Chapter 5
Resource Masters

Course 2
Consumable Workbooks  Many of the worksheets contained in the Chapter Resource Masters booklets are available as consumable workbooks in both English and Spanish.

*Study Guide and Intervention Workbook*  0-07-860128-2
*Study Guide and Intervention Workbook (Spanish)*  0-07-860134-7
*Practice: Skills Workbook*  0-07-860129-0
*Practice: Skills Workbook (Spanish)*  0-07-860135-5
*Practice: Word Problems Workbook*  0-07-860130-4
*Practice: Word Problems Workbook (Spanish)*  0-07-860136-3

Answers for Workbooks  The answers for Chapter 5 of these workbooks can be found in the back of this Chapter Resource Masters booklet.

**StudentWorks™**  This CD-ROM includes the entire Student Edition text along with the English workbooks listed above.

**TeacherWorks™**  All of the materials found in this booklet are included for viewing and printing in the *Glencoe Mathematics: Applications and Concepts, Course 2 TeacherWorks™* CD-ROM.

**Spanish Assessment Masters**  Spanish versions of forms 2A and 2C of the Chapter 5 Test are available in the *Glencoe Mathematics: Applications and Concepts Spanish Assessment Masters, Course 2* (0-07-860138-X).
Teacher’s Guide to Using the
Chapter 5 Resource Masters

The Fast File Chapter Resource system allows you to conveniently file the resources you use most often. The Chapter 5 Resource Masters includes the core materials needed for Chapter 5. 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 in the Glencoe Mathematics: Applications and Concepts, Course 2, TeacherWorks CD-ROM.

Vocabulary Builder Pages vii-viii include a student study tool that presents up to twenty of the key vocabulary terms from the chapter. Students are to record definitions and/or examples for each term. You may suggest that students highlight or star the terms with which they are not familiar.

When to Use Give these pages to students before beginning Lesson 5-1. Encourage them to add these pages to their mathematics study notebook. Remind them to add definitions and examples as they complete each lesson.

Family Letter and Family Activity Page ix is a letter to inform your students’ families of the requirements of the chapter. The family activity on page x helps them understand how the mathematics students are learning is applicable to real life.

When to Use Give these pages to students to take home before beginning the chapter.

Study Guide and Intervention There is one Study Guide and Intervention master for each lesson in Chapter 5.

When to Use Use these masters as reteaching activities for students who need additional reinforcement. These pages can also be used in conjunction with the Student Edition as an instructional tool for students who have been absent.

Practice: Skills There is one master for each lesson. These provide practice that more closely follows the structure of the Practice and Applications section of the Student Edition exercises.

When to Use These provide additional practice options or may be used as homework for second day teaching of the lesson.

Practice: Word Problems There is one master for each lesson. These provide practice in solving word problems that apply the concepts of the lesson.

When to Use These provide additional practice options or may be used as homework for second day teaching of the lesson.

Reading to Learn Mathematics One master is included for each lesson. The first section of each master asks questions about the opening paragraph of the lesson in the Student Edition. Additional questions ask students to interpret the context of and relationships among terms in the lesson. Finally, students are asked to summarize what they have learned using various representation techniques.

When to Use This master can be used as a study tool when presenting the lesson or as an informal reading assessment after presenting the lesson. It is also a helpful tool for ELL (English Language Learner) students.
**Enrichment** There is one extension master for each lesson. These activities may extend the concepts in the lesson, offer an historical or multicultural look at the concepts, or widen students’ perspectives on the mathematics they are learning. These are not written exclusively for honors students, but are accessible for use with all levels of students.

**When to Use** These may be used as extra credit, short-term projects, or as activities for days when class periods are shortened.

**Assessment Options**

The assessment masters in the *Chapter 5 Resources Masters* offer a wide range of assessment tools for intermediate and final assessment. The following lists describe each assessment master and its intended use.

**Chapter Assessment**

**Chapter Tests**

- **Form 1** contains multiple-choice questions and is intended for use with basic level students.

- **Forms 2A and 2B** contain multiple-choice questions aimed at the average level student. These tests are similar in format to offer comparable testing situations.

- **Forms 2C and 2D** are composed of free-response questions aimed at the average level student. These tests are similar in format to offer comparable testing situations. Grids with axes are provided for questions assessing graphing skills.

- **Form 3** is an advanced level test with free-response questions. Grids without axes are provided for questions assessing graphing skills.

All of the above tests include a free-response Bonus question.

- The **Extended-Response Assessment** includes performance assessment tasks that are suitable for all students. A scoring rubric is included for evaluation guidelines. Sample answers are provided for assessment.

- **A Vocabulary Test**, suitable for all students, includes a list of the vocabulary words in the chapter and ten questions assessing students’ knowledge of those terms. This can also be used in conjunction with one of the chapter tests or as a review worksheet.

**Intermediate Assessment**

- Four free-response **quizzes** are included to offer assessment at appropriate intervals in the chapter.

- A **Mid-Chapter Test** provides an option to assess the first half of the chapter. It is composed of both multiple-choice and free-response questions.

**Continuing Assessment**

- The **Cumulative Review** provides students an opportunity to reinforce and retain skills as they proceed through their study of *Glencoe Mathematics: Applications and Concepts*, Course 2. It can also be used as a test. This master includes free-response questions.

- The **Standardized Test Practice** offers continuing review of pre-algebra concepts in various formats, which may appear on the standardized tests that they may encounter. This practice includes multiple-choice, short response, grid-in, and extended response questions. Bubble-in and grid-in answer sections are provided on the master.

**Answers**

- Page A1 is an answer sheet for the Standardized Test Practice questions that appear in the Student Edition on pages 236–237. This improves students’ familiarity with the answer formats they may encounter in test taking.

- Detailed rubrics for assessing the extended response questions on page 237 are provided on page A2.

- The answers for the lesson-by-lesson masters are provided as reduced pages with answers appearing in red.

- Full-size answer keys are provided for the assessment masters in this booklet.
This is an alphabetical list of new vocabulary terms you will learn in Chapter 5. 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>
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</thead>
<tbody>
<tr>
<td>bar notation</td>
<td></td>
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<tr>
<td>common denominator</td>
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<tr>
<td>composite</td>
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<tr>
<td>[kahm-PAH-zuht] number</td>
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<tr>
<td>equivalent</td>
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<tr>
<td>[ih-KWIH-vuh-luhnt] fractions</td>
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<td>factor tree</td>
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<td>greatest common factor</td>
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<td>(GCF)</td>
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<td>least common denominator</td>
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<td>(LCD)</td>
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<tr>
<td>least common multiple</td>
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<td></td>
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<tr>
<td>(LCM)</td>
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<tr>
<td>multiple</td>
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</tbody>
</table>
### Reading to Learn Mathematics

#### Vocabulary Builder (continued)

<table>
<thead>
<tr>
<th>Vocabulary Term</th>
<th>Found on Page</th>
<th>Definition/Description/Example</th>
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<tbody>
<tr>
<td>percent</td>
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<tr>
<td>prime factorization</td>
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<td>prime number</td>
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<td>ratio</td>
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<td>rational numbers</td>
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<td>repeating decimals</td>
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<td>simplest form</td>
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<td>terminating decimals</td>
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<tr>
<td>Venn diagram</td>
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Dear Parent or Guardian:

Helping students make connections between facts they learn in school and how these facts are used in the real world is essential. In our math class, we strive to make math “realistic.” We encounter fractions and percents in a variety of situations, and show students how to apply these to situations they will eventually face.

In Chapter 5, Fractions, Decimals, and Percents, your child will learn about prime factorization, greatest common factors, simplifying fractions, writing fractions and decimals as percents, least common multiple and comparing and ordering rational numbers. In the study of this chapter, your child will complete a variety of daily classroom assignments and activities and possibly produce a chapter project.

By signing this letter and returning it with your child, you agree to encourage your child by getting involved. Enclosed is an activity you can do with your child that also relates the math we will be learning in Chapter 5 to the real world. You may also wish to log on to the Online Study Tools for self-check quizzes, Parent and Student Study Guide pages, and other study help at www.msmath2.net. If you have any questions or comments, feel free to contact me at school.

Sincerely,

Family Letter

Signature of Parent or Guardian _____________________________________________________________________ Date __________
Family Activity

Color by Numbers

Work with a family member to answer the questions below. Purchase a small bag of colored candies or a small box of colored paper clips. Separate by color.

Count the total number of pieces in the bag or box. Count the number of each color. In the table below, write the name of each color and its number. Find the fraction of the total amount for each color. Simplify the fractions and write them in the table. Then write the decimal number for each color.

There are a total of ______ colored pieces.

<table>
<thead>
<tr>
<th>Color</th>
<th>Number</th>
<th>Fraction</th>
<th>Decimal</th>
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<tbody>
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</table>

Graph the fraction for each color on the number line.

![Number Line](image)

Write the fractions in order from least to greatest.

Which color had the largest fractional part? the smallest?
Lesson 5–1

Study Guide and Intervention

Prime Factorization

A prime number is a whole number greater than 1 that has exactly two factors, 1 and itself. A whole number greater than 1 that has more than two factors is a composite number. Every composite number can be written as the product of prime numbers in exactly one way. This is called the prime factorization of the number.

Example 1 Determine whether 21 is prime or composite.

The number 21 has four factors: 1, 3, 7, and 21. So, it is composite.

Example 2 Find the prime factorization of 420.

Write 420 as the product of two factors.

Keep factoring until all of the factors are prime numbers.

The prime factorization of 420 is $2 \times 2 \times 5 \times 3 \times 7$, or $2^2 \times 3 \times 5 \times 7$.

Exercises

Determine whether each number is prime or composite.

1. 97
2. 91
3. 327

Find the prime factorization of each number.

4. 60
5. 441
6. 140

7. 450
8. 156
9. 216
Determine whether each number is **prime** or **composite**.

1. 34  
2. 77  
3. 37  

4. 89  
5. 69  
6. 67  

7. 123  
8. 71  
9. 2  

10. 45  
11. 29  
12. 90  

Find the prime factorization of each number.

13. 48  
14. 54  
15. 108  

16. 80  
17. 125  
18. 66  

19. 250  
20. 187  
21. 242  

Write each expression as a product of its factors.

22. $56ab$  
23. $24bc$  
24. $147abc$
## Practice: Word Problems

### Prime Factorization

1. **FLAG** When the United States had 48 states, the stars were arranged in a $6 \times 8$ rectangular arrangement. What other rectangular arrangements of 48 stars are possible?

2. **MARCHING BAND** A marching band has 72 members. If they are to march with an equal number of people in each row, state all possible numbers of rows and numbers of people in each row.

3. **BIOLOGY** The human face uses 14 muscles to smile and 43 to frown. Which number is prime and which is composite? Explain.

4. **BASEBALL CARDS** Jack is arranging his prized baseball cards in a frame. If he has 24 cards, in how many different numbers of rows and columns can he display them if each row has the same number of cards?

5. **HISTORY** It is estimated that Sophocles, an ancient Greek dramatist, died in 406 B.C. Find the prime factorization of 406.

6. **ANATOMY** There are 230 joints in the human body. Find the prime factorization of 230.

7. **PHOTOS** Bill is arranging 108 photos to display on a poster board for a presentation. If he arranges an equal number of photos in each row, in how many different numbers of rows and columns can he arrange the photos?

8. **ART** The supreme example of Renaissance genius, Leonardo da Vinci, passed away in 1519 A.D. Is 1519 a composite or prime number? Explain.
Pre-Activity  Complete the Mini Lab at the top of page 197 in your textbook. Write your answers below.

1. Using your grid paper, draw as many different rectangles as possible using 3, 4, 5, 6, 7, 8, 9, and 10 squares.

2. Which numbers of squares can be drawn in only one rectangle? In more than one rectangle?

Reading the Lesson

3. How do you know when you are at the bottom of a factor tree?

4. Does the order of the factors in a prime factorization matter?

5. What does the bottom row of the factor tree look like for the prime factorization of $45xy^2$?

Helping You Remember

6. A factor tree can be used to find the prime factorization of a composite number. Why do you think it is called a factor tree? What are the “leaves” of the tree?
Perfect Numbers

A positive integer is perfect if it equals the sum of its factors that are less than the integer itself.

If the sum of the factors (excluding the integer itself) is greater than the integer, the integer is called abundant.

If the sum of the factors (excluding the integer itself) is less than the integer, the integer is called deficient.

The factors of 28 (excluding 28 itself) are 1, 2, 4, 7, and 14. Since $1 + 2 + 4 + 7 + 14 = 28$, 28 is a perfect number.

Complete the table to classify each number as perfect, abundant, or deficient.

<table>
<thead>
<tr>
<th>Number</th>
<th>Divisors (Excluding the Number Itself)</th>
<th>Sum</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. 12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. 20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. 10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Show that each number is perfect.

6. 496
7. 8,128

8. CHALLENGE 33,550,336
**Study Guide and Intervention**

**Greatest Common Factor**

The greatest common factor (GCF) of two or more numbers is the largest number that is a factor of each number. The GCF of prime numbers is 1.

**EXAMPLE 1** Find the GCF of 72 and 108 by listing factors.

factors of 72: 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72

factors of 108: 1, 2, 3, 4, 6, 9, 12, 18, 27, 36, 54, 108

common factors: 1, 2, 3, 4, 6, 9, 12, 18, 36

The GCF of 72 and 108 is 36.

**EXAMPLE 2** Find the GCF of 42 and 60 using prime factors.

Method 1 Write the prime factorization.

\[60 = 2 \times 3 \times 3 \times 5\]
\[42 = 2 \times 3 \times 7\]

Method 2 Divide by prime numbers.

Divide both 42 and 60 by 2.

Then divide the quotients by 3.

\[\begin{array}{c|c}
2 & 42 \\
\hline
24 & 30 \\
\hline
12 & 15 \\
\hline
6 & 5 \\
\hline
3 & 3 \\
\hline
1 & 1 \\
\hline
\end{array}\]

The common prime factors are 2 and 3. The GCF of 42 and 60 is \(2 \times 3\), or 6.

**EXERCISES**

Find the GCF of each set of numbers.

1. 18, 30
2. 60, 45
3. 24, 72

4. 32, 48
5. 100, 30
6. 54, 36

7. 3, 97, 5
8. 4, 20, 24
9. 36, 9, 45
Find the GCF of each set of numbers.

1. 14, 20
2. 16, 42
3. 8, 18
4. 24, 36
5. 72, 22
6. 77, 15
7. 32, 80
8. 90, 120
9. 45, 30
10. 12, 62
11. 15, 27
12. 21, 28
13. 12, 20, 26
14. 15, 20, 25
15. 60, 72, 36
16. 32, 48, 64
17. 36, 48, 30
18. 28, 56, 42
19. 80, 110, 90
20. 9, 25, 49

Find the GCF of each set of algebraic expressions.

21. $21ab, 14b$
22. $20a^2, 36a$
23. $15ab, 5b^2$
24. $35a^2, 85ab$
25. Find the GCF of $2^3 \times 3^2 \times 5$ and $2^2 \times 3 \times 5^2$. 
## Practice: Word Problems

### Greatest Common Factor

<table>
<thead>
<tr>
<th><strong>1. TABLE TENNIS</strong></th>
<th><strong>2. TUMBLING</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rebecca has 20 table tennis balls and 16 table tennis paddles. She wants to sell packages of balls and paddles bundled together. What is the greatest number of packages she can sell with no leftover balls or paddles?</td>
<td>Mr. Nicolet wants to organize equal-sized groups of boys and girls for tumbling exercises. If there are 12 boys and 18 girls and each group is all boys or all girls, what is the largest size group he can organize?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>3. BAKE SALE</strong></th>
<th><strong>4. DOG TREATS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Volunteers at a bake sale want to sell slices of banana nut bread and raisin bread packaged together. They have 63 slices of banana nut bread and 45 slices of raisin bread, and they plan to use all the bread. What is the greatest number of packages they can put together? How many slices of each type of bread are in a package?</td>
<td>Krista wants to give her dog a special treat. She has 81 dog bones and 54 pieces of beef jerky. If she wants to give her dog the same number of treats every day, what is the greatest number of days she can feed the dog these treats? How many of each type should she give the dog?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>5. FRUIT TREES</strong></th>
<th><strong>6. BOARDS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr. Farber has 84 pear trees and 180 apple trees. He wants to plant the trees in rows of equal width. Find the most trees that can be planted in a row if each row has only one type of tree.</td>
<td>A scouting troop has three boards of lengths 14 feet, 28 feet, and 21 feet. If the boards must be cut to produce equal-sized pieces, what is the longest piece that can be cut with no waste?</td>
</tr>
</tbody>
</table>
Pre-Activity  
Read the introduction at the top of page 203 in your textbook.  
Write your answers below.

