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Teacher’s Guide to Using the
Chapter 1 Resource Masters

The Chapter 1 Resource Masters includes the core materials needed for Chapter 1. These materials include worksheets, extensions, and assessment options. The answers for these pages appear at the back of this booklet.

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

Chapter Resources

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

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

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

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

Resources for Computational Lessons

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

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

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

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

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

Resources for Problem-Solving Strategy and Problem-Solving Investigation Lessons

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

**Assessment Options** The assessment masters in the *Chapter 1 Resource Masters* offer a wide variety of assessment tools for monitoring progress as well as final assessment.

**Inventory Placement Test** This two-page test covers key concepts from the previous year and tests what students are expected to bring to the current grade level.

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

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

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

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

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

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

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

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

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

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

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

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

**Answers**

The answers for the Anticipation Guide and Lesson Resources are provided as reduced pages with answers appearing in black. Full size line-up answer keys are provided for the Assessment Masters.
Use this graphic organizer to take notes on **Chapter 1: Number Sense, Algebra, and Functions**.

Fill in the missing information.

<table>
<thead>
<tr>
<th>Type of Number</th>
<th>Definition</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite Number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prime Number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exponent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algebraic Expression</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Function Table</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This is an alphabetical list of new vocabulary terms you will learn in Chapter 1: Number Sense, Algebra, and Functions. As you study the chapter, complete each term’s definition or description. Remember to add the page number where you found the term. Add this page to your math study notebook to review vocabulary at the end of the chapter.

<table>
<thead>
<tr>
<th>Vocabulary Term</th>
<th>Found on Page</th>
<th>Definition/Description/Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>algebra</td>
<td></td>
<td></td>
</tr>
<tr>
<td>algebraic expression</td>
<td></td>
<td></td>
</tr>
<tr>
<td>area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>composite number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>equation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vocabulary Term</td>
<td>Found on Page</td>
<td>Definition/Description/Example</td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>evaluate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>factor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>order of operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>prime number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>variable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Dear Family,

Today my class started Chapter 1: Number Sense, Algebra, and Functions. I will be learning to find the prime factorization of a composite number, to find the value of expressions, to solve equations, and to solve problems using the guess-and-check strategy. I will also use powers and exponents in expressions, complete function tables, and learn to find the area of squares and rectangles. Here are my vocabulary words and an activity that we can do together.

Sincerely, ________________

Key Vocabulary

Area: The number of square units needed to cover the inside of a region or plane figure.

Evaluate: To find the value of an expression.

Function: A relationship that assigns exactly one output value to one input value.

Variable: A symbol, usually a letter, used to represent an unknown quantity.

Activity

Find three objects in your home that are square or rectangular in shape. Using a ruler or tape measure, measure the length and width of each object. Then write the formula you would use to find the area of the rectangle or square. Then solve for the area.

Books to Read

The Grapes of Math
by Greg Tang

Math Curse
by Scieszka & Smith

Can You Count to a GOOGOL?
by Robert Wells
Estimada familia:

Hoy mi clase comenzó el Capítulo 1: El sentido numérico, el álgebra y las funciones. Aprenderé a hallar la factorización prima de un número compuesto, a calcular el valor de expresiones, a resolver ecuaciones y a resolver problemas mediante la estrategia de adivinar y verificar. También usaré potencias y exponentes en las expresiones, completaré tablas de funciones y aprenderé a calcular el área de cuadrados y rectángulos. A continuación, están mis palabras del vocabulario y una actividad que podemos realizar juntos.

Sinceramente, ______________________

Vocabulario clave

Área: Número de unidades cuadradas necesarias para cubrir el interior de una región o figura plana

Evaluar: Calcular el valor de una expresión

Función: Relación que asigna exactamente un valor de salida a un valor de entrada

Variable: Símbolo, generalmente una letra, que se usa para representar una cantidad desconocida

Actividad

Busquen en su hogar tres objetos cuadrados o rectangulares. Usen una regla o una cinta métrica para medir la longitud y el ancho de cada objeto. Luego, escriban la fórmula que usarian para calcular el área del rectángulo o del cuadrado. Por último, calculen el área.

