant to look at. In a golden rectangle, the ratio of the width to the length is a little less than \( \frac{5}{2} \). Which rectangle in Exercise 1 is most nearly a golden rectangle? **B**

Ratios and Rectangles

1. Use a centimeter ruler to measure the width and the length of each rectangle. Then express the ratio of the width to the length as a fraction in simplest form.

   C: width = 4 cm  
   length = 6 cm  
   ratio = \( \frac{2}{3} \)

   B: width = 3 cm  
   length = 5 cm  
   ratio = \( \frac{3}{5} \)

   D: width = 6 cm  
   length = 9 cm  
   ratio = \( \frac{2}{3} \)

   A: width = 2 cm  
   length = 4 cm  
   ratio = \( \frac{1}{2} \)

   E: width = 4 cm  
   length = 4 cm  
   ratio = \( \frac{1}{1} \)

2. Similar figures have the same shape, but not necessarily the same size. Two rectangles are similar if the ratio of the width to the length is the same for each.

Which rectangles in Exercise 1 are similar? **C and D**

3. For centuries artists and architects have used a shape called the golden rectangle because people seem to find it most pleasant to look at. In a golden rectangle, the ratio of the width to the length is a little less than \( \frac{5}{2} \). Which rectangle in Exercise 1 is most nearly a golden rectangle? **B**
Reteach

Problem-Solving Strategy (continued)

Step 4

Is the solution reasonable?

Check

Have you answered the question? Yes.

Does your answer make sense? Yes.

Did you find a pattern and continue it? Yes.

Solve. Use the look for a pattern strategy.

1. On the first day of the crafts fair, 200 people show up. Each day thereafter, the number of people who attend the fair increases by 150. The crafts fair runs for five days. How many people attend the fair on the last day?

800 people

2. A pole vaulter raises the bar 1 inch after each successful vault. To begin the bar is at 6 feet 3 inches. How high will the bar be after 4 successful vaults?

6 feet 7 inches

3. ALGEBRA Find the next three numbers in the pattern below. Then describe the pattern.

-5, 0, 5, 10, ___, ___, ___

15, 20, 25; add 5

4. ALGEBRA Describe the pattern below. Then find the missing number.

10, 20, 30, ___, 50

add 10; 40

Mixed Strategy Review

Use any strategy to solve each problem.

5. NUMBER SENSE The sum of two whole numbers between 20 and 40 is 58. The difference of the two numbers is 12. What are the two numbers?

23 and 35

Strategy: Guess and check.

6. Ramon has $3.50. He buys two pens that cost $0.75 each and a pencil that costs $0.40. How much money does Ramon have left?

$1.60

Strategy: Use the four-step plan.
Solve. Use the look for a pattern strategy.

1. **ALGEBRA** Describe the pattern below. Then, find the missing number. 50, 500, ______, 50,000. ___________
   Each number is 10 times the previous number; 5,000

2. Joe is stacking cans of fruit in a triangular form for a display. The top row has 2 cans, the second row has 4 cans, and the third row has 8 cans. How many cans will be on the fifth row? ___________

3. Write a problem that can be solved by looking for a pattern. Then solve the problem.
   Sara ran 2 miles for 2 days the first week, 4 miles for 3 days the second week. What will she be running by the fourth week? 8 miles, 4 days a week

**Spiral Review**

Write each ratio as a fraction in simplest form. Then explain its meaning. (Lesson 8–1)

4. A dance class has 8 boys and 16 girls. What is the ratio of boys to girls? ___________
   \( \frac{1}{2} \); for every 1 boy, there are 2 girls.

5. On Saturday, there are 5 trains leaving from a station in Philadelphia and going to New York City, and there are 25 buses going from Philadelphia to New York City. What is the ratio of trains to buses leaving Philadelphia and going to New York City? ___________
   \( \frac{1}{5} \); for every 1 train, there are 5 buses.

6. A bookstore has 48 graphic novels and 72 short story collections. What is the ratio of graphic novels to short story collections? ___________
   \( \frac{2}{3} \); for every 2 graphic novels, there are 3 short story collections

---

**Enrich**

Compare Rates

Solve.

1. Diane runs 5 miles in 45 minutes. Claire runs 7 miles in 56 minutes. Who runs at a faster rate? Explain.
   Claire. Diane runs at a rate of \( \frac{1}{9} \) mile per minute. Claire runs at a rate of \( \frac{1}{8} \) mile per minute. \( \frac{1}{8} > \frac{1}{9} \).

2. Lance rides 84 miles in 6 hours. Nathan rides 104 miles in 8 hours. Who rides at a faster rate? Explain.
   Lance. Lance rides at 14 mph. Nathan rides at 13 mph. 14 mph is faster than 13 mph.

3. Annie hikes 51 miles in 3 days. Alex hikes 64 miles in 4 days. Who hikes at a faster pace? Explain.
   Annie. Annie hikes 17 miles per day. Alex hikes 16 miles per day. 17 > 16.

4. Jake’s car uses 5 gallons of gas to drive 115 miles in the city. The car uses 6 gallons of gas to drive 174 miles on the highway. Does Jake’s car get better gas mileage in the city or on the highway? Explain.
   Highway. Jake’s car gets 23 miles per gallon in the city and 29 miles per gallon on the highway. 29 mpg is better than 23 mpg.

5. Oscar’s car uses 8 gallons of gas to drive 256 miles. Randy’s car uses 7 gallons of gas to drive 252 miles. Whose car gets better gas mileage? Explain.
   Randy. Oscar’s car gets 32 mpg, while Randy’s car gets 36 mpg, which is a better rate.

6. Last week Vicky swam 16 laps in 20 minutes. This week she swam 20 laps in 16 minutes. Which week did she swim faster? Explain.
   This week. Last week, Vicky swam \( \frac{4}{5} \) lap per minute. This week, she swam \( 1\frac{1}{4} \) laps per minute. \( 1\frac{1}{4} > \frac{4}{5} \).
To make one serving of a flavored milk drink, 2 ounces of flavoring is mixed with 1 cup of milk. How many ounces of flavoring and how many cups of milk do you need to mix enough for three servings?

Step 1
Understand the exercise and the amounts identified. It may help to draw a picture of the amounts.

Step 2
Make a plan to find the information you need.

Step 3
Solve. Find the ratio in simplest form.

Step 4
Check. Is the solution reasonable? Reread the problem.

Use a ratio table to solve the problem.

1. To make 1 cup of pink icing add 4 drops of red coloring to 1 cup of white icing. How much of each ingredient do you need to make 6 cups of icing that is the same shade of pink?

6 cups of white icing and 24 drops of red coloring
**8–3**

**Homework Practice**

*Ratio Tables*

Use the ratio tables given to solve each problem.

1. To make 2 glasses of orange juice, you need 20 oranges. How many oranges do you need to make 6 glasses of orange juice?