1. Who visited the Fashion Chat Room?

2. Who visited the Music Chat Room?

3. Who visited both chat rooms?

Reading the Lesson

4. What does a Venn diagram show?

5. How does a Venn diagram show relationships between elements?

6. You can find the GCF by using common factors or using common prime factors. What is the difference?

7. Find the prime factors of 20 and 24. What are the prime factors that are common to both numbers? What is the GCF?

8. How is the GCF of two numbers found if you know the prime factors common to the numbers?

Helping You Remember

9. In your own words, describe what the GCF of two numbers is and explain one way to find it.
Sundaram’s Sieve

This arrangement of numbers is called Sundaram’s Sieve. Like the Sieve of Eratosthenes, Sundaram’s arrangement can be used to find prime numbers.

Here’s how to use Sundaram’s Sieve to find prime numbers. If a number, \( n \), is not in the Sieve, then \( 2n + 1 \) is a prime number. If a number, \( n \), is in the Sieve, then \( 2n + 1 \) is not a prime number.

<table>
<thead>
<tr>
<th>4</th>
<th>7</th>
<th>10</th>
<th>13</th>
<th>16</th>
<th>19</th>
<th>22</th>
<th>25</th>
<th>28</th>
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<tbody>
<tr>
<td>7</td>
<td>12</td>
<td>17</td>
<td>22</td>
<td>27</td>
<td>32</td>
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<td>42</td>
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<td>10</td>
<td>17</td>
<td>24</td>
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<td>73</td>
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<td>16</td>
<td>27</td>
<td>38</td>
<td>49</td>
<td>60</td>
<td>71</td>
<td>82</td>
<td>93</td>
<td>104</td>
<td>115</td>
</tr>
</tbody>
</table>

32 is in the sieve. \( 2 \times 32 + 1 = 65 \)  65 is not prime.
35 is not in the sieve. \( 2 \times 35 + 1 = 71 \)  71 is prime.

1. Does the sieve give all primes up to 99? all the composites?

2. Sundaram’s Sieve is constructed from arithmetic sequences. Describe the pattern used to make the first row.

3. How is the first column constructed?

4. How are the second through fifth rows constructed?

5. How would you add a sixth row to the sieve?

6. Use Sundaram’s Sieve to find 5 four-digit prime numbers. You will need to add more numbers to the sieve to do this.
Fractions that have the same value are called **equivalent fractions**. A fraction is in **simplest form** when the GCF of the numerator and denominator is 1.

**EXAMPLE 1** Write \(\frac{36}{54}\) in simplest form.

First, find the GCF of the numerator and denominator.

factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36
factors of 54: 1, 2, 3, 6, 9, 18, 27, 54

The GCF of 36 and 54 is 18.

Then, divide the numerator and the denominator by the GCF.

\[
\frac{36}{54} = \frac{36 \div 18}{54 \div 18} = \frac{2}{3}
\]

So, \(\frac{36}{54}\) written in simplest form is \(\frac{2}{3}\).

**EXAMPLE 2** Write \(\frac{8}{12}\) in simplest form.

\[
\begin{align*}
8 &= 2 \cdot 2 \cdot 2 \\
12 &= 2 \cdot 2 \cdot 3 \\
\text{GCF: } 2 \cdot 2 &= 4 \\
\frac{8}{12} &= \frac{8 \div 4}{12 \div 4} = \frac{2}{3}
\end{align*}
\]

So, \(\frac{8}{12}\) written in simplest form is \(\frac{2}{3}\).

**EXERCISES**

Write each fraction in simplest form.

1. \(\frac{42}{72}\)  
2. \(\frac{40}{64}\)  
3. \(\frac{21}{35}\)  
4. \(\frac{25}{100}\)  
5. \(\frac{99}{132}\)  
6. \(\frac{17}{85}\)
Write each fraction in simplest form.

1. \( \frac{49}{70} \)  
2. \( \frac{5}{30} \)  
3. \( \frac{6}{14} \)  

4. \( \frac{14}{28} \)  
5. \( \frac{72}{72} \)  
6. \( \frac{18}{21} \)  

7. \( \frac{45}{75} \)  
8. \( \frac{50}{200} \)  
9. \( \frac{32}{50} \)  

10. \( \frac{56}{64} \)  
11. \( \frac{14}{35} \)  
12. \( \frac{39}{45} \)  

13. \( \frac{48}{66} \)  
14. \( \frac{42}{45} \)  
15. \( \frac{78}{130} \)  

Write two fractions that are equivalent to each fraction.

16. \( \frac{3}{4} \)  
17. \( \frac{7}{9} \)  
18. \( \frac{7}{11} \)  

19. \( \frac{14}{17} \)  
20. \( \frac{21}{23} \)  
21. \( \frac{11}{17} \)
### Practice: Word Problems

#### Simplifying Fractions

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>EXAM</strong></td>
<td>Mr. Bonilla gave an exam and 20 out of 25 students passed the exam. What fraction of the students passed the exam? Write the answer in simplest form.</td>
<td>2. <strong>GASOLINE</strong></td>
<td>Aisha filled her car’s 24-gallon gas tank. She took a short trip and used 8 gallons of gas. What fraction of the full gas tank was used on the trip? Write the answer in simplest form.</td>
</tr>
<tr>
<td>3. <strong>BICYCLES</strong></td>
<td>A local community college has 860 students. Of these 860 students, 220 ride bicycles. Write the number of bike riders as a fraction of the number of students at the college in simplest form.</td>
<td>4. <strong>PRESIDENTS</strong></td>
<td>Of the first 22 presidents, 8 were from New York. Write the number of presidents from New York as a fraction of the first 22 presidents in simplest form.</td>
</tr>
<tr>
<td>5. <strong>TIME</strong></td>
<td>Ten hours is what part of a day? Write the fraction in simplest form.</td>
<td>6. <strong>MEASUREMENT</strong></td>
<td>Eighteen inches is what part of a yard? Write the fraction in simplest form.</td>
</tr>
</tbody>
</table>
Pre-Activity  Complete the Mini Lab at the top of page 207 in your textbook. Write your answers below.

1. Write a fraction to describe each figure above: \(\frac{\text{number of shaded parts}}{\text{total number of parts}}\).

2. Which figure has a greater portion of its parts shaded?

3. What can you conclude about the fractions you wrote above?

Reading the Lesson

4. How do you find the simplest form of a fraction?

5. When you find the simplest form of a fraction, how can you check to make sure your answer is correct?

6. Use canceling to simplify the fraction \(\frac{2 \times 3 \times 7 \times 11}{3 \times 11 \times 17}\).

Helping You Remember

7. Use a collection of rectangles like the one in the Mini Lab to show how to write \(\frac{15}{25}\) in simplest form.
A Two-Clock Code

Two clock faces can be used to create coded secret messages.

To encode a message, write each letter of the message as a fraction. Use the hour next to the letter as the denominator and the number in the center of that clock as the numerator.

For example, the letter G will be encoded as the fraction $\frac{1}{7}$. The letter R becomes $\frac{2}{5}$.

Notice the Y and Z are both written with the same fraction. The same is true for P and Q.

1. Decode this message. The result will be a “secret” from a well-known poem written by Henry Wadsworth Longfellow.

2. Use the two-clock code to create a secret message of your own.
Example 1 Write \(\frac{5}{9}\) as a decimal.

Method 1 Use pencil and paper.

\[
\begin{align*}
0.555... & \\
9 \overline{)5.000} & \\
\text{The remainder after each step is 5.} & \\
\end{align*}
\]

Method 2 Use a calculator.

\[
\frac{5}{9} \approx 0.55555556
\]

You can use bar notation \(0.\overline{5}\) to indicate that 5 repeats forever.

So, \(\frac{5}{9} = 0.\overline{5}\).

Example 2 Write 0.32 as a fraction in simplest form.

\[
0.32 = \frac{32}{100}
\]

The 2 is in the hundredths place.

\[
= \frac{8}{25}
\]

Simplify.

Exercises

Write each fraction or mixed number as a decimal. Use bar notation if the decimal is a repeating decimal.

1. \(\frac{8}{10}\)  
2. \(\frac{3}{5}\)  
3. \(\frac{7}{11}\)

4. \(4\frac{7}{8}\)  
5. \(\frac{13}{15}\)  
6. \(3\frac{47}{99}\)

Write each decimal as a fraction in simplest form.

7. 0.14  
8. 0.3  
9. 0.94
Write each repeating decimal using bar notation.

1. 0.7353535...
2. 0.424242...
3. 5.126126126...

Write each fraction or mixed number as a decimal. Use bar notation if the decimal is a repeating decimal.

4. \( \frac{3}{5} \)
5. \( \frac{19}{20} \)
6. \( \frac{34}{5} \)

7. \( \frac{23}{50} \)
8. \( \frac{5}{8} \)
9. \( \frac{19}{25} \)

10. \( 4 \frac{17}{37} \)
11. \( 5 \frac{3}{11} \)
12. \( \frac{17}{24} \)

13. \( 6 \frac{7}{32} \)
14. \( 7 \frac{9}{22} \)
15. \( 1 \frac{17}{48} \)

Write each decimal as a fraction in simplest form.

16. 0.8
17. 0.52
18. 0.92

19. 0.48
20. 0.86
21. 0.76
### Practice: Word Problems

**Fractions and Decimals**

1. **BOYS AND GIRLS** There were 6 girls and 18 boys in Mrs. Johnson’s math class. Write the number of girls as a fraction of the number of boys. Then write the fraction as a repeating decimal.

2. **CATS** In a neighborhood of 72 families, 18 families own one or more cats. Write the number of families who own one or more cats as a fraction. Then write the fraction as a decimal.

3. **CELLULAR PHONES** In Italy, about 74 of every 100 people use cellular telephones. Write the fraction of cellular phone users in Italy. Then write the fraction as a decimal.

4. **FRUITS** Ms. Rockwell surveyed her class and found that 12 out of the 30 students chose peaches as their favorite fruit. Write the number of students who chose peaches as a fraction in simplest form. Then write the fraction as a decimal.

5. **TRAVEL** Tora took a short trip of 320 miles. He stopped to have lunch after he had driven 120 miles. Write the fraction of the trip he had completed by lunch in simplest form. Then write the fraction as a decimal.

6. **VOTING** In a recent school election, 208 of the 325 freshmen voted in their class election. Write the fraction of freshmen who voted. Then write the fraction as a decimal.
Pre-Activity  Read the introduction at the top of page 210 in your textbook. Write your answers below.

1. How many games did the USA softball team win? How many did they play?

2. Write a fraction comparing the number of times the team won to the total number of games played.

Reading the Lesson

3. What is meant by the term place value?

4. In place value, what serves as the divider between ones and tenths?

5. What is the difference between a terminating decimal and a repeating decimal? Give an example of each.

Helping You Remember

6. Work with a partner. Use a local newspaper, a favorite magazine, or the Internet. Find real-world situations that use fractions or decimals. Convert the fractions to decimals and the decimals to fractions. Exchange papers with your partner and correct each other’s work.
Making a Line Design

Connect each pair of equivalent numbers with a straight line segment. Although you will draw only straight lines, the finished design will appear curved!
Study Guide and Intervention

Fractions and Percents

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

**Example 1**

Write \(\frac{19}{20}\) as a percent.

Since \(100 \div 20 = 5\), multiply the numerator and denominator by 5.

\[
\frac{19 \times 5}{20 \times 5} = \frac{95}{100} = 95\%
\]

**Example 2**

Write 92% as a fraction in simplest form.

\[
92\% = \frac{92}{100} \quad \text{Definition of percent}
\]

\[
= \frac{23}{25} \quad \text{Simplify.}
\]

**Exercises**

Write each ratio as a percent.

1. \(\frac{14}{100}\)
2. \(\frac{27}{100}\)
3. 34.5 per 100
4. 18 per 100
5. 21:100
6. 96:100

Write each fraction as a percent.

7. \(\frac{3}{100}\)
8. \(\frac{14}{100}\)
9. \(\frac{2}{5}\)
10. \(\frac{1}{20}\)
11. \(\frac{13}{25}\)
12. \(\frac{4}{10}\)

Write each percent as a fraction in simplest form.

13. 35%
14. 18%
15. 75%
16. 80%
17. 16%
18. 15%
Write each ratio as a percent.

1. 26 out of 100
2. 5 per 100
3. 13:100
4. \( \frac{39}{100} \)
5. 12.5 per 100
6. 51 out of 100

Write each fraction as a percent.

7. \( \frac{7}{10} \)
8. \( \frac{6}{50} \)
9. \( \frac{13}{20} \)
10. \( \frac{30}{50} \)
11. \( \frac{7}{20} \)
12. \( \frac{12}{20} \)
13. \( \frac{23}{25} \)
14. \( \frac{3}{10} \)
15. \( \frac{17}{50} \)

Write each percent as a fraction in simplest form.

16. 15%
17. 85%
18. 1%
19. 70%
20. 25%
21. 19%
22. 33%
23. 22%
24. 95%
Practice: Word Problems
Fractions and Percents

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

2. **COMPUTERS** In 2000, 57 out of every 100 school age children (ages 6 to 17 years) had access to a computer both at home and at school. Write this ratio as a percent.

3. **SALES TAX** In one town, the sales tax is 8%. Write this percent as a fraction in simplest form.

4. **HYGEINE** Ms. Agosto surveyed her class and found that 15 out of 30 students brushed their teeth more than twice a day. What percent of students brushed more than twice a day?

5. **DISCOUNT** A local retail store was having a sale and offered all their merchandise at a 25% discount. Write this percent as a fraction in simplest form.

6. **SPACE FLIGHT** About 64% of all individuals who have flown in space from 1961 to 2001 are from the United States. Write this percent as a fraction in simplest form.
Pre-Activity  Read the introduction at the top of page 216 in your textbook. Write your answers below.

1. Shade a $10 \times 10$ grid that represents the number of students that chose each method.

2. What fraction of the students chose the Internet as the method that makes learning more interesting?

Reading the Lesson

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

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

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

Helping You Remember

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

Margarita Colmenares is an environmental engineer. She is a native of Los Angeles and a 1981 graduate of Stanford University. In 1989, she became the first woman president of the Society of Hispanic Professional Engineers. Ms. Colmenares was recently appointed to direct an office at the U.S. Department of Education. She has a special interest in education and has traveled extensively to talk to student groups about careers in engineering.

Environmental engineers like Colmenares use mathematics to predict the effect that our actions will have on our environment. They may also recommend ways to protect the environment. On this page, you will consider some data and recommendations concerning water usage.

Refer to the graph above.

1. Which one category accounts for more than $\frac{1}{3}$ of the water usage?

2. Estimate the fraction of a person’s daily water usage that is for bath and shower.

Use the graph above. Estimate the amount of water used in each category.

3. outside uses 4. bath and shower

5. toilet 6. laundry

7. dishwasher 8. faucets

In each situation, what percent of the water used can be saved by following the recommendation?

9. Using a water-saving shower head can save 65 liters of water out of the 130 liters normally used in a five-minute shower.

10. Turning off the water while brushing your teeth can reduce the water used from 20 liters to 2 liters.
To write a percent as a decimal, divide the percent by 100 and remove the percent symbol. To write a decimal as a percent, multiply the decimal by 100 and add the percent symbol.

**Example 1** Write 42.5% as a decimal.

\[
42.5\% = \frac{42.5}{100} = \frac{425}{1000} = 0.425
\]

Write the percent as a fraction. Multiply by 10 to remove the decimal in the numerator. Simplify. Write the fraction as a decimal.