Libros recomendados

The Grapes of Math
(Las uvas de las matemáticas)
de Greg Tang

Math Curse
(El maleficio de las matemáticas)
de Scieszka & Smith

Can You Count to a GOOGOL?
(¿Puedes contar hasta un gúgol?)
de Robert Wells
# Anticipation Guide

*Number Sense, Algebra, and Functions*

## Before you begin Chapter 1

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

### STEP 1

<table>
<thead>
<tr>
<th>Statement</th>
<th>STEP 2 A or D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Any composite number can be written as a product of prime factors.</td>
<td></td>
</tr>
<tr>
<td>2. The letter $x$ is never used as a variable.</td>
<td></td>
</tr>
<tr>
<td>3. When the amounts on each side of a scale are equal, the scale is balanced.</td>
<td></td>
</tr>
<tr>
<td>4. An equation is a sentence that contains an equals sign.</td>
<td></td>
</tr>
<tr>
<td>5. A number greater than 1 with more than two factors is a prime number.</td>
<td></td>
</tr>
<tr>
<td>6. Every composite number can be expressed as a product of prime numbers.</td>
<td></td>
</tr>
<tr>
<td>7. A <em>factor tree</em> can be used to find the prime factorization of a number.</td>
<td></td>
</tr>
<tr>
<td>8. The area of a figure is the number of units needed to cover its length.</td>
<td></td>
</tr>
</tbody>
</table>

## After you complete Chapter 1

- Reread each statement and complete the last column by entering an A (agree) or a D (disagree).
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a separate sheet of paper to explain why you disagree. Use examples, if possible.
Ready
You will need:
• Number cube
• Paper and pencils

Set
Give paper and a pencil to each player. Each player must copy the template shown below. Have each player toss the number cube once and record the digit on the answer line in their copy of the template.

GO!
Object: Fill in the template with numbers that will create the answer you recorded on the answer line.

1. Race to figure out which numbers can fill each box to create a correct equation.
2. Follow the order of operations. Players may add parenthesis.
3. Create a correct equation first and win the round!
4. Make a new copy of the template, toss the number cube, and begin the game again. The first player to win 3 rounds is the winner of the game.
You can make a factor tree to find the prime factors of a number. Here are two factor trees that show the prime factors of 24.

\[
\begin{align*}
24 & = 12 \times 2 \\
12 & = 6 \times 2 \\
6 & = 3 \times 2 \\
24 & = 8 \times 3 \\
8 & = 4 \times 2 \\
4 & = 2 \times 2
\end{align*}
\]

You get the same prime factors each way.

\[24 = 2 \times 2 \times 2 \times 3\]  prime factorization

Tell whether each number is prime, composite, or neither. Find the prime factorization for the composite numbers.

1. 15
2. 45
3. 7
4. 25
5. 90
6. 11

\[
\begin{align*}
15 & = 3 \times 5 \\
45 & = 9 \times 5 \\
7 & = 1 \times 7 \\
25 & = 5 \times 5 \\
90 & = 10 \times 9 \\
11 & = 1 \times 11
\end{align*}
\]
Use a factor tree to find the prime factors of each number.

1. 48
   \[
   \begin{array}{c}
   48 \\
   \downarrow \quad \downarrow \\
   8 \quad 6 \\
   \downarrow \quad \quad \downarrow \\
   2 \quad 4 \quad 2 \quad 3 \\
   \end{array}
   \]

2. 56
   \[
   \begin{array}{c}
   56 \\
   \downarrow \quad \downarrow \\
   7 \quad 8 \\
   \downarrow \quad \quad \downarrow \\
   7 \quad 4 \quad 2 \\
   \end{array}
   \]

3. 36
   \[
   \begin{array}{c}
   36 \\
   \downarrow \quad \downarrow \\
   6 \quad 6 \\
   \downarrow \quad \quad \downarrow \\
   2 \quad 3 \\
   \end{array}
   \]

Find the prime factorization of each number. Tell whether each number is prime, composite, or neither.