<table>
<thead>
<tr>
<th>Number of Oranges</th>
<th>20</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Glasses</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

2. The science museum requires that 3 adults accompany every 30 students. How many adults must accompany 150 students?

<table>
<thead>
<tr>
<th>Number of Students</th>
<th>30</th>
<th>150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Adults</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

3. Sonya bought 6 cases of bottled water for $24. How much will Sonya pay to buy 4 more cases of bottled water?

<table>
<thead>
<tr>
<th>Cost</th>
<th>$24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases of Bottled Water</td>
<td>6</td>
</tr>
</tbody>
</table>

4. Sherri purchased 500 beads for $25 to make bracelets. If she needs 100 more beads, how much will she pay if she is charged the same rate?

<table>
<thead>
<tr>
<th>Cost</th>
<th>$25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Beads</td>
<td>500</td>
</tr>
</tbody>
</table>

**Spiral Review**

Solve. Use the look for a pattern strategy. (Lesson 8–2)

5. **ALGEBRA** Describe the pattern below. Then find the missing number.

\[
20, 60, 180, 540, \quad \text{multiply by 3}
\]

6. Joe is stacking boxes of sneakers in stacks on shelves. The first shelf holds stacks of 8, and the second shelf holds stacks of 6. How many stacks of sneakers will be on the fourth shelf?

7. In 2000, Jack earned $1,200 for the year and Eddie earned $600 for the year. In 2001, Jack earned $1,800 and Eddie earned $1,400. If the amount of money that each earns increases by the same amount, what year will they be earning the same amount of money?

**Problem-Solving Practice**

*Ratio Tables*

Use ratio tables to solve each problem.

1. Before leaving for a school trip to Spain, Matt traded 500 American dollars and received 250 euros. When he returned from Spain, he had 50 euros left. How much will he receive when he exchanges these euros for dollars?

\[
5 \text{ MR2.3, 5NS2.1}
\]

| Cost       | $100 |

2. Apples are on sale at 10 for $2. Find the cost of 36 apples.

\[
7.20 \quad \text{MR2.3, 5NS2.1}
\]

3. Before administering a medicine, a veterinarian needs to know an animal’s weight in kilograms. If 20 pounds is about 9 kilograms and a dog weighs 40 pounds, what is the dog’s weight in kilograms? Explain your reasoning.

\[
18 \text{ kilograms; 20 pounds equals 9, so each pound equals }.45 \text{ kilogram.}
\]

4. If a hummingbird were to get all of its food from a feeder, then a 16-ounce nectar feeder could feed about 80 hummingbirds a day. How many hummingbirds would you expect to be able to feed with a 4-ounce feeder?

\[
20 \text{ MR2.3, 5NS2.1}
\]

5. A patient receives 2 milliliters of antibiotic every 4 hours. At that rate, how many hours will it take to receive 20 milliliters of antibiotic?

\[
40 \text{ hours MR2.3, 5NS2.1}
\]

6. Luis won a peanut-eating contest by eating 4,800 peanuts in 4 hours. If he ate at a constant rate, how many peanuts had he eaten after 3 hours?

\[
3,600 \text{ MR2.3, 5NS2.1}
\]
**Name __________________________ Date __________________**

**8–3**

**Enrich**

**The Brownie Business**

Julie has decided that she wants to start a brownie business to make extra money over the summer. Before she can ask her parents for money to start her business, she needs to have some information about how many batches of brownies she can make in a day and for how much she must sell the brownies to make a profit.

1. Julie can bake 3 batches of brownies in 2 hours. Her goal is to bake 12 batches of brownies each day. Use the table to find how many hours Julie will need to bake to reach her goal.

<table>
<thead>
<tr>
<th>Batches of Brownies</th>
<th>3</th>
<th>6</th>
<th>9</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

2. Each batch of brownies will be sold for $2. How much money will Julie make if she sells 6 batches of brownies?

<table>
<thead>
<tr>
<th>Batches of Brownies</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>$2</td>
<td>$4</td>
<td>$6</td>
<td>$8</td>
<td>$10</td>
<td>$12</td>
</tr>
</tbody>
</table>

3. If Julie works for 10 hours a day, how many batches of brownies can she bake?

<table>
<thead>
<tr>
<th>Batches of Brownies</th>
<th>3</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td>2</td>
<td>10</td>
</tr>
</tbody>
</table>

4. If Julie hires a friend, they can bake 24 batches of brownies in 8 hours. If they both work 40 hours in one week, how many batches of brownies can they bake that week? If Julie still charges $2 a batch, how much money will they make that week?

<table>
<thead>
<tr>
<th>Hours</th>
<th>8</th>
<th>16</th>
<th>24</th>
<th>32</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batches of Brownies</td>
<td>24</td>
<td>48</td>
<td>72</td>
<td>96</td>
<td>120</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Batches of Brownies</th>
<th>1</th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>$2</td>
<td>$240</td>
</tr>
</tbody>
</table>

---

**8–4**

**Reteach**

**Equivalent Ratios**

Determine if each pair of ratios or rates are equivalent. Explain your reasoning.

Two quantities are equivalent if they have a constant ratio or rate.

1. 10 sandwiches $\div$ $6 = 5$ sandwiches $\div$ $3$ and $20$ sandwiches $\div$ $12 = 5$ sandwiches $\div$ $3$

So, $10$ sandwiches $\div$ $6 = 20$ sandwiches $\div$ $12$.

1. eating peanut butter and jelly sandwiches once every 5 days; eating 4 peanut butter and jelly sandwiches every 20 days

Yes, the numerator and denominator are multiplied by the same number.

Yes, the rates have the same unit rate.

5. 166 miles driven on 4 gallons of gas; 322 miles driven on 11 gallons of gas

No, the numerator and denominator are not multiplied by the same number.

No, the rates do not have the same unit rate.

4. 8 hours of work for $60$ pay; 40 hours of work for $300$

Yes, the rates have the same unit rate.

2. 2 white kittens per litter; 10 white kittens per 4 litters

No, the quantities do not have a constant rate.

3. 1 out of 3 cups of yogurt is strawberry; 4 out of 12 cups of yogurt is strawberry

Yes; the rates have the same unit rate.
Skills Practice

Equivalent Ratios

Determine if each pair of ratios or rates are equivalent. Explain your reasoning.

1. 3 pairs of pants for $60; 4 pairs of pants for $80
   Yes, they have the same unit rate.

2. 18 bagels for $6; 36 bagels for $15
   No, they are not equivalent since their unit rates are $0.33 per bagel and $0.42 per bagel.

3. You give 12 rings to 4 of your friends. Suzanne gives 24 rings to 8 of her friends.
   Yes; they have the same unit rate.

4. Angelica reads 3 books per month. She reads 36 books in a year.
   Yes; they have the same unit rate since there are 12 months in a year.

5. 75 words typed in 5 minutes; 96 words typed in 6 minutes
   No, they are not equivalent since their unit rates are 15 words per minute and 16 words per minute.