**Example 2** Write 0.625 as a percent.

\[
0.625 = 0.0625 \times 100 = 62.5\%
\]

Multiply by 100. Add the % symbol.

**Exercises**

Write each percent as a decimal.

1. 6%
2. 28%
3. 81%
4. 84%
5. 35.5%
6. 12.5%
7. 14.2%
8. 11.1%

Write each decimal as a percent.

9. 0.47
10. 0.03
11. 0.075
12. 0.914
Practice: Skills
Percents and Decimals

Write each percent as a decimal.

1. 5%  
2. 20%
3. 21%  
4. 83%
5. 7%  
6. 56%
7. 16%  
8. 45%
9. 27.3%  
10. 14.9%
11. 91.5%  
12. 29.3%
13. 14.4%  
14. 80%
15. 7.5%  
16. 10 1/2%

Write each decimal as a percent.

17. 0.06  
18. 0.13
19. 0.5  
20. 0.74
21. 0.14  
22. 0.92
23. 0.54  
24. 0.66
25. 0.192  
26. 0.295
27. 0.911  
28. 0.247
29. 0.4165  
30. 0.2199
31. 0.7601  
32. 0.4833
### Practice: Word Problems

#### Percents and Decimals

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>1. AREA</strong></td>
<td>New Mexico’s land area is about 0.03 of the total area of the United States. What percent is New Mexico’s land area of the total area of the United States?</td>
</tr>
<tr>
<td><strong>2. SCALE MODEL</strong></td>
<td>A scale model of a building is 0.25 the actual size. What percent of the actual size of the building is the model?</td>
</tr>
<tr>
<td><strong>3. NFL COACHES</strong></td>
<td>Don Shula ranks among the most successful coaches in the National Football League. In his career, he won 0.665 of his games. Write the decimal as a percent.</td>
</tr>
<tr>
<td><strong>4. SOFTBALL</strong></td>
<td>Jenny’s batting average is 0.346. Write the decimal as a percent.</td>
</tr>
<tr>
<td><strong>5. VITAMINS</strong></td>
<td>A multiple vitamin contains 450 milligrams of calcium. This is 45% of the recommended daily allowance. Write the percent as a decimal.</td>
</tr>
<tr>
<td><strong>6. BASKETBALL</strong></td>
<td>Tao makes 74% of his free throws. Write the percent as a decimal.</td>
</tr>
<tr>
<td><strong>7. SALES TAX</strong></td>
<td>The sales tax in a town is 7.25%. Write the percent as a decimal.</td>
</tr>
<tr>
<td><strong>8. FIELD TRIP</strong></td>
<td>In Ms. Silver’s English class, $20\frac{1}{4}%$ of the students signed up to visit a local museum. Write the percent as a decimal.</td>
</tr>
</tbody>
</table>
Pre-Activity  Read the introduction at the top of page 220 in your textbook. Write your answers below.

1. Write the percent of students who read for fun as a fraction.

2. Write the fraction as a decimal.

Reading the Lesson

3. Describe each step in changing a percent to a decimal.

4. Describe each step in changing a percent to a decimal by first writing the percent as a fraction.

5. Describe how to write a percent as a decimal without writing the percent as a fraction.

Helping You Remember

6. Work with a partner. Think of a way that will help you remember which way to move the decimal when you go from a percent to a decimal and which way to move it when you go from a decimal to a percent.
African-American Scientists and Inventors

When you buy a pair of shoes, you usually have a wide variety of styles, sizes, and prices to choose from. It is the work of an African-American inventor, Jan Matzeliger (1852–1889), that makes this possible. In 1882, Matzeliger patented a lasting machine that could shape the upper portion of a shoe and attach it to the sole in a fraction of the time it took to do the job by hand. Using this machine, shoe manufacturers were able to increase production and reduce prices dramatically.

African Americans have made many significant contributions to mathematics, science, and invention. By solving the percent problems and matching the problem and the correct solution, you will learn more about just a few of them.

<table>
<thead>
<tr>
<th>Solutions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. 20</td>
<td>Benjamin Banneker</td>
</tr>
<tr>
<td>B. 21</td>
<td>Marjorie Lee Browne</td>
</tr>
<tr>
<td>C. 18</td>
<td>Lewis Latimer</td>
</tr>
<tr>
<td>D. 17.5</td>
<td>Jane Cooke Wright</td>
</tr>
</tbody>
</table>

1. 35% of 50 is what number?
   This physician researched and tested chemotherapy as a method of treating cancer. In 1952, she became head of the Cancer Research Foundation at Harlem Hospital.

2. What percent of 75 is 15?
   This mathematician was part of the team of surveyors who created the street plan for Washington, D.C. in the late eighteenth century.

3. 4.5% of 400 is what number?
   In 1876, this engineer drew up the plans that accompanied Alexander Graham Bell’s application for a patent on the telephone.

4. 120% of what number is 25.2?
   In 1949, she became one of the first two African-American women to earn a doctorate in mathematics. She was head of the mathematics department at North Carolina Central University from 1951 to 1970.
**Least Common Multiple**

A **multiple** of a number is the product of that number and any whole number. The least nonzero multiple of two or more numbers is the **least common multiple (LCM)** of the numbers.

**EXAMPLE 1** Find the LCM of 15 and 20 by listing multiples.

List the multiples.

- Multiples of 15: 15, 30, 45, 60, 75, 90, 105, 120, ...
- Multiples of 20: 20, 40, 60, 80, 100, 120, 140, ...

Notice that 60, 120, ..., are common multiples. So, the LCM of 15 and 20 is 60.

**EXAMPLE 2** Find the LCM of 8 and 12 using prime factors.

**Method 1** Write the prime factorization.

- \(8 = 2 \times 2 \times 2 = 2^3\)
- \(12 = 2 \times 2 \times 3 = 2^2 \times 3\)

The prime factors of 8 and 12 are 2 and 3. Multiply the greatest power of both 2 and 3.

The LCM of 8 and 12 is \(2^3 \times 3\), or 24.

**Method 2** Divide by prime numbers.

\[
\begin{align*}
2 & \mid 8 \quad 12 \\
4 & \mid 4 \quad 6 \\
& \quad 2 \quad 3 \\
& \quad 1 \quad 1
\end{align*}
\]

Start dividing by prime factors until both numbers cannot be divided by the same divisor. Then multiply the divisors and quotients to get the LCM.

**EXERCISES**

Find the LCM of each set of numbers.

1. 4, 6
2. 6, 9
3. 5, 9
4. 8, 10
5. 12, 15
6. 15, 21
7. 4, 15
8. 8, 20
9. 8, 16
10. 6, 14
11. 12, 20
12. 9, 12
13. 14, 21
14. 6, 15
15. 4, 6, 8
16. 3, 5, 6
Find the LCM of each set of numbers.

1. 2, 8
2. 6, 10
3. 10, 11
4. 10, 12
5. 9, 18
6. 4, 22
7. 12, 30
8. 4, 13
9. 25, 30
10. 250, 30
11. 200, 18
12. 70, 90
13. 18, 54
14. 30, 65
15. 180, 252
16. 20, 55
17. 21, 60
18. 3, 5, 10
19. 3, 4, 13
20. 4, 10, 12
21. 6, 15, 20
22. 48, 16, 3
23. 66, 55, 44
24. 29, 58, 4
| **1. PROMOTION** | **2. WORK** |
| In a promotion for a local delicatessen, every eighth customer will get a free sandwich and every sixth customer will get a free drink. Which customer will be first to get both a free sandwich and a free drink? | Alano and Abey both work at night. Alano has every fourth night off and Abey has every sixth night off. If they are both off tonight, how long will it be before they are both off again? |
| **3. RADIO** | **4. MUSIC** |
| A radio station is giving away a discount coupon to every twelfth caller and a free concert ticket to every twentieth caller. Which caller will be first to win both the coupon and the ticket? | Faith spent the same amount of money on cassette tapes as she did on CDs. If tapes cost $12 and CDs cost $16, what is the least amount of money she could have spent on each? |
| **5. BIKES** | **6. PAPER GOODS** |
| Three bike riders ride around a circular path. The first rider circles the path in 12 minutes, the second in 18 minutes, and the third in 24 minutes. If they all start at the same place, at the same time, and go in the same direction, after how many minutes will they meet at the starting point? | At a party store, paper cups come in packages of 15, paper plates come in packages of 30, and napkins come in packages of 20. In order to have the same number of cups, plates, and napkins, what is the least number of each that must be purchased? |
5-7

Reading to Learn Mathematics

Least Common Multiple

Pre-Activity  Complete the Mini Lab at the top of page 224 in your textbook. Write your answers below.

1. Add a second floor to each building. Record the total number of cubes used in a table like the one shown below.

<table>
<thead>
<tr>
<th>Number of Floors</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Cubes in Building 1</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Cubes in Building 2</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Continue adding floors until each building has five floors. Record your results.

3. Describe two buildings that have the same number of cubes.

4. If you keep adding floors, will the two buildings have the same number of cubes again? Explain.

Reading the Lesson

5. Explain how to use a Venn diagram to find the LCM of two numbers.

6. Look at Example 2, Method 2, at the top of page 225. Which of the numbers are divisors? Which are quotients?

Helping You Remember

7. Explain how to find the LCM of two or more numbers when you know the prime factorization of each number. Give an example.
A Cross-Number Puzzle

Use the clues at the bottom of the page to complete the puzzle. You are to write one digit in each box.

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<table>
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<tbody>
<tr>
<td>A</td>
<td>2</td>
<td>9</td>
<td>3</td>
<td>B</td>
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<td>C</td>
<td>D</td>
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<td>Q</td>
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<td>R</td>
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</tbody>
</table>

Across

C largest number less than 200 that is divisible by 29
E square of first prime greater than 20
F least common multiple of 3 and 11
H next term in sequence 61, 122, 244, 488
J greatest common factor of 141 and 329
K the eighth power of 2
L least common multiple of 2, 7, and 13
M numerator of fraction equal to 0.8125
N least common multiple of 86 and 5
O smallest prime greater than 60
P largest two-digit prime
Q next term in sequence 4, 15, 26, 37
R largest two-digit composite less than 40

Down

B smallest number divisible by 3 and 5
D the sixth power of 4
G least common multiple of 2 and 179
H the number of two-digit positive integers
I smallest number over 600 divisible by 89
L smallest three-digit number divisible by 13.
M the smallest two-digit prime number
N largest prime factor of 82
O perfect square between 60 and 70
P largest two-digit number divisible by 3
EXAMPLE 1 Which fraction is greater, $\frac{3}{4}$ or $\frac{4}{5}$?

Method 1 Rename using the LCD.

\[
\begin{align*}
\frac{3}{4} &= \frac{3 \times 5}{4 \times 5} = \frac{15}{20} \\
\frac{4}{5} &= \frac{4 \times 4}{5 \times 4} = \frac{16}{20}
\end{align*}
\]

The LCD is 20.

Because the denominators are the same, compare numerators.

Since $\frac{16}{20} > \frac{15}{20}$, then $\frac{4}{5} > \frac{3}{4}$.

Method 2 Write each fraction as a decimal. Then compare decimals.

\[
\begin{align*}
\frac{3}{4} &= 0.75 \\
\frac{4}{5} &= 0.8
\end{align*}
\]

Since 0.8 > 0.75, then $\frac{4}{5} > \frac{3}{4}$.

EXERCISES

Find the LCD of each pair of fractions.

1. $\frac{1}{2}, \frac{1}{8}$

2. $\frac{1}{3}, \frac{3}{4}$

3. $\frac{3}{4}, \frac{7}{10}$

Replace each $\bullet$ with $<$, $>$, or $=$ to make a true sentence.

4. $\frac{1}{2} \bullet \frac{4}{9}$

5. $\frac{4}{5} \bullet \frac{8}{10}$

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

7. $\frac{1}{2} \bullet \frac{5}{9}$

8. $\frac{9}{14} \bullet \frac{10}{17}$

9. $\frac{5}{7} \bullet \frac{6}{11}$

10. $\frac{8}{17} \bullet \frac{1}{2}$

11. $\frac{9}{10} \bullet \frac{17}{19}$
5-8 Practice: Skills

Comparing and Ordering Rational Numbers

Find the LCD of each pair of fractions.

1. \( \frac{4}{7} \), \( \frac{3}{5} \)

2. \( \frac{5}{12} \), \( \frac{7}{24} \)

3. \( \frac{6}{28} \), \( \frac{3}{7} \)

4. \( \frac{7}{15} \), \( \frac{1}{4} \)

5. \( \frac{7}{11} \), \( \frac{3}{5} \)

6. \( \frac{5}{17} \), \( \frac{7}{8} \)

7. \( \frac{5}{12} \), \( \frac{7}{10} \)

8. \( \frac{15}{16} \), \( \frac{1}{4} \)

9. \( \frac{5}{8} \), \( \frac{3}{5} \)

Replace each \( \bullet \) with <, >, or = to make a true sentence.

10. \( \frac{3}{10} \) \( \bullet \) \( \frac{2}{9} \)

11. \( \frac{3}{7} \) \( \bullet \) \( \frac{5}{11} \)

12. \( \frac{9}{12} \) \( \bullet \) \( \frac{3}{4} \)

13. \( \frac{12}{13} \) \( \bullet \) \( \frac{14}{15} \)

14. \( \frac{4}{5} \) \( \bullet \) \( \frac{5}{4} \)

15. \( \frac{17}{30} \) \( \bullet \) \( \frac{13}{20} \)

16. \( \frac{35}{60} \) \( \bullet \) \( \frac{49}{84} \)

17. \( \frac{3}{11} \) \( \bullet \) \( \frac{7}{20} \)

18. \( \frac{12}{3} \) \( \bullet \) \( \frac{9}{7} \)

Order each set of ratios from least to greatest.

19. 0.48, 0.46, \( \frac{9}{20} \)

20. 0.99, 0.89, \( \frac{7}{8} \)

21. \( \frac{1}{4} \), 0.2, 0.4

Determine whether each number is rational. Write yes or no.

22. 2.32332332...

23. \( \frac{7}{19} \)

24. 4.3
## Practice: Word Problems

### Comparing and Ordering Rational Numbers

1. **RAIN** The amount of rainfall was measured after a recent storm. The north side of town received \(\frac{7}{8}\) inch of rain, and the south side received \(\frac{13}{15}\) inch of rain. Which side of town received more rain from the storm?

2. **MOVIES** Because he sees movies at his local theater so often, Delmar is being offered a discount. He can have either \(\frac{1}{3}\) off his next ticket or 30% off his next ticket. Which discount should Delmar choose? Explain.

3. **TRACK** Willie runs the 110-meter hurdles in 17\(\frac{3}{5}\) seconds, and Anier runs it in 17\(\frac{6}{11}\) seconds. Which runner is faster?

4. **FARMING** Cassie successfully harvested \(\frac{7}{12}\) of her crop, and Robert successfully harvested 58% of his crop. Which person successfully harvested the larger portion of his or her crop?

5. **TRANSPORTATION** My-Lien has enough room in her truck to move 3.385 tons of gravel. Her father has asked her to move 3\(\frac{5}{16}\) tons. Will My-Lien be able to move all of the gravel in only one trip? Explain.

6. **WOOD WORKING** Kishi has a bolt that is \(\frac{5}{8}\) inch wide, and she drilled a hole 0.6 inch wide. Is the hole large enough to fit the bolt? Explain.

7. **PIZZA** In a recent pizza-eating contest, Alfonso ate \(1\frac{3}{8}\) pizzas, Della ate \(1\frac{3}{10}\) pizzas, and Delsin ate \(1\frac{4}{9}\) pizzas. Which person won the contest?

8. **STUDYING** For a recent algebra exam, Pat studied \(1\frac{8}{15}\) hours, Toni studied \(1\frac{11}{20}\) hours, and Morgan studied \(1\frac{9}{16}\) hours. List the students in order by who studied the most.
Pre-Activity  Read the introduction at the top of page 227 in your textbook. Write your answers below.