4. 1

5. 45

6. 18

7. 23

8. 39

9. 55

10. 28

11. 79

12. 62

Solve.

13. There are 24 students in Mrs. Green’s class. The number of boys and the number of girls are both prime numbers. There are 2 more boys than girls. How many boys and how many girls are in the class?
Tell whether each number is **prime**, **composite**, or **neither**. Find the prime factorization for each composite number.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 28</td>
<td>2. 36</td>
<td>3. 42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. 11</td>
<td>5. 34</td>
<td>6. 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. 72</td>
<td>8. 23</td>
<td>9. 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Spiral Review**

Create a table to show the possible outcomes for the situation. Then, use the table to describe the probability of the event taking place.

10. Sonja has a bag of canned food. She has two cans of peas, five cans of plum tomatoes, and one can of soup. She grabs a can out of the bag without looking. Describe the probability of Sonja grabbing a can of peas.
### Prime Factors

1. There are 13 flavors at a local ice cream parlor. Is the number 13 a prime number or a composite number? If it is composite, write the number as the product of prime numbers.

2. Martina ate 27 raisins. Is the number 27 prime or composite? If it is composite, write the number as the product of prime numbers.

3. Sydney used divisibility rules to show that the number 640 is composite. What will she write when she writes the number as the product of prime numbers?

4. Hope used a factor tree to factor the number 240. How many “branches” will be at the bottom of this factor tree? Write the number 240 as the product of prime numbers.

5. Cruz and his friend, Penny, need to determine what numbers are prime and what numbers are composite for a homework assignment. Cruz says that the number 5 is a composite number because it has the factors 2 and 2.5. Explain what is wrong with his reasoning.

6. Jesse drew a factor tree of a composite number and ended up with $4 \times 4 \times 5 \times 5 \times 3$ as the prime factorization. Explain what is wrong with this factorization. What is the correct prime factorization? What is the composite number that was factored?
Eratosthenes was a Greek mathematician who lived from about 276 B.C. to 194 B.C. He devised the **Sieve of Eratosthenes** as a method of identifying all the prime numbers up to a certain number. Using the chart below, you can use his method to find all the prime numbers up to 120. Just follow these numbered steps.

1. The number 1 is not prime. Cross it out.

2. The number 2 is prime. Circle it. Then cross out every second number—4, 6, 8, 10, and so on.

3. The number 3 is prime. Circle it. Then cross out every third number—6, 9, 12, and so on.

4. The number 4 is crossed out. Go to the next number that is not crossed out.

5. The number 5 is prime. Circle it. Then cross out every fifth number—10, 15, 20, 25, and so on.

6. Continue crossing out and circling numbers as described in Steps 2–5 until every number is either crossed out or circled. The numbers that are circled at the end of this process are prime numbers.

7. **CHALLENGE** Look at the prime numbers that are circled in the chart. Do you see a pattern among the prime numbers that are greater than 3? What do you think the pattern is?
Sometimes when you multiply, you use the same number as a factor more than once. You can use exponent form to show this.

Write the number of times the factor is used as the exponent.

\[3 \times 3 \times 3 \times 3 \times 3 \times 3, = 3^6\]

Write the factor as the base.

To write \(3 \times 3 \times 3 \times 3 \times 3 \times 3\), or \(3^6\), in standard form, multiply 3 six times.

\[3 \times 3 \times 3 \times 3 \times 3 \times 3 = 3^6 = 729\]

Write each product using an exponent.