Spiral Review

For Exercises 5–6, use the ratio tables given to solve each problem. (Lesson 8–3)

5. To make 6 servings of baked potato skins, you need 18 potatoes. How many potatoes do you need to make 15 servings of baked potato skins?

<table>
<thead>
<tr>
<th>Baked Potato Skins</th>
<th>6</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Potatoes</td>
<td>18</td>
<td>45</td>
</tr>
</tbody>
</table>

6. The aquarium requires that 5 adults accompany every 50 students. How many adults must accompany 200 students?

<table>
<thead>
<tr>
<th>Students</th>
<th>50</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults</td>
<td>5</td>
<td>20</td>
</tr>
</tbody>
</table>
On July 4, 1889, in gratitude to the French for the gift of the Statue of Liberty, Americans from Paris gave to the French a miniature Statue of Liberty. The statue is made of bronze and is approximately one fourth the size and weight of the original. This smaller-scale copy is found near the Grenelle Bridge on the Île des Cygnes, an island in the Seine River about one mile south of the Eiffel Tower.

1. If the original Statue of Liberty is approximately 150 feet tall, about how tall is the replica? **37.5 ft**

2. Complete the table. The first one is done for you.

<table>
<thead>
<tr>
<th>Original Statue of Liberty</th>
<th>Replica</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of hand</td>
<td>16 ft</td>
</tr>
<tr>
<td>Length of nose</td>
<td>4.5 ft</td>
</tr>
<tr>
<td>Length of right arm</td>
<td>42 ft</td>
</tr>
<tr>
<td>Head thickness from ear to ear</td>
<td>10 ft</td>
</tr>
<tr>
<td>Width of mouth</td>
<td>3 ft or 36 in.</td>
</tr>
<tr>
<td>Thickness of waist</td>
<td>35 ft</td>
</tr>
<tr>
<td>Distance from heel to the top of her head</td>
<td>111 ft</td>
</tr>
<tr>
<td>Length of index finger</td>
<td>8 ft</td>
</tr>
<tr>
<td>Circumference of the second joint</td>
<td>3.5 ft</td>
</tr>
</tbody>
</table>

3. The fingernail on the index finger of the original weighs 1.5 kilograms. How much does the fingernail on the replica in France weigh? **0.375 kg**

4. The dimensions of the tablet that Lady Liberty is holding are 23.6 feet by 13.6 feet by 2 feet. What are the dimensions of the smaller-scale tablet in France? **5.9 ft by 3.4 ft by 0.5 ft**

5. Challenge: The fingernail on the index finger is 13 inches long and 10 inches wide. What will be the area of the fingernail on the replica in France? **8.125 in²**
1. Mayumi is driving home from college. She has 510 miles left to go. Her average speed is 52 miles per hour. How long will it take for her to get there?

2. Leo goes on a hot-air balloon ride. The ride covers 70 miles and takes 4 hours. What was the speed of the balloon?

3. The number of goals Dana scored in the first three years of playing hockey are shown. At this rate, how many goals should he expect to score at the end of the fourth year?

<table>
<thead>
<tr>
<th>Year</th>
<th>Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
</tr>
</tbody>
</table>

4. For a class project, Javier has to create a flag to represent his class. He has a silver diamond in the center of one of his stripes. There are several possibilities for the flag that Javier can create. Find how many different flags Javier can make with two stripes and one diamond.

5. Kim has to drive a total of 275 miles to visit her grandfather. If she drives 65 miles per hour for the first 160 miles and then 70 miles per hour for the rest of the trip, how long will it take her to make the trip?

6. To train for a race, you plan to run 1 mile the first week and double the number of miles each week for five weeks. How many miles will you run the 5th week?
8–5

Skills Practice
Problem-Solving Investigation

Use any strategy shown below to solve each problem.

• Act it out
• Look for a pattern
• Make a table

1. To train for the bicycle race, Dan plans to ride 10 miles per day the first week, adding 3 miles per week. How many miles will he ride per day the eighth week?

31 miles

2. A rancher is building a square corral with sides that are 20 feet long. He plans to put a post every 5 feet around the edge of the corral. How many posts will he need?

16 posts

3. At 5 P.M., the temperature was 3°C. By 8 P.M., the temperature had dropped 6°C. What was the temperature at 8 P.M.?

−3°C

4. Which is greater for the following data: the mode or the median? 8, 10, 4, 7, 36, 21, 8, 11, 19

The median (median = 10; mode = 8)

5. Write a problem that you can solve using a problem-solving strategy. What strategy would you use to solve the problem? Explain why you chose that strategy.

Check student answers

8–5

Homework Practice
Problem-Solving Investigation

Use any strategy shown below to solve each problem.

• Act it out • Look for a pattern • Make a table

1. Frank completed 3 passes the first year that he played football, 5 the second year, and 7 the third year. At this rate, how many passes should he expect to complete during his sixth year playing football?

13 passes

2. To train for the Math League competition, Janice spent \( \frac{1}{2} \) hour each day of the first week reviewing lessons, adding an additional \( \frac{1}{2} \) hour each week for 4 weeks. What were the total number of hours she spent reviewing during the fourth week?

14 hours

3. The table below shows the amount of snow in Maine for 4 weeks during January. What is the mean amount of snow that fell during the month of January?

<table>
<thead>
<tr>
<th>Week</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snow (in.)</td>
<td>21</td>
<td>28</td>
<td>29</td>
<td>22</td>
</tr>
</tbody>
</table>

25 inches

Spiral Review

Determine if each pair of ratios or rates are equivalent.

4. $5 for 10 notebooks; $40 for 8 notebooks

No; since the unit rates are not the same, \( \frac{\$0.50}{1 \text{ notebook}} \) and \( \frac{\$0.50}{1 \text{ notebook}} \), the rates are not equivalent; \( \frac{\$5}{10 \text{ notebooks}} \) does not equal \( \frac{\$40}{8 \text{ notebooks}} \)

5. $9 for 3 rolls of film; $30 for 15 rolls of film

No; since the unit rates are not the same, \( \frac{\$3 \text{ per roll of film}}{1 \text{ roll of film}} \) and \( \frac{\$2 \text{ per roll of film}}{1 \text{ roll of film}} \), the rates are not equivalent; \( \frac{\$9}{5 \text{ rolls of film}} \) does not equal \( \frac{\$30}{15 \text{ rolls of film}} \)
Choose the best strategy to solve the problem. Tell what strategy you used.

1. Helena was making a beaded necklace. She strung one blue bead, three red beads, and two green beads. Then she strung two blue beads, four red beads, and three green beads. What combination of beads will she string next?

**Three blue beads, five red beads, and four green beads; look for a pattern**

2. The Hernandez family is posing for a picture. The family has a mother, father, two children, and a grandmother. They will sit on the sofa in their living room for the picture. How many different ways can the Hernandez family sit on the sofa for the shot?