1. A batting average is the ratio of hits to at-bats. Write each player’s batting average as a fraction.

2. Estimate which fraction is greater than \( \frac{1}{2} \). Which is less than \( \frac{1}{2} \)?

3. Which player has the better batting average?

Reading the Lesson

4. What are three ways in which you can compare fractions?

5. Complete the following table of common fraction-decimal-percent equivalents.

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Decimal</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{1}{5} )</td>
<td></td>
<td>20%</td>
</tr>
<tr>
<td>( \frac{7}{10} )</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>25%</td>
</tr>
</tbody>
</table>

6. How are the following sets of numbers related: whole numbers, rational numbers, integers?

Helping You Remember

7. In this lesson you learned about the LCD. What do each of the following abbreviations stand for: LCD, LCM, and GCF? How are the LCD and LCM related?
**Intersection and Union of Sets**

The darker shaded areas in the Venn diagrams show the *union* and *intersection* of sets $A$ and $B$.

For example, if $A = \{1, 2, 3, 4\}$ and $B = \{3, 4, 5, 6\}$, then their union and intersection are written as:

Union: $A \cup B = \{1, 2, 3, 4, 5, 6\}$  
Intersection: $A \cap B = \{3, 4\}$

**Draw a Venn diagram for sets $A$ and $B$. Then write the numbers included in $A \cup B$ and $A \cap B$. In Exercises 2 and 4, record the numbers as decimals.**

1. $A = \{\text{integers between 0 and 7}\}$  
   $B = \{\text{factors of 12}\}$

2. $A = \{\text{one-place decimals between 0 and 0.5}\}$  
   $B = \{\text{fractions with 1, 2, 3, or 4 as numerator and 5 as a denominator}\}$

3. $A = \{\text{perfect squares between 0 and 30}\}$  
   $B = \{\text{odd whole numbers less than 10}\}$

4. $A = \left[\begin{array}{cccc}1 & 1 & 1 & 1 \\ 2 & 3 & 4 & 5 \end{array}\right]$  
   $B = \{0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9\}$
Write the letter for the correct answer in the blank at the right of each question.

1. Which number is prime?
   A. 17        B. 21        C. 18        D. 15  1. __

2. Find the prime factorization of 18.
   F. $2 \times 9$       G. $2^2 \times 3$       H. $3 \times 6$       I. $2 \times 3^2$  2. __

3. Write $70xy$ as a product of its factors.
   A. $10 \times 70 \times x \times y$       B. $2 \times 5 \times 7$
   C. $2 \times 5 \times 7 \times x \times y$       D. $10 \times 7 \times x \times x \times y$  3. __

4. Find the GCF of 18 and 54.
   F. 6       G. 18       H. 9       I. 12  4. __

5. Find the GCF of $12t$ and $18t$.
   A. $6t$       B. $3t$       C. 6       D. 3  5. __

6. Write $\frac{72}{81}$ in simplest form.
   F. $\frac{24}{27}$       G. $\frac{7}{8}$       H. $\frac{3}{4}$       I. $\frac{8}{9}$  6. __

7. Write $\frac{4}{5}$ as a decimal.
   A. 0.8       B. 0.8       C. 8.0       D. 0.08  7. __

8. Write $1\frac{8}{9}$ as a decimal.
   F. 0.1$\bar{8}$       G. 1.8       H. 1$\bar{8}$       I. 18.9  8. __

9. Write 23% as a decimal.
   A. 0.023       B. 2.3       C. 23       D. 0.23  9. __

10. Write a ratio equivalent to 50%.
    F. 50 per 100       G. $\frac{5}{100}$       H. 5:1,000       I. 5 per 100  10. __

11. Which is 0.25 written as a percent?
    A. $\frac{1}{4}\%$       B. 25%       C. 2.5%       D. 250%  11. __
12. Write 0.125 as a fraction in simplest form.
   F. $\frac{1}{8}$   G. $\frac{1}{6}$   H. $\frac{3}{8}$   I. $\frac{1}{5}$   12. ____

13. Write $\frac{3}{5}$ as a percent.
   A. 3.5%   B. 35%   C. 60%   D. 6%   13. ____

14. Write 75% as a fraction in simplest form.
   F. $\frac{1}{4}$   G. $\frac{3}{4}$   H. $\frac{4}{5}$   I. $\frac{1}{5}$   14. ____

15. Find the LCM of 15, 25, and 125.
   A. 375   B. 125   C. 5   D. 275   15. ____

16. Find the LCD for $\frac{1}{12}$ and $\frac{1}{8}$.
   F. 96   G. 88   H. 12   I. 24   16. ____

For Questions 17 and 18, replace each $\bullet$ to make a true sentence.

17. $\frac{13}{28}$ $\bullet$ $\frac{17}{30}$
   A. $>$   B. $<$   C. $=$   D. $\times$   17. ____

18. $\frac{7}{12}$ $\bullet$ $\frac{5}{9}$
   F. $>$   G. $<$   H. $=$   I. $\div$   18. ____

19. Find the least fraction.
   A. $\frac{15}{16}$   B. $\frac{4}{5}$   C. $\frac{9}{10}$   D. $\frac{7}{8}$   19. ____

20. DOGS Kelly spent 30 minutes in the afternoon walking her dog. What part of one hour did she spend walking the dog? Write the fraction in simplest form.
   F. $\frac{30}{60}$   G. $\frac{30}{24}$   H. $\frac{1}{2}$   I. $\frac{5}{4}$   20. ____

Bonus Write 24.1464646... using bar notation. B: ________________
Write the letter for the correct answer in the blank at the right of each question.

1. Evaluate \( w^2 - 2w + 6 \) for \( w = 1 \). Is the resulting number *prime* or *composite*?
   - A. 5; composite
   - B. 5; prime
   - C. 4; composite
   - D. 4; prime
   1. ____

2. Find the prime factorization of 182.
   - F. \( 2 \times 91 \)
   - G. \( 14 \times 17 \)
   - H. \( 2 \times 7 \times 13 \)
   - I. \( 13 \times 14 \)
   2. ____

3. Write \( 50p^2q \) as a product of its factors.
   - A. \( 2 \times 5 \times p \times p \times q \)
   - B. \( 2 \times 5 \times 5 \times p \times q \times q \)
   - C. \( 2 \times 5 \times 5 \times p \times q \)
   - D. \( 2 \times 5 \times 5 \times p \times p \times q \)
   3. ____

4. Find the GCF of 8, 20, and 36.
   - F. 2
   - G. 4
   - H. 6
   - I. 8
   4. ____

5. Find the GCF of \( 16x^2 \) and \( 56x \).
   - A. \( 8x \)
   - B. \( 2x \)
   - C. 8
   - D. 4
   5. ____

6. Write \( \frac{32}{72} \) in simplest form.
   - F. \( \frac{16}{36} \)
   - G. \( \frac{8}{18} \)
   - H. \( \frac{4}{9} \)
   - I. \( \frac{1}{2} \)
   6. ____

7. Write \( \frac{7}{25} \) as a decimal.
   - A. 0.28
   - B. 2.8
   - C. 0.028
   - D. 0.28
   7. ____

8. Write \( 4\frac{2}{3} \) as a decimal.
   - F. 0.46
   - G. 46.6
   - H. 4.6
   - I. 4.6
   8. ____

9. Write \( 79\frac{1}{2}% \) as a decimal.
   - A. 79.5
   - B. 7.95
   - C. 0.795
   - D. 0.79\( \frac{1}{2} \)
   9. ____

10. Write a ratio equivalent to 30%.
    - F. \( \frac{30}{1000} \)
    - G. 30 per 100
    - H. 300:10
    - I. 3:100
    10. ____

11. Which is 0.07 written as a percent?
    - A. 0.07%
    - B. 0.7%
    - C. 70%
    - D. 7%
    11. ____
12. Write 0.82 as a fraction in simplest form.
   F. $\frac{41}{50}$  G. $\frac{12}{25}$  H. $\frac{2}{5}$  I. $\frac{8}{10}$  12. ____

13. Write $\frac{7}{16}$ as a percent.
   A. 0.4375%  B. 437.5%  C. 4.375%  D. 43.75%  13. ____

14. Write 12% as a fraction in simplest form.
   F. $\frac{1}{12}$  G. $\frac{12}{100}$  H. $\frac{3}{25}$  I. $\frac{6}{50}$  14. ____

15. Find the LCM of 17, 27, and 37.
   A. 629  B. 16,983  C. 5,661  D. 1,887  15. ____

16. Find the LCD for $\frac{11}{7}$ and $\frac{3}{8}$.
   F. 14  G. 16  H. 33  I. 56  16. ____

For Questions 17 and 18, replace each * to make a true sentence.

17. $\frac{7}{15}$ * $\frac{13}{24}$
   A. >  B. <  C. =  D. +  17. ____

18. $\frac{7}{11}$ * $\frac{3}{5}$
   F. >  G. <  H. =  I. +  18. ____

19. Find the least fraction.
   A. $\frac{13}{15}$  B. $\frac{7}{8}$  C. $\frac{2}{3}$  D. $\frac{3}{4}$  19. ____

20. RUNNING Alberto spent 25 minutes running in the afternoon.
    What part of one hour did he spend running? Find the fraction in simplest form.
    F. $\frac{25}{24}$  G. $\frac{25}{60}$  H. $\frac{5}{60}$  I. $\frac{5}{12}$  20. ____

Bonus What percent of 100 is 50?

B: ________________
Write the letter for the correct answer in the blank at the right of each question.

1. Evaluate $s^2 - s + 7$ for $s = 2$. Is the resulting number prime or composite?
   A. 7; prime  
   B. 7; composite  
   C. 9; composite  
   D. 9; prime  

2. Find the prime factorization of 42.
   F. $2 \times 3 \times 7$  
   G. $3^2 \times 7$  
   H. $3 \times 14$  
   I. $2 \times 5^2$  

3. Write $81r^2s$ as a product of its factors.
   A. $9 \times 9 \times r \times s$  
   B. $3 \times 3 \times 3 \times 3 \times r \times s \times s$  
   C. $3 \times 3 \times 3 \times r \times r \times s$  
   D. $3 \times 3 \times 3 \times r \times r \times s$  

4. Find the GCF of 36, 60, and 72.
   F. 6  
   G. 12  
   H. 36  
   I. 18  

5. Find the GCF of $48x$ and $56x^2$.
   A. 8  
   B. 4  
   C. $8x$  
   D. $4x^2$  

6. Write $\frac{12}{27}$ in simplest form.
   F. $\frac{1}{3}$  
   G. $\frac{1}{2}$  
   H. $\frac{4}{9}$  
   I. $\frac{3}{7}$  

7. Write $\frac{5}{8}$ as a decimal.
   A. 0.0625  
   B. $0.6\overline{2}$  
   C. 6.25  
   D. 0.625  

8. Write $3\frac{4}{9}$ as a decimal.
   F. 0.34  
   G. 3.4  
   H. 3.4  
   I. $34.\overline{4}$  

9. Write $61\frac{1}{2}$% as a decimal.
   A. 0.615  
   B. 61.5  
   C. 6.15  
   D. $0.61\frac{1}{2}$  

10. Write a ratio equivalent to 90%.
    F. 10 per 100  
    G. 90 per 100  
    H. 9:100  
    I. $\frac{90}{1,000}$  

11. Which is 0.01 written as a percent?
    A. 99%  
    B. 10%  
    C. 1%  
    D. 0.1%
12. Write 0.75 as a fraction in simplest form.
   F. \( \frac{7}{5} \)  \( \quad \) G. \( \frac{75}{100} \)  \( \quad \) H. \( \frac{1}{2} \)  \( \quad \) I. \( \frac{3}{4} \)  \( \quad \) 12. ____

13. Write \( \frac{3}{4} \) as a percent.
   A. 75%  \( \quad \) B. 0.75%  \( \quad \) C. 750%  \( \quad \) D. 7.5%  \( \quad \) 13. ____

14. Write 8% as a fraction in simplest form.
   F. \( \frac{2}{25} \)  \( \quad \) G. \( \frac{8}{100} \)  \( \quad \) H. \( \frac{4}{50} \)  \( \quad \) I. \( \frac{80}{100} \)  \( \quad \) 14. ____

15. Find the LCM of 12, 16, and 24.
   A. 24  \( \quad \) B. 192  \( \quad \) C. 48  \( \quad \) D. 96  \( \quad \) 15. ____

16. Find the LCD for \( \frac{1}{4} \) and \( \frac{2}{3} \).
   F. 4  \( \quad \) G. 12  \( \quad \) H. 7  \( \quad \) I. 18  \( \quad \) 16. ____

For Questions 17 and 18, replace each \( \bullet \) to make a true sentence.

17. \( \frac{4}{9} \bullet \frac{7}{12} \)
   A. >  \( \quad \) B. <  \( \quad \) C. =  \( \quad \) D. –  \( \quad \) 17. ____

18. \( \frac{4}{5} \bullet \frac{2}{3} \)
   F. >  \( \quad \) G. <  \( \quad \) H. =  \( \quad \) I. +  \( \quad \) 18. ____

19. Find the least fraction.
   A. \( \frac{5}{7} \)  \( \quad \) B. \( \frac{7}{8} \)  \( \quad \) C. \( \frac{11}{15} \)  \( \quad \) D. \( \frac{7}{10} \)  \( \quad \) 19. ____

20. **LAWN CARE**  Erik spent 55 minutes in the morning mowing the lawn.
    What part of one hour did he spend mowing the lawn? Find the fraction in simplest form.
   F. \( \frac{55}{60} \)  \( \quad \) G. \( \frac{5}{6} \)  \( \quad \) H. \( \frac{11}{12} \)  \( \quad \) I. \( \frac{55}{24} \)  \( \quad \) 20. ____

**Bonus**  What percent of 100 is 5?  \( \quad \)  B: ____________
1. Evaluate \( x^2 + x + 3 \) for \( x = 0, 1, \) and \( 2. \) Are the resulting numbers prime or composite?

Find the prime factorization of each number.

2. 102

3. 378

Find the GCF of each set of numbers or algebraic expressions.

4. 21, 63

5. 72, 84, 132

6. 30a, 42a^2

Write each fraction in simplest form.

7. \( \frac{39}{52} \)

8. \( \frac{6}{18} \)

Write each fraction, mixed number, or percent as a decimal. Use bar notation if the decimal is a repeating decimal.

9. \( \frac{8}{9} \)

10. \( 6\frac{3}{4} \)

11. 78%

Write each decimal or percent as a fraction in simplest form.

12. 0.02

13. 68%
Write each ratio, fraction, or decimal as a percent.

14. 36.1 per 100

15. \( \frac{4}{5} \)

16. 0.19

Find the LCM of each set of numbers.

17. 18, 30, 45

18. 21, 35

Find the LCD for each pair of fractions.

19. \( \frac{9}{15} \), \( \frac{8}{17} \)

20. \( \frac{6}{17} \), \( \frac{19}{51} \)

For Questions 21–23, replace each \( \bullet \) with <, >, or = to make a true sentence.

21. \( \frac{8}{13} \bullet \frac{5}{17} \)

22. \( \frac{10}{15} \bullet \frac{5}{14} \)

23. \( \frac{9}{19} \bullet \frac{19}{39} \)

24. Order \( \frac{1}{4} \), 0.5, and \( \frac{10}{25} \) from least to greatest.

25. **NEWSPAPER** Richard surveyed his class and found that 14 out of 26 students read the sports section of the newspaper first. Write the ratio as a fraction in simplest form and as a decimal to the nearest thousandth.

**Bonus** Replace \( \square \) with a prime factor to make a true sentence: \( 2 \times \square \times 7^2 = 294 \).
1. Evaluate \(y^2 + 2y + 1\) for \(y = 0, 1,\) and \(2\). Are the resulting numbers prime or composite?

Find the prime factorization of each number.

2. 72

3. 98

Find the GCF of each set of numbers or algebraic expressions.

4. 48, 56

5. 20, 36, 48

6. \(32z^2, 42z^3\)

Write each fraction in simplest form.

7. \(\frac{28}{48}\)

8. \(\frac{63}{102}\)

Write each fraction, mixed number, or percent as a decimal. Use bar notation if the decimal is a repeating decimal.

9. \(\frac{3}{11}\)

10. \(7\frac{3}{5}\)

11. 84%

Write each decimal or percent as a fraction in simplest form.

12. 0.06

13. 88%
Write each ratio, fraction, or decimal as a percent.