1. \(4 \times 4 \times 4\)
   - Exponent Form: _____
   - What is the base? _____
   - What is the exponent? _____

2. \(2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2\)
   - Exponent Form: _____
   - What is the base? _____
   - What is the exponent? _____

3. \(10 \times 10 \times 10 \times 10\)
   - Exponent Form: _____
   - What is the base? _____
   - What is the exponent? _____

4. \(5 \times 5\)
   - Exponent Form: _____
   - What is the base? _____
   - What is the exponent? _____

5. \(3 \times 3 \times 3 \times 3 \times 3\)
   - Exponent Form: _____
   - What is the base? _____
   - What is the exponent? _____

6. \(7 \times 7 \times 7 \times 7 \times 7\)
   - Exponent Form: _____
   - What is the base? _____
   - What is the exponent? _____
Skills Practice

Powers and Exponents

Complete the table.

<table>
<thead>
<tr>
<th>Exponent</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>$4^5$</td>
</tr>
<tr>
<td>2.</td>
<td>$6 \times 6$</td>
</tr>
<tr>
<td>3.</td>
<td>$1^7$</td>
</tr>
<tr>
<td>4.</td>
<td>$5^2$</td>
</tr>
<tr>
<td>5.</td>
<td>$6 \times 6 \times 6 \times 6$</td>
</tr>
<tr>
<td>6.</td>
<td>$10^2$</td>
</tr>
<tr>
<td>7.</td>
<td>$2 \times 2 \times 2 \times 2 \times 2 \times 2$</td>
</tr>
<tr>
<td>8.</td>
<td>$3 \times 3 \times 3$</td>
</tr>
<tr>
<td>9.</td>
<td>$8^2$</td>
</tr>
<tr>
<td>10.</td>
<td>$4^1$</td>
</tr>
<tr>
<td>11.</td>
<td>$5 \times 5 \times 5 \times 5$</td>
</tr>
<tr>
<td>12.</td>
<td>$10 \times 10 \times 10 \times 10 \times 10$</td>
</tr>
<tr>
<td>13.</td>
<td>$7 \times 7 \times 7 \times 7$</td>
</tr>
<tr>
<td>14.</td>
<td>$2^3$</td>
</tr>
<tr>
<td>15.</td>
<td>$9^1$</td>
</tr>
<tr>
<td>16.</td>
<td>$3^4$</td>
</tr>
</tbody>
</table>

Problem Solving.

Solve.

17. There are 10 boxes of postcards. Each box contains 10 bundles of 10 postcards. How many postcards are there altogether? How do you write this number in exponent form?

18. A school has a telephone system for letting families know about emergency school closings. The system is a pyramid with 5 layers. Three parents are on the top layer of the pyramid. Each parent in each layer calls three different parents. How many parents are in the chain?
Complete the table.

<table>
<thead>
<tr>
<th>Exponent</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. $6^2$</td>
<td>36</td>
</tr>
<tr>
<td>2. $5 \times 5$</td>
<td>25</td>
</tr>
<tr>
<td>3. $4^4$</td>
<td>256</td>
</tr>
<tr>
<td>4. $2 \times 2 \times 2 \times 2$</td>
<td>16</td>
</tr>
<tr>
<td>5. $3^3$</td>
<td>27</td>
</tr>
<tr>
<td>6. $6^3$</td>
<td>216</td>
</tr>
<tr>
<td>7. $4 \times 4 \times 4$</td>
<td>64</td>
</tr>
<tr>
<td>8. $3 \times 3$</td>
<td>9</td>
</tr>
<tr>
<td>9. $2^3$</td>
<td>8</td>
</tr>
<tr>
<td>10. $5 \times 5 \times 5$</td>
<td>125</td>
</tr>
<tr>
<td>11. $7 \times 7 \times 7$</td>
<td>343</td>
</tr>
<tr>
<td>12. $8^3$</td>
<td>512</td>
</tr>
</tbody>
</table>

Spiral Review

Find the prime factorization of the composite numbers.

13. 75
   _________

14. 77
    _________

15. 42
    _________

Tell whether each number is prime, composite, or neither.

16. 17
    _________

17. 25
    _________

18. 44
    _________

19. 7
    _________

20. 31
    _________

21. 0
    _________
1. Lou wrote $3^4$ in standard form. What was the number?