**120; make a table**

3. James is studying for the spelling bee championship. The championships takes place in 15 days. The first day, he memorizes 5 words. Each day after that, he memorizes 5 more words. How many words are in all will James know on the day before the championship?

**70; make a table or use the four-step plan**

4. Kelly swam 15 lengths of the swimming pool. It took her $7\frac{1}{2}$ minutes. If her pool is 36 feet long, how long would it take her to swim across a lake that is 48 yards wide?

**30 minutes; the four-step plan**

5. An elevator can safely carry 500 pounds. On the first floor, two 125-pound women got on the elevator. On the second floor, one of the women got off, and a 215-pound man got on. On the third floor, a 140-pound woman got on with her 12-pound baby. On the fourth floor, the 125-pound woman got off, but another woman wanted to get on. What is the most the woman can weigh for her to safely board the elevator?

**133 pounds; act it out**
8-6

Name ____________________________ Date ____________________________

Skills Practice
Algebra: Ratios and Equations

Solve.

1. \( \frac{n}{6} = \frac{6}{9} \)
   \( n = 4 \)

2. \( \frac{10}{n} = \frac{4}{8} \)
   \( n = 20 \)

3. \( \frac{4}{8} = \frac{2}{n} \)
   \( n = 4 \)

4. \( \frac{n}{3} = \frac{15}{45} \)
   \( n = 1 \)

5. \( \frac{15}{7} = \frac{n}{105} \)
   \( n = 225 \)

6. \( \frac{21}{6} = \frac{35}{n} \)
   \( n = 10 \)

7. \( \frac{12}{13} = \frac{n}{130} \)
   \( n = 120 \)

8. \( \frac{9}{n} = \frac{3}{4} \)
   \( n = 6 \)

9. \( \frac{48}{n} = \frac{3}{4} \)
   \( n = 64 \)

10. \( \frac{n}{8} = \frac{3}{4} \)
    \( n = 6 \)

11. \( \frac{9}{n} = \frac{54}{12} \)
    \( n = 2 \)

12. \( \frac{9}{100} = \frac{n}{50} \)
    \( n = 4.5 \)

13. \( \frac{n}{4} = \frac{26}{52} \)
    \( n = 2 \)

14. \( \frac{5}{n} = \frac{25}{34} \)
    \( n = 170 \)

15. \( \frac{n}{8} = \frac{36}{48} \)
    \( n = 48 \)

16. \( \frac{n}{4} = \frac{24}{32} \)
    \( n = 3 \)

17. \( \frac{25}{5} = \frac{n}{10} \)
    \( n = 50 \)

18. \( \frac{n}{2} = \frac{11}{6} \)
    \( n = 3.7 \)

19. \( \frac{3}{n} = \frac{36}{48} \)
    \( n = 4 \)

20. \( \frac{4}{n} = \frac{24}{32} \)
    \( n = 3 \)

21. \( \frac{6}{100} = \frac{n}{50} \)
    \( n = 3 \)

22. \( \frac{35}{42} = \frac{5}{n} \)
    \( n = 6 \)

23. For every 7 girls on a swim team, there are 9 boys. If there are 18 boys on the swim team, how many girls are there?
   \( 14 \)

24. In a box of marbles, there are 4 red marbles for every 9 blue marbles. If the box has 81 blue marbles, how many red marbles are in the box?
   \( 36 \)
Problem-Solving Practice

Algebra: Ratios and Equations

Solve.

1. A florist is using carnations to make bouquets for each table in a restaurant. He has used 24 carnations for 3 bouquets. There are 27 tables in the restaurant. Write an equation to express the relationship between the 24 carnations for 3 bouquets and the number of carnations c needed for 27 tables. Then solve.

\[
\frac{24}{3} = \frac{c}{27}; c = 216
\]

2. A recent survey reported that out of 200 middle school students, 120 said that they read at least one news story in the newspaper every day. At this rate, how many out of 600 middle school students would you expect to read at least one news story in the newspaper every day?

360

3. Jim spent $51 on 3 CDs. At this rate, how much would 8 CDs cost?

$136

4. Suppose 5 out of every 30 students get on the honor roll. Predict how many students will get on the honor roll in a school system of 1,200 students.

200

5. This past Saturday, a free ticket to the circus was placed on the back of every fifth sales receipt. If there were 7,200 sales receipts given out, how many people got a free ticket to the circus?

1,440

6. After selling tickets for 2 hours, the circus company had already sold 450 tickets. If tickets continue to sell at this rate for the next 3 hours, how many more tickets will the circus company sell?

675

Enrich

All About Ada

Did you know that a woman wrote the first description of a computer programming language? She was the daughter of a famous English lord and was born in 1815. She had a deep understanding of mathematics and was fascinated by calculating machines. Her interests led her to create the first algorithm. In 1843, she translated a French version of a lecture by Charles Babbage. In her notes to the translation, she outlined the fundamental concepts of computer programming. She died in 1852. In 1979, the U.S. Department of Defense named the computer language Ada after her.

To find out this woman's full name, solve the equation for each letter.

1. \[
\frac{7}{A} = \frac{28}{40}; A = 10
\]

2. \[
\frac{5}{B} = \frac{36}{45}; B = 8
\]

3. \[
\frac{1}{C} = \frac{15}{5}; C = 3
\]

4. \[
\frac{5}{D} = \frac{35}{63}; D = 9
\]

5. \[
\frac{2}{E} = \frac{8}{20}; E = \frac{2}{5}
\]

6. \[
\frac{2}{F} = \frac{18}{27}; F = 3
\]

7. \[
\frac{6}{G} = \frac{12}{14}; G = \frac{9}{7}
\]

8. \[
\frac{9}{H} = \frac{O}{44}; O = 36
\]

9. \[
\frac{2}{I} = \frac{8}{25}; I = \frac{2}{3}
\]

10. \[
\frac{5}{J} = \frac{25}{30}; J = \frac{5}{6}
\]

Now look for each solution below. Write the corresponding letter on the line above the solution. If you have calculated correctly, the letters will spell her name.

A A

D D

A A

B B

Y Y

R R

O O

N N

L L

O O

V V

F F

E E

L L

A A

C C

E E
Reteach
Algebra: Sequences and Expressions

A sequence is a list of numbers in a specific order. Sequences can be shown as lists or in a table.

List → 4, 8, 12, 16, ...

Table →

<table>
<thead>
<tr>
<th>Position</th>
<th>Value of Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>n</td>
<td>4n</td>
</tr>
</tbody>
</table>

You can write an algebraic expression to describe a sequence. The value of each term can be described as a function of its position in the sequence.

In the example above, notice that the value of each term is 4 times its position number. So, the value of the term in position \( n \) is \( 4n \).

<table>
<thead>
<tr>
<th>Position</th>
<th>Multiply by 4</th>
<th>Value of Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>( 1 \times 4 )</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>( 2 \times 4 )</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>( 3 \times 4 )</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>( 4 \times 4 )</td>
<td>16</td>
</tr>
<tr>
<td>( n )</td>
<td>( n \times 4 )</td>
<td>( 4n )</td>
</tr>
</tbody>
</table>

Use words and symbols to describe the value of each term as a function of its position. Then find the value of the tenth term in the sequence.