14. 73.2 per 100
14. ________________

15. \( \frac{26}{50} \)
15. ________________

16. 0.27
16. ________________

Find the LCM of each set of numbers.

17. 24, 30, 360
17. ________________

18. 36, 96
18. ________________

Find the LCD for each pair of fractions.

19. \( \frac{3}{22} \), \( \frac{7}{55} \)
19. ________________

20. \( \frac{9}{10} \), \( \frac{11}{25} \)
20. ________________

For Questions 21–23, replace each \( \bullet \) with \(<, >, \) or \( = \) to make a true sentence.

21. \( \frac{7}{9} \bullet \frac{15}{17} \)
21. ________________

22. \( \frac{7}{8} \bullet \frac{8}{10} \)
22. ________________

23. \( \frac{7}{11} \bullet \frac{35}{55} \)
23. ________________

24. Order \( \frac{7}{8} \), 0.8, and \( \frac{15}{16} \) from least to greatest.
24. ________________

25. MOVING Louisa surveyed her class and found that 10 out of 24 students had moved to a new city before they started school. Write the ratio as a fraction in simplest form and as a decimal to the nearest thousandth.
25. ________________

Bonus Replace \( \square \) with a prime factor to make a true sentence: \( 2^2 \times \square \times 11 = 220 \).
B: ________________
1. Evaluate \(6x^2 + 3x + 1\) for \(x = 0, 1,\) and \(2.\) Are the resulting numbers prime or composite?

Find the prime factorization of each number.

2. 51

3. 520

Find the GCF of each set of numbers or algebraic expressions.

4. 49, 84

5. 30, 54, 102

6. \(12bc, 4b^2, 52b^2c\)

Write each fraction in simplest form.

7. \(\frac{14}{63}\)

8. \(\frac{44}{121}\)

Write each fraction, mixed number, or percent as a decimal. Use bar notation if the decimal is a repeating decimal.

9. \(\frac{17}{24}\)

10. \(3\frac{9}{11}\)

11. 5.7%

Write each decimal or percent as a fraction in simplest form.

12. 0.94

13. 46%
Write each ratio, fraction, or decimal as a percent.

14. \( \frac{33}{3} : 100 \)  

15. \( \frac{16}{25} \)  

16. 0.3025

Find the LCM of each set of numbers.

17. 21, 49

18. 12, 24, 96

Find the LCD for each pair of fractions.

19. \( \frac{1}{6}, \frac{5}{21} \)

20. \( \frac{4}{9}, \frac{15}{36} \)

For Questions 21–23, replace each \( \bullet \) with \(<\), \(>\), or \(=\) to make a true sentence.

21. \( \frac{4}{7} \bullet \frac{5}{8} \)

22. \( \frac{10}{15} \bullet \frac{8}{16} \)

23. \( \frac{3}{5} \bullet \frac{12}{20} \)

24. Order \( \frac{19}{5} \), 4.0625, and \( 3\frac{11}{12} \) from least to greatest.

25. MUSIC Paris practiced playing the trombone for 1 hour and 24 minutes. Write the time Paris spent practicing in hours as a decimal.

Bonus 29% of 100 is what number?

B: ________________
Chapter 5
Extended Response Assessment

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. A community is providing a gardening area for its residents. The area will be laid out in individual garden plots as shown below.

   ![Diagram of garden plots]

   a. The garden area will be fenced. The fence posts in front are to be equally spaced along the entire length with posts at the corners of each garden plot. Would a spacing of 3 feet between posts work? Explain.

   b. Find the prime factorizations of 30 and 24. Find the common factors of 30 and 24. Explain each step.

   c. What is the longest spacing between posts that can be used? What is this distance called? List the multiples of the widths of each size lot. What is the LCM?

   d. If the fence posts are to be equally spaced along the width of the garden area with posts at the corners of each garden plot, what spacing would you recommend? Why?

2. Many rates are used in baseball to indicate a player’s or team’s performance.

   a. A player’s batting average is the ratio of the number of hits to the number of official times at bat. Julian has 27 hits in 72 times at bat. Write his batting average as a fraction, as a decimal, and as a percent. Show and explain your work.

   b. Pitcher Pedro Sanchez won 125 of his games during his career. If he pitched 200 games, explain how you would use mathematics to show his career performance. Show his career performance as a percent, as a decimal, and as a fraction.
Choose the correct term or number to complete each sentence.

1. Every composite number can be written as the product of prime numbers, which is its (prime factorization, multiple), in exactly one way.

2. Fractions like \( \frac{3}{9} \) and \( \frac{6}{18} \) are called (least common multiples, equivalent fractions) because they have the same value.

3. A (terminating decimal, repeating decimal) is a decimal that ends when it reaches a remainder of zero.

4. The (least common denominator, greatest common factor) is the greatest of the factors that are common to two or more numbers.

5. The product of a number and any whole number is called a (prime number, multiple).

6. (Rational numbers, Greatest common factors) are numbers that can be written as fractions.

7. A (prime factorization, ratio) is a comparison of two numbers by division.

8. A whole number greater than 1 that has more than two factors is called a (composite number, prime number).

9. A (Venn diagram, factor tree) uses circles to show how elements among sets of numbers are related.

10. A percent is a ratio that compares a number to (0, 100).

11. In your own words, define the term simplest form.
Find the prime factorization of each number.

1. 28
2. 44
3. 315
4. 500

Write each expression as a product of its factors.

5. $24ab$
6. $12xy^2$

Find the GCF of each set of numbers.

7. 30, 105
8. 4, 6, 14

Find the GCF of each set of algebraic expressions.

9. $18w, 63w^2$
10. $10r^3, 55r$

1. Write 0.64 as a fraction in simplest form.

Write each fraction in simplest form.

2. $\frac{12}{64}$
3. $\frac{30}{36}$

Write each fraction or mixed number as a decimal. Use bar notation if the decimal is a repeating decimal.

4. $2\frac{5}{8}$
5. $\frac{7}{9}$
Chapter 5 Quiz
(Lessons 5-5 and 5-6)

1. Write 66% as a fraction in simplest form.
2. Write \( \frac{7}{20} \) as a percent.

Write each ratio as a percent.
3. 38:100
4. 17 out of 100

Write each percent as a decimal.
5. 84%
6. 6%
7. \( 25\frac{1}{2}% \)

Write each decimal as a percent.
8. 0.28
9. 0.299
10. 0.04

MULTIPLE-CHOICE TEST ITEM
Find the number that is not rational.
A. 7.030030003...
B. \(-8.4\)
C. \(\frac{5}{2}\)
D. \(7.\overline{3}\)

Find the LCM of each set of numbers.
2. 18, 24
3. 25, 30, and 36

Replace each \( \bullet \) with <, >, or = to make a true sentence.
4. \( \frac{24}{30} \bullet \frac{45}{50} \)
5. \( \frac{6}{17} \bullet \frac{18}{51} \)
Chapter 5 Mid-Chapter Test
(Lessons 5-1 through 5-8)

PART I

Write the letter for the correct answer in the blank at the right of each question.

1. Which number is composite?
   A. 31        B. 37        C. 35        D. 3
   1. _____

2. Find the prime factorization of 280.
   F. $2^2 \times 5 \times 7$  G. $2 \times 4 \times 5 \times 7$  H. $2^3 \times 35$  I. $2^3 \times 5 \times 7$
   2. _____

3. Find the GCF of 28 and 49.
   A. 2        B. 196        C. 7        D. 1,372
   3. _____

4. Find the GCF of $27ab$ and $81b^2$.
   F. $9b$  G. $27b$  H. $81b$  I. 27
   4. _____

5. Which of the following fractions is equivalent to $\frac{3}{7}$?
   A. $\frac{9}{21}$  B. $\frac{7}{3}$  C. $\frac{6}{15}$  D. $\frac{15}{28}$
   5. _____

6. Write $6 \frac{1}{11}$ as a decimal using bar notation.
   F. 0.609  G. 6.90  H. 60.09  I. 6.$\overline{09}$
   6. _____

7. Express 0.44 as a fraction.
   A. $\frac{44}{10}$  B. $\frac{11}{25}$  C. $\frac{22}{100}$  D. $4\frac{11}{25}$
   7. _____

PART II

8. Is the value of $5e - 2f$ prime or composite if $e = 2$ and $f = 3$?  8. ________________

9. Write $100m^2n$ as a product of its factors.  9. ________________

10. Find the GCF of $30w$ and $75w^2$.  10. ________________

11. Find the GCF of 20, 48, and 64.  11. ________________

12. Write $\frac{32}{48}$ in simplest form.  12. ________________

13. TIME 45 minutes is what part of one hour? Write the result as a fraction in simplest form.
   13. ________________

14. Write 2.124124124... using bar notation.  14. ________________

15. Write $7\frac{7}{8}$ as a decimal.  15. ________________
1. **FIELD TRIP** To attend a class field trip, each student will have to pay $3 for the theater ticket and $2.50 for transportation. If there are 200 students in the class, how much money will be collected for the field trip? (Lesson 1-1)

2. **EXERCISE** The frequency table summarizes the number of miles Sakima trained on his in-line skates while preparing for a race. What was the number of miles that he skated most frequently? (Lesson 2-1)

<table>
<thead>
<tr>
<th>Number of Miles</th>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–5</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>6–11</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>12–17</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>18–23</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>24–29</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

3. Find $|t|$ if $t = -7$. (Lesson 3-1)

4. Find $(-10)^2$. (Lesson 3-6)

For Exercises 5 and 6, write each sentence as an algebraic equation.

5. Six more than twice a number is 18. (Lesson 4-1)

6. Twice Kia’s age is 24. (Lesson 4-1)

7. Solve $7t - 13 = 22$. (Lesson 4-4)

8. Find the prime factorization of 252. (Lesson 5-1)

9. Find the GCF of 12, 24, and 132. (Lesson 5-2)

10. Write $\frac{24}{24}$ in simplest form. (Lesson 5-3)

11. Write $2\frac{9}{20}$ as a decimal. (Lesson 5-4)

12. Write $\frac{17}{20}$ as a percent. (Lesson 5-5)

13. Write 5.4% as a decimal. (Lesson 5-6)

14. Find the LCM of 20 and 30. (Lesson 5-7)

15. Order the numbers from least to greatest: (Lesson 5-8)

$58\frac{1}{2}, \frac{5}{8}, 58\frac{2}{5}, 58.5, 58\%$
1. Solve \( c = 14 + 21 \). (Lesson 1-5)
   A. 7  B. 35  C. 34  D. 36

2. What is the mode of the data in the stem-and-leaf plot? (Lesson 2-5)
   - Stem | Leaf
   - 20 | 0 5
   - 21 | 4 8 9
   - 22 | 1 3 7 8
   - 23 | 2 2
   F. 23  G. 22  H. 232  I. 4

3. What is the upper quartile of the box-and-whisker plot shown? (Lesson 2-6)
   A. 0  B. 10  C. 25  D. 30

4. Which of these correctly orders the integers from greatest to least? (Lesson 3-2)
   F. 7, 3, 0, −8, −1  G. −8, 7, 3, −1, 0  H. −8, −1, 0, 3, 7  I. 7, 3, 0, −1, −8

5. The quotient of a number and 4 is −8. Find the number. (Lesson 3-7)
   A. 22  B. −32  C. 24  D. 212

6. Solve \( 4g + 2 \leq 10 \). (Lesson 4-5)
   F. \( g \geq 3 \)  G. \( g \geq 2 \)  H. \( g \leq 3 \)  I. \( g \leq 2 \)

7. Which expression represents the prime factorization of 132? (Lesson 5-1)
   A. \( 2 \times 3^2 \times 11 \)  B. \( 4 \times 33 \)  C. \( 2 \times 6 \times 11 \)  D. \( 2^2 \times 3 \times 11 \)

8. Write 0.84 as a fraction in simplest form. (Lesson 5-4)
   F. \( \frac{21}{25} \)  G. \( \frac{42}{50} \)  H. \( \frac{84}{100} \)  I. \( \frac{42}{5} \)

9. Find the LCM of 8, 12, and 28. (Lesson 5-7)
   A. 84  B. 168  C. 28  D. 4
10. **TESTS** The data shows the quiz scores earned by students in a science class. What is the median? (Lesson 2-4)

<table>
<thead>
<tr>
<th>Quiz Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 17 20 10 15</td>
</tr>
<tr>
<td>19 0 13 17 14</td>
</tr>
<tr>
<td>17 20 11 10 9</td>
</tr>
</tbody>
</table>

11. Evaluate $|−213|$. (Lesson 3-1)

12. Find the slope of the line that passes through the points $(-1, 5)$ and $(6, 7)$. (Lesson 4-7)

13. Write $35a^2b^2$ as a product of its factors. (Lesson 5-1)

14. Order the numbers from least to greatest: $\frac{9}{10}$, 0.99, $\frac{100}{99}$, 99.99%. (Lesson 5-8)

15. Which ratio is closest to 1? Explain. (Lesson 5-8)

16. Is the number 0.7070070007... rational? Explain. (Lesson 5-8)
Part 1: Multiple Choice

Select the best answer from the choices given and fill in the corresponding oval.


Part 2: Short Response/Grid in

Solve the problem and write your answer in the blank.

For grid in questions, also enter your answer by writing each number or symbol in a box. Then fill in the corresponding circle for that number of symbol.

10. ______________ (grid in)
11. ______________
12. ______________ (grid in)
13. ______________ (grid in)
14. ______________
15. ______________ (grid in)
16. ______________
17. ______________

Part 3: Extended Response

Record your answers for Questions 18 and 19 on the back of this paper.
General Scoring Guidelines

• If a student gives only a correct numerical answer to a problem but does not show how he or she arrived at the answer, the student will be awarded only 1 credit. All extended response questions require the student to show work.

• A fully correct answer for a multiple-part question requires correct responses for all parts of the question. For example, if a question has three parts, the correct response to one or two parts of the question that required work to be shown is not considered a fully correct response.

• Students who use trial and error to solve a problem must show their method. Merely showing that the answer checks or is correct is not considered a complete response for full credit.

Exercise 18 Rubric

<table>
<thead>
<tr>
<th>Score</th>
<th>Specific Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>An understanding of GCF is demonstrated by determining the greatest number of bottles in a row is 6. An understanding of LCM is demonstrated by determining the first time that all three packages are sealed at the same time is 120 s.</td>
</tr>
<tr>
<td>3</td>
<td>The correct values of 6 bottles and 120 s are determined, but the demonstration of understanding is not complete. <strong>OR</strong> The understanding is complete, but one computational error is made.</td>
</tr>
<tr>
<td>2</td>
<td>An understanding of GCF is demonstrated and the number of bottles in a row is determined, but no understanding LCM is demonstrated and the time is incorrectly. <strong>OR</strong> An understanding of the LCM is demonstrated and the time is determined, but no understanding of GCF is demonstrated and the number of bottles in a row is incorrect. <strong>OR</strong> Both numerical values are correct, but no understanding of GCF or LCM are demonstrated.</td>
</tr>
<tr>
<td>1</td>
<td>Only one numerical value is correct and no understanding of GCF or LCM are demonstrated. <strong>OR</strong> The numerical values are incorrect, but some understanding of GCF and LCM is demonstrated.</td>
</tr>
<tr>
<td>0</td>
<td>Response is completely incorrect.</td>
</tr>
</tbody>
</table>

Exercise 19 Rubric

<table>
<thead>
<tr>
<th>Score</th>
<th>Specific Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>The model of each ratio is drawn accurately. The classroom with the greatest number of students volunteering is determined to be Room A, and the classroom with the greatest fraction of students volunteering is determined to be Room B. The ratios are correctly written as $\frac{7}{24} = 0.2916 = 29.2%, \frac{3}{8} = 0.375 = 37.5%, \text{ and } \frac{6}{18} = \frac{1}{3} = 0.3 = 33.3%$.</td>
</tr>
<tr>
<td>3</td>
<td>The classrooms are correctly identified and the ratios are correctly written in other forms, but the models are not accurately drawn. <strong>OR</strong> The models are accurate and the classrooms are correctly identified, but there is a computational error in changing the ratios to other forms.</td>
</tr>
<tr>
<td>2</td>
<td>One of the ratios is not accurately modeled and is incorrectly written to other forms, but the other two ratios are correct. The classrooms are correctly identified. <strong>OR</strong> The classrooms are correctly identified and the ratios are correctly changed, but the models are incorrect. <strong>OR</strong> The ratios are correctly modeled and changed, but the classrooms are incorrectly identified.</td>
</tr>
<tr>
<td>1</td>
<td>Only the models or changes to other forms is correct. <strong>OR</strong> Only one ratio is modeled and changed to other forms correctly.</td>
</tr>
<tr>
<td>0</td>
<td>Response is completely incorrect.</td>
</tr>
</tbody>
</table>
Determine whether each number is prime or composite.