2. Heidi’s family drove 1,000 mi on vacation. Write this number using a base and an exponent. Use 10 as the base.

3. Halle’s family is buying new carpet for her bedroom. The room is 4 yards long and 4 yards wide. Write the area using a base and an exponent. Remember that area is calculated by multiplying the length times the width.

4. Lupe emptied her bank and has 144 pennies and 121 nickels. Write each of these numbers using a base and an exponent. For the pennies use 12 as the base. For the nickels use 11 as the base.

5. For a punch bowl, Carin needs a block of ice with a volume of at least 125 cubic inches. She has a cube of ice that is five inches on each side. Write the volume of the cube using a base and exponents. Then write it in standard form. Is the block of ice big enough? Remember that volume is calculated by multiplying length times width times height.

6. Very large and very small numbers in science are often written using bases and exponents. For example, the sun is approximately $1.5 \times 10^8$ km from Earth. Write $10^8$ in standard form.
**Enrich**

*Making Models for Numbers*

Have you wondered why we read the number $3^2$ as three squared? The reason is that a common model for $3^2$ is a square with sides of length 3 units. As you see, the figure that results is made up of 9 square units.

Make a model for each expression.

1. $2^2$
2. $4^2$
3. $1^2$
4. $5^2$

Since we read the expression $2^3$ as *two cubed*, you probably have guessed that there is also a model for this number. The model, shown at the right, is a cube with sides of length 2 units. The figure that results is made up of 8 cubic units.

Exercises 5 and 6 refer to the figure to the right.

5. What expression is being modeled? _____

6. Suppose that the entire cube is painted red. Then the cube is cut into small cubes along the lines shown.
   a. How many small cubes are there in all? _____
   b. How many small cubes have red paint on exactly three of their faces? _____
   c. How many small cubes have red paint on exactly two of their faces? _____
   d. How many small cubes have red paint on exactly one face? _____
   e. How many small cubes have no red paint at all? _____

7. CHALLENGE In the space at the right, draw a model for the expression $4^3$. 
You can use a phrase to help you remember the order of operations.

Please  Excuse  My  Dear  Aunt  Sally
Parentheses  Exponents  Multiply  Divide  Add  Subtract

Evaluate.

Step 1  Parentheses  \( 8^2 + (6 - 2) \times 5 - 10 \div 2 \)
Step 2  Exponents  \( 8^2 + 4 \times 5 - 10 \div 2 \)
Step 3  Multiply and Divide from left to right.  \( 64 + 20 - 5 \)
Step 4  Add and Subtract from left to right.  \( 79 \)

Find the value of each expression. Follow the steps in the order of operations.

1.  \( 6^2 - 10 + 5 \times (2 - 1) \)
   \( 6^2 - 10 + 5 \times _____ \)
   _____ - 10 + 5 \times _____
   _____ - 10 + _____ = _____

2.  \( 6 \times (9 - 4) + 3^2 \)
   \( 6 \times _____ + 3^2 \)
   6 \times _____ + _____
   _____ + _____ = _____

Find the value of each expression.

3.  \( 7 \times (3 + 9) = _____ \)

4.  \( (12 + 3) - 2 + 3 \times 7 = _____ \)

5.  \( 3 \times 4^2 + 8 - 5 = _____ \)

6.  \( 100 + 10^2 \times (6 - 3) = _____ \)

7.  \( 36 \times 3 - 10 = _____ \)

8.  \( 5^2 \times 2 + 4 = _____ \)

9.  \( 6^2 \div (9 - 5) + 7 = _____ \)

10.  \( 25 - 2 \times 6 + 4^2 = _____ \)

11.  \( 9 \times (14 - 3) \div 3 = _____ \)

12.  \( 63 \div 9 + 2 \times 5 = _____ \)
Find the value of each expression.