1. The value of the term is 2 more than its position; \( n + 2; 12 \)

Skills Practice
Algebra: Sequences and Expressions

Use words and symbols to describe the value of each term as a function of its position. Then find the value of the twelfth term in the sequence.

1. Position
Value of Term
7 8 9 10

add 6 to the position number;

\( n + 6; 18 \)

2. Position
Value of Term
15 20 25 30

multiply the position number by 5; \( 5n; 60 \)

3. Position
Value of Term
11 13 15 17

multiply the position number by 2 and subtract 1; \( 2n - 1; 23 \)

4. There are 12 inches in 1 foot. Make a table and write an algebraic expression relating the number of inches to the number of feet. Then find Reese’s height in inches if he is 4 feet tall.

<table>
<thead>
<tr>
<th>Feet</th>
<th>1 2 3 4</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inches</td>
<td>12 24 36 48</td>
<td>( 12n )</td>
</tr>
</tbody>
</table>

Reese’s height in inches is 48 inches.
**Homework Practice**

**Algebra: Sequences and Expressions**

Use words and symbols to describe the value of each term as a function of its position. Then find the value of the tenth term in the sequence.

<table>
<thead>
<tr>
<th>Position</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>( n )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Term</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>( n )</td>
</tr>
</tbody>
</table>

The value of each term is 5 times its position; \( 5n; 50 \)

1. There are 3 feet in 1 yard. Write an algebraic expression relating the number of feet in a yard. Then find the length of a field in yards if it is 60 feet long.

\[
\frac{n}{3}; 60 \div 3 = 20 \text{ yards}
\]

2. There are 24 hours in 1 day. Write an algebraic expression relating the number of hours to the number of days. Then find the number of hours in 5 days.

\[
24n; 24 \times 5 = 120 \text{ hours}
\]

3. It costs $12 an hour to rent a colonial costume. Write an expression to find the amount charged for renting a costume for \( n \) hours. Then use the expression to find out how much it would cost to rent a costume for 5 hours.

\[
$12n; $12 \times 5 = $60
\]

4. A student is charged $0.50 for every day a library book is overdue. Write an expression to find the amount charged for returning a book \( n \) days overdue. Then use the expression to find out how much it would cost to return a book 10 days overdue.

\[
$0.50n; $0.50 \times 10 = $5
\]

5. The label says there are 6 grams of protein in one cup of ice cream. Write an algebraic expression relating the grams of protein to the number of cups. Then find the amount of protein in 3 cups of ice cream.

\[
6c; 6 \times 3 = 18 \text{ grams}
\]
A geometric sequence is one in which the ratio between the two terms is constant.

1. SQUARE NUMBERS A square number can be modeled by using an area model to create an actual square.
   a. Draw the next two terms in the sequence.

   1 4 9 16

   b. The function that describes square numbers is \( n^2 \). Complete the table by finding the missing position and the missing value of the term for square numbers.

<table>
<thead>
<tr>
<th>Position</th>
<th>3  8 10 11 13 15 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Term</td>
<td>9  64 100 121 169 225 625</td>
</tr>
</tbody>
</table>

2. TRIANGULAR NUMBERS A triangular number can be modeled by using symbols to create triangles. The first three triangular numbers are 1, 3, and 6.
   a. Draw the next two terms in the sequence.

   1 3 6 10 15

   b. The function that describes the triangular number sequence is \( n \times \frac{(n + 1)}{2} \). Complete the table for triangular numbers.

<table>
<thead>
<tr>
<th>Position</th>
<th>3  4  8 10 15 20 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Term</td>
<td>6  10 36 55 120 210 5050</td>
</tr>
</tbody>
</table>

A function is a relationship in which one quantity depends on another quantity. You can use an equation to represent a function. An equation is a mathematical statement that contains an equal sign.

A poster of Lake Tahoe comes in several sizes. However, for every poster, the length is 3 times its width.

You can make a table to show the function.

<table>
<thead>
<tr>
<th>Width (in inches), ( w )</th>
<th>6 12 18 24 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (in inches), ( \ell )</td>
<td>18 36 54 72 90</td>
</tr>
</tbody>
</table>

You can describe a function in words or you can write an equation.

Words: The length is 3 times the width.
Equation: Let \( \ell \) represent the length of the rectangle. Let \( w \) represent the width.
Write \( \ell = 3w \).

Complete the table for the function.

1. The cost of shipping an item is $1.50 per pound.
   Let \( w \) represent the weight in pounds.
   Let \( c \) represent the shipping cost in dollars.
   \( c = 1.5w \)

<table>
<thead>
<tr>
<th>Weight in pounds, ( w )</th>
<th>1 2 3 4 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping cost in dollars, ( c )</td>
<td>$1.50 $3 $4.50 $6.00 $7.50</td>
</tr>
</tbody>
</table>

2. Graph the results from Exercise 1 on a coordinate grid.
Skills Practice

Algebra: Equations and Graphs

Complete the table. Write an equation to represent the function displayed in each table.

1. **Input, x** | 0 | 1 | 2 | 3 | 4 | 5 | **Output, y** | 1 | 3 | 5 | 7 | 9 | 11

   \[ y = 1 + 2x \]

2. **Input, x** | 0 | 1 | 2 | 3 | 4 | 5 | **Output, y** | 4 | 5 | 6 | 7 | 8 | 9

   \[ y = 4 + x \]

3. **Input, x** | 0 | 1 | 2 | 3 | 4 | 5 | **Output, y** | 5 | 7 | 9 | 11 | 13 | 15

   \[ y = 5 + 2x \]

4. The student admission to a local theatre is shown in the table. Write a sentence and an equation to describe the data. Then find the total cost of admission for 7 people, 8 people, and 9 people. Graph the results on a coordinate grid.

   **Admission to the theatre**
   
   is $5 per person;

   \[ t = 5n; \$35, \$40, \$45 \]

   \[ \begin{array}{c|c}
   \text{Number of People, n} & \text{Total Admission, } S, t \\
   \hline
   1 & 5 \\
   2 & 10 \\
   3 & 15 \\
   4 & 20 \\
   \end{array} \]

   \[ p = 10c \]

   3. Write an equation to find \( p \).

   4. How many points will a player earn if he or she collects 9 coins?

   \[ 90 \]

Homework Practice

Algebra: Equations and Graphs

Write an equation to represent the function displayed in the table.

1. **Input, x** | 1 | 2 | 3 | 4 | 5 | **Output, y** | 5 | 10 | 15 | 20 | 25

   \[ y = 5x \]

Use the following information for Exercises 2–4.

In a video game, each player earns 10 points for every coin he or she collects.