1. 34 composite
2. 77 composite
3. 37 prime
4. 89 prime
5. 69 composite
6. 67 prime
7. 123 composite
8. 71 prime
9. 2 prime
10. 45 composite
11. 29 prime
12. 90 composite

Find the prime factorization of each number.

13. 48 $2^4 \cdot 3$
14. 54 $2 \cdot 3^3$
15. 108 $2^2 \cdot 3^3$
16. 80 $2^4 \cdot 5$
17. 125 $5^3$
18. 66 $2 \cdot 3 \cdot 11$
19. 250 $2 \cdot 5^3$
20. 187 $11 \cdot 17$
21. 242 $2 \cdot 11^2$

Write each expression as a product of its factors.

22. $56 = ab^2 \cdot 7$
Pre-Activity  Complete the Mini Lab at the top of page 197 in your textbook. Write your answers below.

1. Using your grid paper, draw as many different rectangles as possible using 3, 4, 5, 6, 7, 8, 9, and 10 squares.  See students' work.

2. Which numbers of squares can be drawn in only one rectangle? In more than one rectangle? 3, 5, 7; 4, 6, 8, 9, 10

Reading the Lesson

3. How do you know when you are at the bottom of a factor tree? Sample answer: when all of the factors are prime numbers

4. Does the order of the factors in a prime factorization matter? No

5. What does the bottom row of the factor tree look like for the prime factorization of 45? Sample answer: $3 \times 3 \times 5 \times x \times y \times y$

Helping You Remember

6. A factor tree can be used to find the prime factorization of a composite number. Why do you think it is called a factor tree? What are the “leaves” of the tree? Sample answer: It is called a factor tree because it starts with one number then branches out into factors of the number; each “leaf” of the tree is a factor of the number above it.
Enrichment

**Perfect Numbers**

A positive integer is perfect if it equals the sum of its factors that are less than the integer itself.

If the sum of the factors (excluding the integer itself) is greater than the integer, the integer is called abundant.

If the sum of the factors (excluding the integer itself) is less than the integer, the integer is called deficient.

The factors of 28 (excluding 28 itself) are 1, 2, 4, 7, and 14.

Since \( 1 + 2 + 4 + 7 + 14 = 28 \), 28 is a perfect number.

Complete the table to classify each number as perfect, abundant, or deficient.

<table>
<thead>
<tr>
<th>Number</th>
<th>Divisors (Excluding the Number Itself)</th>
<th>Sum</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 14</td>
<td>1, 2, 7</td>
<td>10</td>
<td>deficient</td>
</tr>
<tr>
<td>2. 6</td>
<td>1, 2, 3</td>
<td>6</td>
<td>perfect</td>
</tr>
<tr>
<td>3. 12</td>
<td>1, 2, 3, 4, 6</td>
<td>16</td>
<td>abundant</td>
</tr>
<tr>
<td>4. 20</td>
<td>1, 2, 4, 5, 10</td>
<td>22</td>
<td>abundant</td>
</tr>
<tr>
<td>5. 10</td>
<td>1, 2, 5</td>
<td>8</td>
<td>deficient</td>
</tr>
</tbody>
</table>

Show that each number is perfect.

6. 496  \( 1 + 2 + 4 + 8 + 16 + 31 + 62 + 124 + 248 = 496 \)

7. 8,128 \( 1 + 2 + 4 + 8 + 16 + 32 + 127 + 254 + 508 + 1,016 + 2,032 + 4,064 = 8,128 \)

8. CHALLENGE 33,550,336 \( 1 + 2 + 4 + 8 + 16 + 32 + 64 + 128 + 256 + 512 + 1,024 + 2,048 + 4,096 + 8,191 + 16,382 + 32,764 + 65,532 + 131,056 + 262,112 + 524,224 + 1,048,448 + 2,096,896 + 4,193,792 + 8,387,584 + 16,775,168 = 33,550,336 \)

Practice: Word Problems

**Prime Factorization**

1. **FLAG** When the United States had 48 states, the stars were arranged in a \( 6 \times 8 \) rectangular arrangement. What other rectangular arrangements of 48 stars are possible? \( 1 \times 48; 2 \times 24; 3 \times 16; 4 \times 12 \)

2. **MARCHING BAND** A marching band has 72 members. If they are to march in an equal number of people in each row, state all possible numbers of rows and numbers of people in each row. \( 1 \times 72; 2 \times 36; 3 \times 24; 4 \times 18; 6 \times 12; 8 \times 9 \)

3. **BIOLOGY** The human face uses 14 muscles to smile and 43 to frown. Which number is prime and which is composite? Explain. 43 is prime; 14 is composite; The only factors of 43 are 1 and 43 but 14 has several factors.

4. **BASEBALL CARDS** Jack is arranging his prized baseball cards in a frame. If he has 24 cards, in how many different numbers of rows and columns can he display them if each row has the same number of cards? \( 1 \times 24; 2 \times 12; 3 \times 8; 4 \times 6 \)

5. **HISTORY** It is estimated that Sophocles, an ancient Greek dramatist, died in 406 b.c. Find the prime factorization of 406. \( 2 \times 7 \times 29 \)

6. **ANATOMY** There are 230 joints in the human body. Find the prime factorization of 230. \( 2 \times 5 \times 23 \)

7. **PHOTOS** Bill is arranging 108 photos to display on a poster board for a presentation. If he arranges an equal number of photos in each row, in how many different numbers of rows and columns can he arrange the photos? Sample answer: 12 ways; \( 1 \times 108, 108 \times 1, 12 \times 54, 54 \times 2, 3 \times 36, 36 \times 3, 4 \times 27, 27 \times 4, 6 \times 18, 18 \times 6, 9 \times 12, 12 \times 9 \)

8. **ART** The supreme example of Renaissance genius, Leonardo da Vinci passed away in 1519 a.d. Is 1519 a composite or prime number? Explain. Composite; \( 1519 = 7 \times 217 \)
Practice: Word Problems

Greatest Common Factor

1. **TABLE TENNIS** Rebecca has 20 table tennis balls and 16 table tennis paddles. She wants to sell packages of balls and paddles bundled together. What is the greatest number of packages she can sell with no leftover balls or paddles?

2. **TUMBLING** Mr. Nicolet wants to organize equal-sized groups of boys and girls for tumbling exercises. If there are 12 boys and 18 girls and each group is all boys or all girls, what is the largest size group he can organize?

3. **BAKE SALE** Volunteers at a bake sale want to sell slices of banana nut bread and raisin bread packaged together. They have 63 slices of banana nut bread and 45 slices of raisin bread. What is the greatest number of packages they can put together? How many slices of each type of bread are in a package?

4. **DOG TREATS** Krista wants to give her dog a special treat. She has 81 dog bones and 54 pieces of beef jerky. If she wants to give her dog the same number of treats every day, what is the greatest number of days she can feed the dog these treats? How many of each type should she give the dog?

5. **FRUIT TREES** Mr. Farber has 84 pear trees and 180 apple trees. He wants to plant the trees in rows of equal width. Find the most trees that can be planted in a row if each row has only one type of tree.

6. **BOARDS** A scouting troop has three boards of lengths 14 feet, 28 feet, and 21 feet. The boards must be cut to produce equal-sized pieces. What is the longest piece that can be cut with no waste?

Find the GCF of each set of numbers.

1. 14, 20 2
2. 16, 42 2
3. 8, 18 2
4. 24, 36 12
5. 72, 22 2
6. 77, 15 1
7. 32, 80 16
8. 90, 120 30
9. 45, 30 15
10. 12, 62 2
11. 15, 27 3
12. 21, 28 7
13. 12, 20, 26 2
14. 15, 20, 25 5
15. 60, 72, 36 12
16. 32, 48, 64 16
17. 36, 48, 30 6
18. 28, 56, 42 14
19. 80, 110, 90 10
20. 9, 25, 49 1

Find the GCF of each set of algebraic expressions.

21. \(21ab, 14b\) 7b
22. \(20a^2, 36a\) 4a
23. \(15ab, 5b\) 5b
24. \(35a^2, 85ab\) 5a
25. Find the GCF of \(2^3 \times 3^2 \times 5\) and \(2^2 \times 3 \times 5^2\). \(2^2 \times 3 \times 5\) or 60
Sundaram's Sieve

This arrangement of numbers is called Sundaram’s Sieve. Like the Sieve of Eratosthenes, Sundaram’s arrangement can be used to find prime numbers.

Here’s how to use Sundaram’s Sieve to find prime numbers. If a number, \( n \), is not in the Sieve, then \( 2n + 1 \) is a prime number. If a number, \( n \), is in the Sieve, then \( 2n + 1 \) is not a prime number.

32 is in the sieve.

\[ \frac{32}{1} = 32 \]

65 is not prime.

35 is not in the sieve.

\[ \frac{35}{1} = 35 \]

71 is prime.

1. Does the sieve give all primes up to 99? all the composites?
   All primes except 2; only 22 of the composites.

2. Sundaram’s Sieve is constructed from arithmetic sequences. Describe the pattern used to make the first row.
   Start with 4 and add 3 each time.

3. How is the first column constructed?
   It is the same as the first row.

4. How are the second through fifth rows constructed?
   Arithmetic sequences using 5, 7, 9, and 11.

5. How would you add a sixth row to the sieve?
   Start with 19 and add 13 each time.

6. Use Sundaram’s Sieve to find 5 four-digit prime numbers. You will need to add more numbers to the sieve to do this.
   Answers will vary.
Simplifying Fractions

Fractions that have the same value are called equivalent fractions. A fraction is in simplest form when the GCF of the numerator and denominator is 1.

**EXAMPLE 1**

Write \(\frac{36}{54}\) in simplest form.

First, find the GCF of the numerator and denominator:

factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36
factors of 54: 1, 2, 3, 6, 9, 18, 27, 54

The GCF of 36 and 54 is 18.

Then, divide the numerator and the denominator by the GCF:

\[ \frac{36}{54} = \frac{36 \div 18}{54 \div 18} = \frac{2}{3} \]

So, \(\frac{36}{54}\) written in simplest form is \(\frac{2}{3}\).

**EXAMPLE 2**

Write \(\frac{8}{12}\) in simplest form.

\[ \frac{8}{12} = \frac{8 \div 4}{12 \div 4} = \frac{2}{3} \]

So, \(\frac{8}{12}\) written in simplest form is \(\frac{2}{3}\).

**EXERCISES**

Write each fraction in simplest form.

1. \(\frac{42}{72}\)
2. \(\frac{40}{64}\)
3. \(\frac{21}{35}\)
4. \(\frac{25}{100}\)
5. \(\frac{99}{132}\)
6. \(\frac{17}{85}\)

Write two fractions that are equivalent to each fraction.

16–21 Sample answers given.

16. \(\frac{3}{4}\)
17. \(\frac{7}{9}\)
18. \(\frac{7}{11}\)
19. \(\frac{14}{17}\)
20. \(\frac{21}{23}\)
21. \(\frac{31}{37}\)

22. \(\frac{22}{33}\)
23. \(\frac{34}{51}\)
24. \(\frac{46}{69}\)
25. \(\frac{63}{69}\)
26. \(\frac{22}{33}\)
27. \(\frac{34}{51}\)
28. \(\frac{22}{33}\)
Pre-Activity
Complete the Mini Lab at the top of page 207 in your textbook. Write your answers below.

1. Write a fraction to describe each figure above:
   \[
   \frac{1}{3}
   \]

2. Which figure has a greater portion of its parts shaded?
   Neither, they both have an equal portion shaded.

3. What can you conclude about the fractions you wrote above?
   They are equal.

Reading the Lesson
4. How do you find the simplest form of a fraction? Sample answer:
   1) Find the GCF of the numerator and denominator. 2) Divide the numerator and denominator by the GCF.

5. When you find the simplest form of a fraction, how can you check to make sure your answer is correct? Multiply the numerator and denominator of the answer by the GCF of the original numerator and denominator. If you get the original fraction, your answer is correct.

6. Use canceling to simplify the fraction:
   \[
   \frac{2 \times 3 \times 7 \times 11}{3 \times 11 \times 17} = \frac{2 \times 7}{17} = \frac{14}{17}
   \]

Helping You Remember
7. Use a collection of rectangles like the one in the Mini Lab to show how to write \(\frac{15}{20}\) in simplest form.
   \[
   \frac{3}{4} = \frac{\boxed{12}}{\boxed{16}}
   \]
A Two-Clock Code

Two clock faces can be used to create coded secret messages.

To encode a message, write each letter of the message as a fraction. Use the hour next to the letter as the denominator and the number in the center of that clock as the numerator.

For example, the letter G will be encoded as the fraction \( \frac{2}{5} \). The letter R becomes \( \frac{2}{5} \).

Notice the Y and Z are both written with the same fraction. The same is true for \( P \) and \( Q \).

1. Decode this message. The result will be a "secret" from a well-known poem written by Henry Wadsworth Longfellow.

   \[
   \frac{1}{12} \quad \frac{2}{12} \quad \frac{3}{12} \quad \frac{4}{12} \quad \frac{5}{12} \quad \frac{6}{12} \quad \frac{7}{12} \quad \frac{8}{12} \quad \frac{9}{12} \quad \frac{10}{12} \quad \frac{11}{12} \quad \frac{12}{12}
   \]

   If the British march by land or sea

   from the town tonight, hang a

   lantern aloft in the belfry arch

   of the North Church tower as a signal

   light, one if by land, and two, if by sea.

2. Use the two-clock code to create a secret message of your own.

   Answers will vary.
Practice: Word Problems
Fractions and Decimals

1. **BOYS AND GIRLS**
   There were 6 girls and 18 boys in Mrs. Johnson's math class. Write the number of girls as a fraction of the number of boys. Then write the fraction as a repeating decimal.
   \[ \frac{6}{18} = 0.3 \]

2. **CATS**
   In a neighborhood of 72 families, 18 families own one or more cats. Write the number of families who own one or more cats as a fraction. Then write the fraction as a decimal.
   \[ \frac{18}{72} = 0.25 \]

3. **CELLULAR PHONES**
   In Italy, about 74 of every 100 people use cellular telephones. Write the fraction of cellular phone users in Italy. Then write the fraction as a decimal.
   \[ \frac{74}{100} = 0.74 \]

4. **FRUITS**
   Ms. Rockwell surveyed her class and found that 12 out of the 30 students chose peaches as their favorite fruit. Write the number of students who chose peaches as a fraction in simplest form. Then write the fraction as a decimal.
   \[ \frac{12}{30} = \frac{2}{5} = 0.4 \]

5. **TRAVEL**
   Tora took a short trip of 320 miles. He stopped to have lunch after he had driven 120 miles. Write the fraction of the trip he had completed by lunch in simplest form. Then write the fraction as a decimal.
   \[ \frac{3}{5} = 0.6 \]

6. **VOTING**
   In a recent school election, 208 of the 325 freshmen voted in their class election. Write the fraction of freshmen who voted. Then write the fraction as a decimal.
   \[ \frac{208}{325} = 0.64 \]
Making a Line Design

Connect each pair of equivalent numbers with a straight line segment. Although you will draw only straight lines, the finished design will appear curved!