1. $44 + 7 \times 3$ ______

2. $48 \div (8 - 2)$ ______

3. $(3 + 4) \times 8 \div 2$ ______

4. $18 + 12 \div 2 + 3$ ______

5. $4^2 \times 2 - 10$ ______

6. $(6 \div 3) + (8 \times 5)$ ______

7. $(3 + 2) \times 3^2$ ______

8. $24 \div 6 \times 3 + 52$ ______

9. $(2 \times 5) - (3 \times 3)$ ______

10. $96 \div (3 \times 4) \div 2$ ______

11. $100 - 8^2 + 4 \div 4$ ______

12. $(200 - 50) \div (12 - 9)$ ______

13. $47 + 3 \times 11 - 36 \div 3$ ______

14. $(7 + 6) \times (7 - 3)$ ______

15. $50 - (-4 + 1)^2 \div 9$ ______

16. $6^2 - 9 \times 4 + (1 + 2)^2$ ______

Solve.

17. Tickets to the school play cost $4 for adults and $2 for students. If 255 adults and 382 students attended the play, write an expression that shows the total amount of money made on ticket sales. Then simplify the expression.

18. At the school play, popcorn costs $1 and juice costs $2. Suppose 235 people buy popcorn and 140 people buy juice. Write an expression that shows the total amount of money made by selling refreshments. Then simplify the expression.
Find the value of each expression.

1. \(2 \times (4 + 7) - 6\) 
2. \(10 \times (6 - 3) \div 15\)
3. \(15 \div 3 + 16 \times (9 - 5)\)
4. \(66 \div 11 + 3\)
5. \(13 + 5^2 \times (8 - 3)\)
6. \(18 - 3^2 + (9 - 0)\)
7. \(27 \div 3^2 + (38 - 15)\)
8. \(26 + 6^2 \times 4\)
9. \(8 \div (20 - 16) + 3^2\)
10. \(7 \times 6 \div 2 + (9 - 4)\)
11. \(22 \times 4 \div 4 - 4^2\)
12. \(8 + 32 \times (20 - 10)\)

Spiral Review

Write each product using an exponent. (Lesson 1–2)

13. \(4 \times 4 \times 4\)
14. \(5 \times 5 \times 5 \times 5\)
15. \(8 \times 8\)
16. \(3 \times 3 \times 3\)

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

17. \(7^3\)
18. \(6^2\)
19. \(4^2\)
20. \(2^3\)
21. \(3^5\)
22. \(5^4\)
1. Ted evaluated the expression $2 + 4 \times 6$. What was his answer?

2. Frank evaluated the expression $8^2 - (2 \times 6 + 3)$. What was his answer?

3. Francisco wrote the number $3 \times 10^2$ in standard form. His answer was 900. What mistake did he make in order of operations?

4. Glenn ate 2 apples a day for a week. In addition to the apples, he ate 3 pears during the week. Write the expression that shows how many pieces of fruit he ate during the week.

5. Create an expression whose value is 12. It should contain four numbers and two different operations.

6. Keiko’s class collected coins to buy food for a local family. When Keiko counted the coins, there were 27 quarters, 92 dimes, 140 nickels, and 255 pennies. Her teacher offered to add an amount to the total, equal to what the students collected. What expression did he use to find out how much money they had?
Now that you have learned how to evaluate an expression using the order of operations, can you work backward? In this activity, the value of the expression will be given to you. It is your job to decide what the operations or the numbers must be in order to arrive at that value.