2. Make a table to show the relationship between the number of coins collected, \( c \) and the total points, \( p \). Graph the results on a coordinate grid.

   \[ \begin{array}{c|c|c|c|c}
   \text{Number of coins, } c & 1 & 2 & 3 & 4 \\
   \hline
   \text{Total points, } p & 10 & 20 & 30 & 40 \\
   \end{array} \]

   \[ p = 10c \]

   3. Write an equation to find \( p \).

   4. How many points will a player earn if he or she collects 9 coins?

   \[ 90 \]

Spiral Review

Solve. (Lesson 8–7)

5. There are 60 minutes in 1 hour. Write an algebraic equation relating the number of hours to the number of minutes. Then find the duration of the movies in hours if Liz and her friends watched two movies that together were 270 minutes long.

   \[ \frac{m}{60} = h; \frac{270}{m} = 4\frac{1}{2} \text{ hours} \]
Answers

Grade 5

8–8

Problem-Solving Practice
Algebra: Equations and Graphs

Write an equation to represent the function displayed in the table.

1. The table shows the amount of money Yvonne earns based on the number of hours she walks dogs. Write a sentence and an equation to describe the data. Then find the total earnings for 6 hours, 7 hours, and 8 hours. Graph the results on a coordinate grid.

<table>
<thead>
<tr>
<th>Hours Walking Dogs</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earnings ((y))</td>
<td>$2</td>
<td>$4</td>
<td>$6</td>
<td>$8</td>
</tr>
</tbody>
</table>

Yvonne earns $2 for each hour she walks dogs; \(y = 2x\); $12, $14, $16

2. The basketball team is holding a car wash to raise money. They are charging $8 for each car they wash. Make a table to show the relationship between the number of cars washed, \(c\), and the total amount earned, \(t\). Graph the results on a coordinate grid. Then, write an equation to find the total amount earned, \(t\) for washing cars, \(c\).

<table>
<thead>
<tr>
<th>Cars Washed, (c)</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount Earned, (t)</td>
<td>$8</td>
<td>$16</td>
<td>$24</td>
</tr>
</tbody>
</table>

\(t = 8c\)

3. While in normal flight, a hawk flies at an average speed of 10 miles an hour. Make a table to show the relationship between the total distance, \(d\), that a hawk can travel in, \(h\) hours. Then, write an equation to find the total distance, \(d\) that a hawk can travel in, \(h\) hours while in normal flight. Graph the results on a coordinate grid.

<table>
<thead>
<tr>
<th>Hours, (h)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance, (d)</td>
<td>10</td>
<td>20</td>
<td>30</td>
<td>40</td>
</tr>
</tbody>
</table>

\(d = 10h\)

Enrich

Enchanted Rock

Enchanted Rock is a pink granite dome located in Enchanted Rock State Natural Area in Central Texas. It is one of the largest batholiths in the United States. A batholith is made of igneous rock and is the result of volcanic activity. The Enchanted Rock dome rises 425 feet above the ground and is 1,825 feet above sea level.

The entrance fee to Enchanted Rock State Natural Area is $5 per person.

1. Complete the table to find the entrance cost for groups of different sizes.

<table>
<thead>
<tr>
<th>Input, (x)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output, (y)</td>
<td>$5</td>
<td>$10</td>
<td>$15</td>
<td>$20</td>
<td>$25</td>
<td>$30</td>
<td>$35</td>
<td>$40</td>
</tr>
</tbody>
</table>

2. Write and graph an equation to represent the function displayed in the table. \(y = 5x\)

3. If the park has 290 visitors, how much money did they collect in entrance fees? \$1,450

4. A local environmental group is planning to hike up Enchanted Rock. The group will cover each member’s entrance fee and will provide lunch for its members. The group budgets $75 for lunch, regardless of the number of people on the hike. Complete the table to show the total expenses of the group based on the number of people on the hike.

<table>
<thead>
<tr>
<th>Input, (x)</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output, (y)</td>
<td>$100</td>
<td>$125</td>
<td>$150</td>
<td>$175</td>
<td>$200</td>
<td>$225</td>
</tr>
</tbody>
</table>

5. Write and graph an equation to represent the function displayed in the table. \(y = 5x + 75\)

6. The group will hike up the dome at a rate of 1,500 feet per hour. What is their hiking speed per minute? \(25\) feet per minute
**Vocabulary Test**

Match each word to its definition. Write your answers on the line provided.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ratio</td>
<td>C</td>
<td>A. A ratio of two measurements or amounts made with different units in which the second amount is 1.</td>
</tr>
<tr>
<td>2. equivalent ratios</td>
<td>D</td>
<td>B. A relationship in which one quantity depends upon another quantity.</td>
</tr>
<tr>
<td>3. rate</td>
<td>A</td>
<td>C. A relationship between two quantities in which the first measures a certain number of units and the second measures another number of units.</td>
</tr>
<tr>
<td>4. function</td>
<td>B</td>
<td>D. Ratios that can be represented by equivalent fractions.</td>
</tr>
<tr>
<td>5. simplest form</td>
<td>E</td>
<td>E. A fraction in which the numerator and the denominator have no common factor greater than 1.</td>
</tr>
<tr>
<td>6. ratio table</td>
<td>G</td>
<td>F. A list of numbers in a specific order.</td>
</tr>
<tr>
<td>7. sequence</td>
<td>F</td>
<td>G. A table with columns filled with pairs of numbers that have the same ratio.</td>
</tr>
</tbody>
</table>

---

**Oral Assessment**

Place 8 playing cards face up on a table. Make sure there are some face cards and some number cards. Read each question aloud to the student. Then write the student’s answers on the lines below the question.

1. How many face cards are there compared to number cards?

   **Student answers will vary.**

2. Can you compare the number of face cards to the amount of number cards using the word more and then using the word times?

   **Student answers will vary.**

3. Can you compare the amount of number cards to the number of faces cards using the word less and then using a fraction?

   **Student answers will vary.**

4. Tell how you got your answer.

   **Student answers will vary.**

5. What is the ratio of face cards to number cards?

   **Student answers will vary.**

6. Tell how you got your answer.

   **Student answers will vary.**
7. Several students were surveyed to find out their favorite breakfast drink. What ratio compares the number of students who chose apple juice to the total number of students who responded?

<table>
<thead>
<tr>
<th>Beverage</th>
<th>Apple Juice</th>
<th>Orange Juice</th>
<th>Milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Responses</td>
<td>6</td>
<td>9</td>
<td>3</td>
</tr>
</tbody>
</table>

6:18 or 1:3

8. What ratio compares the number of students who chose milk to the total number of students who responded?

3:18 or 1:6

9. Tell how you got your answer.

Sample answer: I added the total number of students who responded and formed the ratio with that number and the number who chose milk.