1. $0.05$ and $0.125$
2. $0.5$ and $0.2$
3. $0.3$ and $0.1$
4. $0.6$ and $0.63$
5. $0.03$ and $0.384615$
6. $0.16$ and $0.142857$
7. $0.5$ and $0.25$
8. $0.875$ and $0.05$
9. $0.375$ and $0.0625$
10. $0.75$ and $0.083$
11. $1$ and $0.05$
12. $15$ and $0.083$
13. $12$ and $0.0625$
14. $34$ and $0.0125$
15. $38$ and $0.00625$
16. $19$ and $0.004167$
17. $13$ and $0.0025$
18. $59$ and $0.00125$
19. $1$ and $0.000625$
20. $8$ and $0.0003125$

NAME ____________________________ DATE ______________ PERIOD _____

Enrichment

Pre-Activity  Read the introduction at the top of page 210 in your textbook. Write your answers below.

1. How many games did the USA softball team win? How many did they play?
   $7$; $10$

2. Write a fraction comparing the number of times the team won to the total number of games played.
   $\frac{7}{10}$

Reading the Lesson

3. What is meant by the term place value?
   Sample answer: the value of the place of a digit in a numeral

4. In place value, what serves as the divider between ones and tenths?
   the decimal point

5. What is the difference between a terminating decimal and a repeating decimal? Give an example of each.
   Sample answer: A terminating decimal has an ending, and a repeating decimal does not; $6.25$ is a terminating decimal, and $0.7777...$ is a repeating decimal.

Helping You Remember

6. Work with a partner. Use a local newspaper, a favorite magazine, or the Internet. Find real-world situations that use fractions or decimals. Convert the fractions to decimals and the decimals to fractions. Exchange papers with your partner and correct each other’s work.
   See students’ work.
5-5 Practice: Skills
Fractions and Percents

Write each ratio as a percent.
1. 26 out of 100 26% 2. 5 per 100 5% 3. 13:100 13%
4. 39/100 39% 5. 12.5 per 100 12.5% 6. 51 out of 100 51%

Write each fraction as a percent.
7. 1/2 50% 8. 7/10 70% 9. 3/10 30%
10. 23/25 92% 11. 17/50 34% 12. 19/50 38%

Write each percent as a fraction in simplest form.
13. 15% 3/20 17. 85% 17/20 18. 1% 1/100
19. 70% 7/10 20. 25% 1/4 21. 19% 19/100
22. 33% 33/100 23. 22% 11/50 24. 95% 19/20
Pre-Activity

Read the introduction at the top of page 216 in your textbook. Write your answers below.

1. Shade a $10 \times 10$ grid that represents the number of students that chose each method.

2. What fraction of the students chose the Internet as the method that makes learning more interesting?

Reading the Lesson

3. There is more than one way to write a ratio. Write the ratio that compares 4 to 25 in three different ways.
   Sample answer: 4 out of 25, 4:25, and $\frac{4}{25}$

4. Write the ratio in Exercise 3 as a percent.
   16%

5. How does having ratios written as percents make it easier to compare amounts? Sample answer: Percents have the same denominator (100), so all you need to do is compare the numerators.

Helping You Remember

6. Work with a partner. Explain to your partner how to convert a ratio that does not compare a number to 100 as a percent. Then have your partner explain to you how to change from a percent to a fraction in simplest form. Both of you should use examples as well as general explanations. See students’ work.
Write 42.5% as a decimal.

\[ 42.5\% = \frac{425}{1000} \]

Multiply by 10 to remove the decimal in the numerator.

\[ 0.425 \]

Write the percent as a fraction.

\[ \frac{425}{1000} = \frac{425 \div 10}{1000 \div 10} = \frac{42.5}{100} \]

Simplify.

\[ 0.425 \]

Write the fraction as a decimal.

Write 0.625 as a percent.

\[ 0.625 \times 100 = 62.5\% \]

Add the % symbol.

Write each percent as a decimal.

1. 6% \[ 0.06 \]
2. 28% \[ 0.28 \]
3. 81% \[ 0.81 \]
4. 84% \[ 0.84 \]
5. 35.5% \[ 0.355 \]
6. 12.5% \[ 0.125 \]
7. 14.2% \[ 0.142 \]
8. 11.1% \[ 0.111 \]

Write each decimal as a percent.

9. 0.47 \[ 47\% \]
10. 0.03 \[ 3\% \]
11. 0.075 \[ 7.5\% \]
12. 0.914 \[ 91.4\% \]

Environmental engineers like Colmenares use mathematics to predict the effect that our actions will have on our environment. They may also recommend ways to protect the environment. On this page, you will consider some data and recommendations concerning water usage.

Refer to the graph above.

1. Which one category accounts for more than $\frac{1}{3}$ of the water usage?
   - outside uses

2. Estimate the fraction of a person’s daily water usage that is for bath and shower.
   - about $\frac{1}{5}$

Use the graph above. Estimate the amount of water used in each category. Sample answers are given.

3. outside uses \[ \frac{2}{5} \times 300 = 120 \text{ liters} \]
4. bath and shower \[ \frac{1}{5} \times 300 = 60 \text{ liters} \]
5. toilet \[ \frac{1}{5} \times 300 = 60 \text{ liters} \]
6. laundry \[ \frac{3}{20} \times 300 = 45 \text{ liters} \]
7. dishwasher \[ \frac{1}{100} \times 300 = 3 \text{ liters} \]
8. faucets \[ \frac{1}{10} \times 300 = 30 \text{ liters} \]

In each situation, what percent of the water used can be saved by following the recommendation?

9. Using a water-saving shower head can save 65 liters of water out of the 130 liters normally used in a five-minute shower. 50%
10. Turning off the water while brushing your teeth can reduce the water used from 20 liters to 2 liters. 90%
Practice: Word Problems  
Percents and Decimals

1. AREA New Mexico’s land area is about 0.03 of the total area of the United States. What percent is New Mexico’s land area of the total area of the United States? 3%

2. SCALE MODEL A scale model of a building is 0.25 the actual size. What percent of the actual size of the building is the model? 25%

3. NFL COACHES Don Shula ranks among the most successful coaches in the National Football League. In his career, he won 0.665 of his games. Write the decimal as a percent. 66.5%

4. SOFTBALL Jenny’s batting average is 0.346. Write the decimal as a percent. 34.6%

5. VITAMINS A multiple vitamin contains 450 milligrams of calcium. This is 45% of the recommended daily allowance. Write the percent as a decimal. 0.45

6. BASKETBALL Tao makes 74% of his free throws. Write the percent as a decimal. 0.74

7. SALES TAX The sales tax in a town is 7.25%. Write the percent as a decimal. 0.0725

8. FIELD TRIP In Ms. Silver’s English class, 20\(\frac{1}{4}\)% of the students signed up to visit a local museum. Write the percent as a decimal. 0.2025
African-American Scientists and Inventors

When you buy a pair of shoes, you usually have a wide variety of styles, sizes, and prices to choose from. It is the work of an African-American inventor, Jan Matzeliger (1852–1889), that makes this possible. In 1882, Matzeliger patented a lasting machine that could shape the upper portion of a shoe and attach it to the sole in a fraction of the time it took to do the job by hand. Using this machine, shoemakers were able to increase production and reduce prices dramatically.

African Americans have made many significant contributions to mathematics, science, and invention. By solving the percent problems and matching the problem and the correct solution, you will learn more about just a few of them.

1. 35% of 50 is what number?

2. What percent of 75 is 15?

3. 4.5% of 400 is what number?

4. 120% of what number is 25.2?

### Solutions

- A. 20 Benjamin Banneker
- B. 21 Marjorie Lee Browne
- C. 18 Lewis Latimer
- D. 17.5 Jane Cooke Wright

1. 35% of 50 is what number?  
   This physician researched and tested chemotherapy as a method of treating cancer. In 1952, she became head of the Cancer Research Foundation at Harlem Hospital. D

2. What percent of 75 is 15?  
   This mathematician was part of the team of surveyors who created the street plan for Washington, D.C. in the late eighteenth century. A

3. 4.5% of 400 is what number?  
   In 1876, this engineer drew up the plans that accompanied Alexander Graham Bell’s application for a patent on the telephone. C

4. 120% of what number is 25.2?  
   In 1949, she became one of the first two African-American women to earn a doctorate in mathematics. She was head of the mathematics department at North Carolina Central University from 1951 to 1970. B
Find the LCM of each set of numbers.

1. 2, 8 \[\text{LCM} = 8\]
2. 6, 10 \[\text{LCM} = 30\]
3. 10, 11 \[\text{LCM} = 110\]
4. 10, 12 \[\text{LCM} = 60\]
5. 9, 18 \[\text{LCM} = 18\]
6. 4, 22 \[\text{LCM} = 44\]
7. 12, 30 \[\text{LCM} = 60\]
8. 4, 13 \[\text{LCM} = 52\]
9. 25, 30 \[\text{LCM} = 150\]
10. 250, 30 \[\text{LCM} = 750\]
11. 200, 18 \[\text{LCM} = 1800\]
12. 70, 90 \[\text{LCM} = 630\]
13. 18, 54 \[\text{LCM} = 54\]
14. 30, 65 \[\text{LCM} = 390\]
15. 180, 252 \[\text{LCM} = 1260\]
16. 20, 55 \[\text{LCM} = 220\]
17. 21, 60 \[\text{LCM} = 420\]
18. 3, 5, 10 \[\text{LCM} = 30\]
19. 4, 6, 13 \[\text{LCM} = 156\]
20. 4, 10, 12 \[\text{LCM} = 60\]
21. 6, 15, 20 \[\text{LCM} = 60\]
22. 48, 16, 3 \[\text{LCM} = 48\]
23. 66, 55, 44 \[\text{LCM} = 660\]
24. 29, 58, 4 \[\text{LCM} = 116\]
5-7 Practice: Word Problems

Least Common Multiple

1. PROMOTION In a promotion for a local delicatessen, every eighth customer will get a free sandwich and every sixth customer will get a free drink. Which customer will be first to get both a free sandwich and a free drink? **the 24th customer**

2. WORK Alano and Abey both work at night. Alano has every fourth night off and Abey has every sixth night off. If they are both off tonight, how long will it be before they are both off again? **12 nights**

3. RADIO A radio station is giving away a discount coupon to every twelfth caller and a free concert ticket to every twentieth caller. Which caller will be first to win both the coupon and the ticket? **the 60th caller**

4. MUSIC Faith spent the same amount of money on cassette tapes as she did on CDs. If tapes cost $12 and CDs cost $16, what is the least amount of money she could have spent on each? **$48**

5. BIKES Three bike riders ride around a circular path. The first rider circles the path in 12 minutes, the second in 18 minutes, and the third in 24 minutes. If they all start at the same place, at the same time, and go in the same direction, after how many minutes will they meet at the starting point? **72 min**

6. PAPER GOODS At a party store, paper cups come in packages of 15, paper plates come in packages of 30, and napkins come in packages of 20. In order to have the same number of cups, plates, and napkins, what is the least number of each that must be purchased? **60**

5-7 Reading to Learn Mathematics

Least Common Multiple

Pre-Activity Complete the Mini Lab at the top of page 224 in your textbook. Write your answers below.

1. Add a second floor to each building. Record the total number of cubes used in a table like the one shown below.

<table>
<thead>
<tr>
<th>Number of Floors</th>
<th>Building 1</th>
<th>Building 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>18</td>
<td>24</td>
</tr>
<tr>
<td>3</td>
<td>27</td>
<td>36</td>
</tr>
<tr>
<td>4</td>
<td>36</td>
<td>48</td>
</tr>
<tr>
<td>5</td>
<td>45</td>
<td>60</td>
</tr>
</tbody>
</table>

2. Continue adding floors until each building has five floors. Record your results.

3. Describe two buildings that have the same number of cubes. **Both buildings have the same number of cubes when Building 1 has 4 floors and Building 2 has 3 floors.**

4. If you keep adding floors, will the two buildings have the same number of cubes again? Explain. Yes; Sample answer: Every fourth floor in Building 1 will have the same number of cubes as every third floor in Building 2.

Reading the Lesson

5. Explain how to use a Venn diagram to find the LCM of two numbers. **Sample answer: Write multiples of each number in a circle, with the multiples that are common to both numbers in the overlapping part of the circles. The smallest number in the overlapping part is the LCM of the two numbers.**

6. Look at Example 2, Method 2, at the top of page 225. Which of the numbers are divisors? Which are quotients? **Divisors: vertical 2, 2, 3; quotients: horizontal 2 and 3 at the top**

Helping You Remember

7. Explain how to find the LCM of two or more numbers when you know the prime factorization of each number. Give an example. **Sample answer: The LCM is the product of the greatest powers of each of the prime factors; to find the LCM of 16 and 18, first find the prime factorization of each number: 16 = 2 × 2 × 2 × 2 = 2⁴ and 18 = 2 × 3 × 3 = 2 × 3². Then the LCM is the product of the greatest power of 2 and the greatest power of 3, or 2⁴ × 3² = 144.**
### A Cross-Number Puzzle

Use the clues at the bottom of the page to complete the puzzle. You are to write one digit in each box.

| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| 2 | 9 | 3 | 8 | 1 | C | 1 | 7 | D | 4 | 5 | F | G | 3 | H | 9 | 7 | 6 | 9 | J | L | 1 | 8 | 2 | M | 1 | 3 |
| 8 | 4 | 7 | 5 | 0 | K | 2 | 5 | 6 | 1 | 4 | 8 | 4 | R | 3 | 9 | 1 | Q | 4 | 8 | 4 | | |

### Across

- **A** largest number less than 200 that is divisible by 29
- **B** smallest number divisible by 3 and 5
- **C** the sixth power of 4
- **D** the least common multiple of 2 and 179
- **E** square of first prime greater than 20
- **F** least common multiple of 3 and 11
- **G** the least common multiple of 2 and 179
- **H** the number of two-digit positive integers
- **I** smallest number over 600 divisible by 89
- **J** greatest common factor of 141 and 329
- **K** the eighth power of 2
- **L** least common multiple of 2, 7, and 13
- **M** numerator of fraction equal to 0.8125
- **N** least common multiple of 86 and 5
- **O** smallest prime greater than 60
- **P** largest two-digit prime
- **Q** next term in sequence 4, 15, 26, 37
- **R** largest two-digit composite less than 40

### Down

- **B** smallest number divisible by 3 and 5
- **C** the sixth power of 4
- **D** the least common multiple of 2 and 179
- **E** square of first prime greater than 20
- **F** least common multiple of 3 and 11
- **G** the least common multiple of 2 and 179
- **H** the number of two-digit positive integers
- **I** smallest number over 600 divisible by 89
- **J** greatest common factor of 141 and 329
- **K** the eighth power of 2
- **L** least common multiple of 2, 7, and 13
- **M** numerator of fraction equal to 0.8125
- **N** least common multiple of 86 and 5
- **O** smallest prime greater than 60
- **P** largest two-digit prime
- **Q** next term in sequence 4, 15, 26, 37
- **R** largest two-digit composite less than 40

### Exercises

Find the LCD of each pair of fractions.

1. \[ \frac{1}{2} \div \frac{3}{4} \]
2. \[ \frac{13}{8} \div 12 \]
3. \[ \frac{3}{4} \div \frac{7}{10} \]

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

4. \[ \frac{1}{2} \div \frac{3}{4} \]
5. \[ \frac{4}{9} \div \frac{8}{10} \]
6. \[ \frac{3}{4} \div \frac{7}{8} \]
7. \[ \frac{1}{2} \div \frac{5}{9} \]
8. \[ \frac{9}{14} \div \frac{10}{17} \]
9. \[ \frac{5}{7} \div \frac{6}{11} \]
10. \[ \frac{8}{17} \div \frac{1}{2} \]
11. \[ \frac{9}{10} \div \frac{17}{19} \]
### Practice: Skills
#### Comparing and Ordering Rational Numbers

Find the LCD of each pair of fractions.

1. \( \frac{4}{7}, \frac{3}{5} \) \( \frac{35}{35} \)
2. \( \frac{5}{12}, \frac{7}{24} \) \( \frac{24}{24} \)
3. \( \frac{6}{28}, \frac{3}{7} \) \( \frac{28}{28} \)

4. \( \frac{7}{19}, \frac{1}{4} \) \( \frac{60}{60} \)
5. \( \frac{7}{3}, \frac{3}{5} \) \( \frac{55}{55} \)
6. \( \frac{5}{7}, \frac{7}{11} \) \( \frac{136}{136} \)

7. \( \frac{5}{7}, \frac{7}{10} \) \( \frac{60}{60} \)
8. \( \frac{15}{11}, \frac{1}{4} \) \( \frac{16}{16} \)
9. \( \frac{5}{3}, \frac{8}{5} \) \( \frac{40}{40} \)

Replace each \( \cdot \) with \(<, >, \) or \( = \) to make a true sentence.