10. What ratio compares the number of students who chose orange juice to the total number of students who responded?

9:18 or 1:2

11. What ratio compares the number of students who chose milk to the number of students who chose orange juice?

3:9 or 1:3

12. Tell how you got your answer.

Sample answer: I located data from the chart for the numbers or students who chose milk and orange juice and formed a ratio with those numbers.
# Chapter 8 Assessment Answer Key

## Chapter Diagnostic Assessment

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>$\frac{1}{4}$</td>
</tr>
<tr>
<td>2.</td>
<td>$\frac{1}{2}$</td>
</tr>
<tr>
<td>3.</td>
<td>$\frac{1}{3}$</td>
</tr>
<tr>
<td>4.</td>
<td>$\frac{1}{9}$</td>
</tr>
<tr>
<td>5.</td>
<td>$\frac{x}{2}$</td>
</tr>
<tr>
<td>6.</td>
<td>$b = 6$</td>
</tr>
<tr>
<td>7.</td>
<td>$y = 7$</td>
</tr>
<tr>
<td>8.</td>
<td>$a = 8$</td>
</tr>
<tr>
<td>9.</td>
<td>$y = 4$</td>
</tr>
<tr>
<td>10.</td>
<td>$x = 8$</td>
</tr>
<tr>
<td>11.</td>
<td>$m = 7$</td>
</tr>
<tr>
<td>12.</td>
<td>$n = 12$</td>
</tr>
<tr>
<td>13.</td>
<td>$8, 10, 12$</td>
</tr>
<tr>
<td>14.</td>
<td>$20, 25, 30$</td>
</tr>
<tr>
<td>15.</td>
<td>$76, 80, 84$</td>
</tr>
<tr>
<td>16.</td>
<td>65 minutes</td>
</tr>
</tbody>
</table>

## Chapter Pretest

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>$\frac{1}{5}$</td>
</tr>
<tr>
<td>2.</td>
<td>$\frac{2}{3}$</td>
</tr>
<tr>
<td>3.</td>
<td>$\frac{5}{6}$</td>
</tr>
<tr>
<td>4.</td>
<td>$\frac{3}{2}$ in. $\frac{1}{3}$ hr.</td>
</tr>
<tr>
<td>5.</td>
<td>$\frac{25}{1}$ envelopes $\frac{13.4}{1}$ tons $\frac{1}{1}$ day</td>
</tr>
<tr>
<td>6.</td>
<td>$\frac{13}{n}; 182$</td>
</tr>
<tr>
<td>7.</td>
<td>$a = 1$</td>
</tr>
<tr>
<td>8.</td>
<td>$h = 25$</td>
</tr>
<tr>
<td>9.</td>
<td>$n - 3; 11$</td>
</tr>
<tr>
<td>10.</td>
<td>$y = 5x$</td>
</tr>
</tbody>
</table>

## Quiz 1 (8–1 through 8–3)

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>$\frac{45}{50}, \frac{9}{10}$; for every 9 minutes spent teaching math, there are 10 minutes spent each day teaching language arts</td>
</tr>
<tr>
<td>2.</td>
<td>$\frac{8}{10}, \frac{4}{5}$; for every 4 fourth-graders, there are 5 fifth-graders.</td>
</tr>
<tr>
<td>3.</td>
<td>Each number is 2.4 times the missing number; 35.136</td>
</tr>
<tr>
<td>4.</td>
<td>60</td>
</tr>
<tr>
<td>5.</td>
<td>60 lemons</td>
</tr>
<tr>
<td>6.</td>
<td>$$36$</td>
</tr>
</tbody>
</table>
Chapter 8 Assessment Answer Key

**Quiz 2 (8–4 through 8–6)**
Page 52

Yes; since the unit rates are the same, $5 per book, the rates are equivalent

1. $n + 5, 15$

No; since the unit rates are not the same, $2 per sandwich and $5 per sandwich, the rates are not equivalent;

\[
\frac{$10}{5 \text{ sandwiches}} = \frac{$15}{3 \text{ sandwiches}}
\]

No; since the unit rates are not the same, $2 per daisy and $5 per daisy, the rates are not equivalent;

\[
\frac{$16}{8 \text{ daisies}} \neq \frac{$60}{12 \text{ daisies}}
\]

3. $n + 7, 17$

4. $n - 1, 9$

5. Number of months, $m$
   | Total cost ($), $t$
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>24</td>
</tr>
</tbody>
</table>

6. $t = 6m$

7. $\frac{t}{m} = 6$

8. $2 \frac{1}{2}$ hours

9. $40$

**Quiz 3 (8–7 through 8–8)**
Page 53

1. $n + 5, 15$

2. $n - 2, 8$

3. $n + 7, 17$

4. $n - 1, 9$

5. Number of months, $m$
   | Total cost ($), $t$
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>24</td>
</tr>
</tbody>
</table>

6. $t = 6m$

7. $\frac{t}{m} = 6$

8. $2 \frac{1}{2}$ hours

9. $40$

**Mid Chapter Review**
Page 54

1. $B$

2. $F$

3. $A$

4. $H$

Find the unit rates. They should be equal.

The value of the term in position $n$ is $4n$. 

7. $40$
## Chapter 8 Assessment Answer Key

### Chapter Test, Form 1
Page 60

1. **D**
2. **G**
3. **B**
4. **H**
5. **B**
6. **J**
7. **B**
8. **J**
9. **C**
10. **H**
11. **D**
12. **G**

### Chapter Test, Form 2A
Page 61

1. **D**
2. **F**
3. **C**
4. **F**
5. **D**
6. **H**
7. **A**

(continued on the next page)
<table>
<thead>
<tr>
<th>Chapter Test, Form 2A</th>
<th>Chapter Test, Form 2B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page 63</td>
<td>Page 64</td>
</tr>
<tr>
<td>6. H</td>
<td>12. F</td>
</tr>
</tbody>
</table>
Chapter 8 Assessment Answer Key

Chapter Test, Form 2C
Page 66

1. \( \frac{7}{4} \)

2. \( \frac{1}{3} \)

3. \( \frac{9 \text{ miles}}{1 \text{ day}} \)

4. \( \frac{18 \text{ meters}}{1 \text{ minute}} \)

5. \( \frac{16}{1 \text{ hour}} \)

6. \( 120 \)

7. yes

8. no

9. 33

10. 4

11. 3

12. multiply the position number by 2 and add 3; \( 2n + 3; 23 \)

13. \( s = 8p \)

14. 88

15. \( y = 3x \)

16. 