10. \( \frac{3}{10} \cdot \frac{2}{9} > \)
11. \( \frac{3}{7} \cdot \frac{5}{11} < \)
12. \( \frac{9}{12} \cdot \frac{3}{4} = \)

13. \( \frac{12}{13} \cdot \frac{14}{15} < \)
14. \( \frac{4}{5} \cdot \frac{5}{4} < \)
15. \( \frac{17}{30} \cdot \frac{13}{20} < \)

16. \( \frac{35}{60} \cdot \frac{49}{84} = \)
17. \( \frac{3}{11} \cdot \frac{3}{20} > \)
18. \( \frac{13}{3} \cdot \frac{9}{7} > \)

Order each set of ratios from least to greatest.

19. \( 0.48, 0.46, \frac{9}{20} \)
20. \( 0.99, 0.89, \frac{7}{8} \)
21. \( \frac{1}{4}, 0.2, 0.4 \)

\[ \frac{9}{20}, 0.46, 0.48, \quad 0.7, 0.89, 0.99, \quad \frac{1}{4}, 0.2, 0.4 \]

Determine whether each number is rational. Write yes or no.

22. \( 2.323323332... \) no
23. \( \frac{7}{19} \) yes
24. \( 4.3 \) yes

---

### Practice: Word Problems
#### Comparing and Ordering Rational Numbers

1. **RAIN** The amount of rainfall was measured after a recent storm. The north side of town received \( \frac{7}{3} \) inch of rain, and the south side received \( \frac{13}{15} \) inch of rain. Which side of town received more rain from the storm? **north**

2. **MOVIES** Because he sees movies at his local theater so often, Delmar is being offered a discount. He can have either \( \frac{1}{3} \) off his next ticket or \( 30\% \) off his next ticket. Which discount should Delmar choose? Explain. \( \frac{1}{3} \) off; \( \frac{1}{3} > 30\% \)

3. **TRACK** Willie runs the 110-meter hurdles in 17 seconds, and Anier runs it in 17 \( \frac{5}{11} \) seconds. Which runner is faster? **Anier**

4. **FARMING** Cassie successfully harvested \( \frac{7}{12} \) of her crop, and Robert successfully harvested 58\% of his crop. Which person successfully harvested the larger portion of his or her crop? **Cassie**

5. **TRANSPORTATION** My-Lien has enough room in her truck to move 3.385 tons of gravel. Her father has asked her to move 3 \( \frac{5}{16} \) tons. Will My-Lien be able to move all of the gravel in only one trip? Explain. **Yes; \( 3 \frac{5}{16} < 3.385 \)**

6. **WOOD WORKING** Kishi has a bolt that is \( \frac{5}{8} \) inch wide, and she drilled a hole 0.6 inch wide. Is the hole large enough to fit the bolt? Explain. **No; \( \frac{5}{8} > 0.6 \)**

7. **PIZZA** In a recent pizza-eating contest, Alfonso ate 1 \( \frac{2}{5} \) pizzas, Della ate 1 \( \frac{3}{10} \) pizzas, and Delsin ate 1 \( \frac{5}{12} \) pizzas. Which person won the contest? **Delsin**

8. **STUDYING** For a recent algebra exam, Pat studied 1 \( \frac{8}{15} \) hours, Toni studied 1 \( \frac{3}{20} \) hours, and Morgan studied 1 \( \frac{9}{16} \) hours. List the students in order by who studied the most. **Morgan, Toni, Pat**
Comparing and Ordering Rational Numbers

Pre-Activity  Read the introduction at the top of page 227 in your textbook. Write your answers below.

1. A batting average is the ratio of hits to at-bats. Write each player’s batting average as a fraction.
   - Latanya: \( \frac{7}{12} \)
   - Patrick: \( \frac{8}{18} \)

2. Estimate which fraction is greater than \( \frac{1}{2} \). Which is less than \( \frac{1}{2} \)?
   - \( \frac{7}{12} \) is greater than \( \frac{1}{2} \)
   - \( \frac{8}{18} \) is less than \( \frac{1}{2} \)

3. Which player has the better batting average? Latanya

Reading the Lesson

4. What are three ways in which you can compare fractions? 1) Rename the fractions using the LCD. 2) Write each fraction as a decimal and then compare the decimals. 3) Estimate, using a number line if necessary.

5. Complete the following table of common fraction-decimal-percent equivalents.

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Decimal</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{1}{5} )</td>
<td>0.2</td>
<td>20%</td>
</tr>
<tr>
<td>( \frac{5}{5} )</td>
<td>0.6</td>
<td>60%</td>
</tr>
<tr>
<td>( \frac{7}{10} )</td>
<td>0.7</td>
<td>70%</td>
</tr>
<tr>
<td>( \frac{1}{4} )</td>
<td>0.25</td>
<td>25%</td>
</tr>
</tbody>
</table>

6. How are the following sets of numbers related: whole numbers, rational numbers, integers? Sample answer: The set of rational numbers includes all of the integers and whole numbers. The set of integers includes all whole numbers.

Helping You Remember

7. In this lesson you learned about the LCD. What do each of the following abbreviations stand for: LCD, LCM, and GCF? How are the LCD and LCM related? Sample answer: LCD: least common denominator; LCM: least common multiple; GCF: greatest common factor. The LCD of a set of fractions is the LCM of the denominators of the fractions.
### Chapter 5 Assessment Answer Key

<table>
<thead>
<tr>
<th>Form 1</th>
<th>Form 2A</th>
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<td>Page 285</td>
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<td>2. I</td>
<td>2. H</td>
</tr>
<tr>
<td>3. C</td>
<td>3. D</td>
</tr>
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<td>5. A</td>
<td>5. A</td>
</tr>
<tr>
<td>6. I</td>
<td>6. H</td>
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<td>7. B</td>
<td>7. A</td>
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<td>8. I</td>
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<td>10. F</td>
<td>10. G</td>
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(continued on the next page)
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<th>Form 2B</th>
<th>Page 288</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page 286</td>
<td>Page 287</td>
<td></td>
</tr>
<tr>
<td>12. <strong>F</strong></td>
<td>1. <strong>C</strong></td>
<td>12. <strong>I</strong></td>
</tr>
<tr>
<td>13. <strong>D</strong></td>
<td>2. <strong>F</strong></td>
<td>13. <strong>A</strong></td>
</tr>
<tr>
<td>14. <strong>H</strong></td>
<td>3. <strong>D</strong></td>
<td>14. <strong>F</strong></td>
</tr>
<tr>
<td>15. <strong>B</strong></td>
<td>4. <strong>G</strong></td>
<td>15. <strong>C</strong></td>
</tr>
<tr>
<td>16. <strong>I</strong></td>
<td>5. <strong>C</strong></td>
<td>16. <strong>G</strong></td>
</tr>
<tr>
<td>17. <strong>B</strong></td>
<td>6. <strong>H</strong></td>
<td>17. <strong>B</strong></td>
</tr>
<tr>
<td>18. <strong>F</strong></td>
<td>7. <strong>D</strong></td>
<td>18. <strong>F</strong></td>
</tr>
<tr>
<td>19. <strong>C</strong></td>
<td>8. <strong>G</strong></td>
<td>19. <strong>D</strong></td>
</tr>
<tr>
<td>20. <strong>I</strong></td>
<td>9. <strong>A</strong></td>
<td>20. <strong>H</strong></td>
</tr>
<tr>
<td><strong>B:</strong> <strong>50%</strong></td>
<td>10. <strong>G</strong></td>
<td><strong>B:</strong> <strong>5%</strong></td>
</tr>
</tbody>
</table>
1. $3, 5, 9; 3$ and $5$ prime, $9$ composite

2. $2 \times 3 \times 17$

3. $2 \times 3^3 \times 7$

4. $21$

5. $12$

6. $6a$

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

8. $\frac{1}{3}$

9. $0.8$

10. $6.75$

11. $0.78$

12. $\frac{1}{50}$

13. $\frac{17}{25}$

14. $36.1\%$

15. $80\%$

16. $19\%$

17. $90$

18. $105$

19. $255$

20. $51$

21. $> $

22. $> $

23. $<$

24. $\frac{1}{4}, \frac{10}{25}, 0.5$

25. $\frac{7}{13}, 0.538$

B: $3$
Chapter 5 Assessment Answer Key

Form 2D
Page 291

1. _____ 1, 4, 9; 1 neither, 4 and 9 composite

2. _____ $2^3 \times 3^2$

3. _____ $2 \times 7^2$

4. _____ 8

5. _____ 4

6. _____ $2z$

7. _____ $\frac{7}{12}$

8. _____ $\frac{21}{34}$

9. _____ 0.27

10. _____ 7.6

11. _____ 0.84

12. _____ $\frac{3}{50}$

13. _____ $\frac{22}{25}$

Page 292

14. _____ 73.2%

15. _____ 52%

16. _____ 27%

17. _____ 360

18. _____ 288

19. _____ 110

20. _____ 50

21. _____ <

22. _____ >

23. _____ =

24. _____ $0.8, \frac{7}{8}, \frac{15}{16}$

25. _____ $\frac{5}{12}, 0.417$

B: _____ 5
Chapter 5 Assessment Answer Key

Form 3
Page 293

1. 1, 10, 31; 1 neither, 31 prime, 10 composite

2. 3 × 17

3. 2³ × 5 × 13

4. 7

5. 6

6. 4b

7. 2

8. 4

9. 0.7083

10. 3.81

11. 0.057

12. 47

40

13. 23

50

Page 294

14. 33\frac{1}{3}

15. 64%

16. 30.25%

17. 147

18. 96

19. 42

20. 36

21. <

22. >

23. =

24. \frac{19}{5}, 3\frac{11}{12}, 4.0625

25. 1.4

B: 29
## Level Specific Criteria

<table>
<thead>
<tr>
<th>Level</th>
<th>Specific Criteria</th>
</tr>
</thead>
<tbody>
<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 5 Assessment Answer Key
Page 295, Extended Response Assessment
Sample Answers

In addition to the scoring rubric found on page A28, the following sample answers may be used as guidance in evaluating extended response assessment items.

1. a. Yes, because 30 and 24 are both divisible by 3.
   
   b. 
   
   \[
   \begin{array}{c}
   \frac{30}{5} = 6 \quad \frac{15}{3} = 5 \\
   \frac{6}{2} = 3 \quad \frac{5}{2} = 2 \\
   \frac{3}{1} = 3 \quad \frac{2}{1} = 2 \\
   \end{array}
   \]

   List the factors of each number:
   factors of 30: 1, 2, 3, 5, 6, 10, 15, 30
   factors of 24: 1, 2, 3, 4, 6, 8, 12, 24

   Identify the common factors.
   common factors: 1, 2, 3, and 6

   c. 6 ft; it is called the greatest common factor.
   Multiples of 25: 25, 50, 75, 100, 125, 150, 175.
   Multiples of 15: 15, 30, 45, 60, 75, 90, 105, 120, 135, 150
   The LCM is 75.

   d. Five feet; 5 is a factor of 25 and 15.
   It is also close to 6 feet which is the spacing used across the front.

2. a. Julian’s batting average: \( \frac{27}{72} \) 0.375, 37.5%
   
   b. Write a fraction with the number of games won over the number of games pitched.
   I would express this fraction as a decimal. \( \frac{125}{200} = 0.625 \), 62.5%
### Vocabulary Test/Review

1. prime factorization  
2. equivalent fractions  
3. terminating decimal  
4. greatest common factor  
5. multiple  
6. Rational numbers  
7. ratio  
8. composite number  
9. Venn diagram  
10. 100  
11. the form of a fraction in which the GCF of the numerator and denominator is 1

### Quiz (Lessons 5-1 and 5-2)

**Page 297**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>$2^2 \times 7$</td>
</tr>
<tr>
<td>2.</td>
<td>$2^2 \times 11$</td>
</tr>
<tr>
<td>3.</td>
<td>$3^2 \times 5 \times 7$</td>
</tr>
<tr>
<td>4.</td>
<td>$2^2 \times 5^3$</td>
</tr>
<tr>
<td>5.</td>
<td>$\frac{a \times b}{2 \times 2 \times 3 \times x \times y \times y}$</td>
</tr>
<tr>
<td>6.</td>
<td>$\frac{9w}{5r}$</td>
</tr>
</tbody>
</table>

### Quiz (Lessons 5-5 and 5-6)

**Page 298**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>$\frac{33}{50}$</td>
</tr>
<tr>
<td>2.</td>
<td>$35%$</td>
</tr>
<tr>
<td>3.</td>
<td>$38%$</td>
</tr>
<tr>
<td>4.</td>
<td>$17%$</td>
</tr>
<tr>
<td>5.</td>
<td>$0.84$</td>
</tr>
<tr>
<td>6.</td>
<td>$0.06$</td>
</tr>
<tr>
<td>7.</td>
<td>$0.255$</td>
</tr>
<tr>
<td>8.</td>
<td>$28%$</td>
</tr>
<tr>
<td>9.</td>
<td>$29.9%$</td>
</tr>
<tr>
<td>10.</td>
<td>$4%$</td>
</tr>
</tbody>
</table>

### Quiz (Lessons 5-3 and 5-4)

**Page 297**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>$\frac{16}{25}$</td>
</tr>
<tr>
<td>2.</td>
<td>$\frac{3}{16}$</td>
</tr>
<tr>
<td>3.</td>
<td>$\frac{5}{6}$</td>
</tr>
<tr>
<td>4.</td>
<td>$2.625$</td>
</tr>
<tr>
<td>5.</td>
<td>$0.7$</td>
</tr>
</tbody>
</table>

### Quiz (Lessons 5-7 and 5-8)

**Page 62**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>A</td>
</tr>
<tr>
<td>2.</td>
<td>72</td>
</tr>
<tr>
<td>3.</td>
<td>900</td>
</tr>
<tr>
<td>4.</td>
<td>$&lt; $</td>
</tr>
<tr>
<td>5.</td>
<td>$=$</td>
</tr>
</tbody>
</table>
### Chapter 5 Assessment Answer Key

#### Mid-Chapter Test
Page 299

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C</td>
</tr>
<tr>
<td>2</td>
<td>I</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
</tr>
<tr>
<td>4</td>
<td>G</td>
</tr>
<tr>
<td>5</td>
<td>A</td>
</tr>
<tr>
<td>6</td>
<td>I</td>
</tr>
<tr>
<td>7</td>
<td>B</td>
</tr>
</tbody>
</table>
| 8 | composite  
   \[2 \times 2 \times 5 \times 5 \times m \times m \times n\]  |
| 9 |   |
| 10| \[15w\]  |
| 11| \[4\]  |
| 12| \[\frac{2}{3}\]  |
| 13| \[\frac{3}{4}\]  |
| 14| \[2.124\]  |
| 15| \[7.875\]  |

#### Chapter 5 Cumulative Review
Page 300

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$1,100</td>
</tr>
<tr>
<td>2</td>
<td>12–17 mi</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>[6 + 2x = 18]</td>
</tr>
<tr>
<td>6</td>
<td>[2a = 24]</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>[2^2 \times 3^2 \times 7]</td>
</tr>
<tr>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>2.45</td>
</tr>
<tr>
<td>12</td>
<td>85%</td>
</tr>
<tr>
<td>13</td>
<td>0.054</td>
</tr>
<tr>
<td>14</td>
<td>60</td>
</tr>
<tr>
<td>15</td>
<td>[58% \end{array}, \frac{5}{8}, \frac{56}{2}, 58.5, 58.5]</td>
</tr>
</tbody>
</table>
Chapter 5 Assessment Answer Key

Standardized Test Practice

1. 

10. 

2. 

11. 

12. 

3. 

13. 

4. 

14. 

5. 

15. 99.99%; Sample answer: The difference between 99.99% = 0.9999 and 1 is the least.

6. 

16. No; Sample answer: The number cannot be written as a fraction or as a terminating or repeating decimal.

7. 

8. 

9. 

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