17. 40 minutes

Chapter Test, Form 2D
Page 67

1. \( \frac{1}{3} \)

2. \( \frac{7}{4} \)

3. \( \frac{18 \text{ m}}{1 \text{ min}} \)

4. \( \frac{9 \text{ mi}}{1 \text{ d}} \)

5. \( \frac{16}{1 \text{ h}} \)

6. \( 90 \)

7. no

8. yes

9. 4

10. 3

(continued on the next page)
## Chapter 8 Assessment Answer Key

### Chapter Test, Form 2D

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.</td>
<td>( \text{multiply the position number by 2 and add 1; } 2n + 1; 25 )</td>
</tr>
<tr>
<td>12.</td>
<td>( s = 8p )</td>
</tr>
<tr>
<td>13.</td>
<td>88</td>
</tr>
<tr>
<td>14.</td>
<td>( y = 3x + 1 )</td>
</tr>
<tr>
<td>15.</td>
<td>( y = 4x )</td>
</tr>
</tbody>
</table>

### Chapter Test, Form 3

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>( \frac{2}{5} )</td>
</tr>
<tr>
<td>2.</td>
<td>( \frac{5}{2} )</td>
</tr>
<tr>
<td>3.</td>
<td>( \frac{18 \text{ cm}}{1 \text{ min}} )</td>
</tr>
<tr>
<td>4.</td>
<td>( \frac{6 \text{ mi}}{1 \text{ d}} )</td>
</tr>
<tr>
<td>5.</td>
<td>( \frac{$11}{1 \text{ h}} )</td>
</tr>
<tr>
<td>6.</td>
<td>5</td>
</tr>
<tr>
<td>7.</td>
<td>3:1, 6:2</td>
</tr>
<tr>
<td>8.</td>
<td>5:12, 10:24</td>
</tr>
<tr>
<td>9.</td>
<td>1</td>
</tr>
<tr>
<td>10.</td>
<td>15</td>
</tr>
<tr>
<td>11.</td>
<td>136</td>
</tr>
<tr>
<td>12.</td>
<td>( 130n )</td>
</tr>
<tr>
<td>13.</td>
<td>( m = 2.5w )</td>
</tr>
<tr>
<td>14.</td>
<td>( $22.50 )</td>
</tr>
<tr>
<td>15.</td>
<td>( y = 7x )</td>
</tr>
<tr>
<td>16.</td>
<td>no; ( \frac{12}{4} &lt; \frac{3}{1.05} )</td>
</tr>
<tr>
<td>Level</td>
<td>Specific Criteria</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------</td>
</tr>
<tr>
<td>4</td>
<td>The student demonstrates a <strong>thorough understanding</strong> of the mathematics concepts and/or procedures embodied in the task. The student has responded correctly to the task, used mathematically sound procedures, and provided clear and complete explanations and interpretations. The response may contain minor flaws that do not detract from the demonstration of a thorough understanding.</td>
</tr>
<tr>
<td>3</td>
<td>The student demonstrates an <strong>understanding</strong> of the mathematics concepts and/or procedures embodied in the task. The student’s response to the task is essentially correct with the mathematical procedures used and the explanations and interpretations provided demonstrating an essential but less than thorough understanding. The response may contain minor errors that reflect inattentive execution of the mathematical procedures or indications of some misunderstanding of the underlying mathematics concepts and/or procedures.</td>
</tr>
<tr>
<td>2</td>
<td>The student has demonstrated only a <strong>partial understanding</strong> of the mathematics concepts and/or procedures embodied in the task. Although the student may have used the correct approach to obtaining a solution or may have provided a correct solution, the student’s work lacks an essential understanding of the underlying mathematical concepts. The response contains errors related to misunderstanding important aspects of the task, misuse of mathematical procedures, or faulty interpretations of results.</td>
</tr>
<tr>
<td>1</td>
<td>The student has demonstrated a <strong>very limited understanding</strong> of the mathematics concepts and/or procedures embodied in the task. The student’s response to the task is incomplete and exhibits many flaws. Although the student has addressed some of the conditions of the task, the student reached an inadequate conclusion and/or provided reasoning that was faulty or incomplete. The response exhibits many errors or may be incomplete.</td>
</tr>
<tr>
<td>0</td>
<td>The student has provided a <strong>completely incorrect</strong> solution or uninterpretable response, or no response at all.</td>
</tr>
</tbody>
</table>
Chapter 8 Assessment Answer Key

Page 72, Extended-Response Test
Sample Answer

In addition to the scoring rubric found on page A30, the following sample answers may be used as guidance in evaluating open-ended assessment items.

1. a. To find the ratio of sunflowers to flowers in Belinda’s garden, first find the total number of flowers:
   \[9 + 18 + 27 = 54.\]
   Then write a fraction to express the ratio of sunflowers to flowers and put it in simplest form:
   \[
   \frac{9}{54} = \frac{1}{6}.
   \]
   So the ratio is \(\frac{1}{6}\), 1 to 6, or 1:6, which means that one out of every 6 flowers in Belinda’s garden is a sunflower.

b. To find the ratio of sunflowers to flowers in Dee’s garden, first find the total number of flowers:
   \[8 + 12 + 28 = 48.\]
   Then write a fraction to express the ratio of sunflowers to flowers and put it in simplest form:
   \[
   \frac{8}{48} = \frac{1}{6}.
   \]
   So the ratio is \(\frac{1}{6}\), 1 to 6, or 1:6, which means that one out of every 6 flowers in Dee’s garden is a sunflower.

c. Yes. Equivalent ratios express the same relationship between two quantities. The ratios \(\frac{9}{54}\) and \(\frac{8}{48}\) both simplify to the same ratio, \(\frac{1}{6}\), which means that the ratio of sunflowers to flowers is the same in both Belinda’s and Dee’s gardens.

2. a. Equivalent ratios are ratios that can be written using equivalent fractions.
   b. Josh delivered newspapers at the rate of \(\frac{21}{7}\) or \(\frac{3}{1}\), which means that Josh delivered newspapers at the unit rate of \(\frac{3 \text{ papers}}{1 \text{ day}}\). Jake delivered newspapers at the rate of \(\frac{50}{10}\) or \(\frac{5}{1}\), which means that Jake delivered newspapers at the unit rate of \(\frac{5 \text{ papers}}{1 \text{ day}}\). The rates are not equivalent because \(\frac{3 \text{ papers}}{1 \text{ day}}\) is not equivalent to \(\frac{5 \text{ papers}}{1 \text{ day}}\).

3. a. Multiply the number of bottles by 5 to find how many cents Susan can make by recycling.
   b. \(5b = c\), where \(b = \) the number of bottles Susan brings to the recycling center, and \(c = \) the number of cents she will receive.

   c. 35¢, 40¢, 45¢

   d. Using the equation \(5b = c\), replace \(c\) with 500 because $5 equals 500 cents:
   \[5b = 500.\]
   Then, solve for \(b\) by dividing both sides by 5:
   \[
   \frac{5}{5}b = \frac{500}{5}.
   \]
   Therefore, \(b = 100.\) Susan will have to collect and bring 100 bottles to the recycling center to make $5.
Chapter 8 Assessment Answer Key

Cumulative Standardized Test Practice

1. B
2. F
3. C
4. F
5. D
6. H
7. B
8. F
9. C
10. 4:11
11. seven o’clock
12. \( \frac{1}{5280} = \frac{6}{f} \)
13. \( c = 1.75 + 0.5m \)
14. 51.545
15. \( y = \frac{x}{6} \)