**Fill in each □ with +, −, ×, or ÷ to make a true statement.**

1. \(48 \square 3 \square 2 = 18\)
2. \(30 \square 15 \square 3 = 6\)
3. \(24 \square 12 \square 6 \square 3 = 4\)
4. \(24 \square 12 \square 6 \square 3 = 18\)
5. \(4 \square 16 \square 2 \square 8 = 24\)
6. \(45 \square 3 \square 3 \square 9 = 3\)
7. \(36 \square 2 \square 3 \square 12 \square 2 = 0\)
8. \(72 \square 12 \square 4 \square 8 \square 3 = 0\)

**Fill in each □ with one of the given numbers to make a true statement. Each number may be used only once.**

9. \(6, 12, 24\)
   \[\square \div \square \times \square = 12\]
10. \(4, 9, 36\)
    \[\square - \square \div \square = 0\]
11. \(6, 8, 12, 24\)
    \[\square \div \square + \square - \square = 4\]
12. \(2, 5, 10, 50\)
    \[\square - \square \div \square + \square = 50\]
13. \(2, 4, 6, 8, 10\)
    \[\square \div \square \times \square + \square - \square = 0\]
14. \(1, 3, 5, 7, 9\)
    \[\square \div \square \times \square - \square \div \square = 8\]
The three tallest buildings in Boston are the Prudential Tower (750 ft), the John Hancock Tower (790 ft), and the Federal Reserve Building (604 ft). How much taller is the Prudential Tower than the Federal Reserve Building?

**Step 1**

**Understand**

Be sure you understand the problem.

Read carefully. Identify what you need to do.

- What do you know? ________________
- What have you been asked to do? ________________

**Step 2**

**Plan**

You can subtract the heights of the buildings.

**Plan a strategy.**

- Decide what actions you will take and in what order.

**Step 3**

**Solve**

Solve the problem.

Follow your plan.

Subtract the height of the Federal Reserve Building from the height of the Prudential Tower.

\[
\begin{array}{c}
750 \\
- 604 \\
\hline
146
\end{array}
\]

The Prudential Tower is 146 feet taller than the Federal Reserve Building.

**Step 4**

**Check**

Did you answer the question? Is the solution reasonable?

Yes, you have found the difference in heights.

**Solve. Use the four-step process.**

1. Scotia Plaza in Toronto is 902 feet tall. First Canadian Place in Toronto is 978 feet tall. How much taller is First Canadian Place than Scotia Plaza?

2. Dallas’ Renaissance Tower is 886 feet, Bank of America Plaza is 921 feet, and Comerica Bank Tower is 787 feet. What is the total height of all 3 buildings?
3. The Andersons are buying a paddle boat for $530. They plan to pay in four equal payments. How much will their payments be?

4. Lynn can walk two miles in 24 minutes. At this rate, how long will it take her to walk 6 miles?

5. Bridgit plays on the basketball team. The table shows the number of baskets she made in the first six days of practice. If the pattern continues, how many baskets will she make on the eighth day?

<table>
<thead>
<tr>
<th>Day</th>
<th>Baskets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>21</td>
</tr>
<tr>
<td>2</td>
<td>22</td>
</tr>
<tr>
<td>3</td>
<td>24</td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

6. The Glendale Plaza Building in Glendale, California is 353 feet tall. The U.S. Bank Tower in Los Angeles, California is 1,017 feet tall. Which building is taller?

7. After going on vacation, you come home with $5. You spent $6 on a pair of sunglasses, $10 on snacks, $4 on a book, and $5 on arcade games. How much money did you start with?
Solve. Use the four-step plan.

1. The three highest mountains in Colorado are Mount Massive (14,421 ft), Mount Harvard (14,420 ft), and Mount Elbert (14,433 ft). How much taller is Mount Elbert than Mount Massive?

2. Hoover Dam, in the United States, is 223 meters high. Ertan Dam, in China, is 240 meters high. In Canada, Mica Dam is 243 meters high. What is the total height of all three dams?

3. The Akshi Kaikyo suspension bridge in Japan has a span of 6,570 feet. The Humber suspension bridge in England has a span of 4,626 feet. How much longer is the Humber suspension bridge than the Akshi Kaikyo suspension bridge?

4. There are three long tunnels that go under Boston Harbor. The Sumner Tunnel is 5,653 feet long. The Callahan Tunnel is 5,070 feet long. The Ted Williams Tunnel is 8,448 feet long. What is the total length of all three tunnels?

5. Use the data from the table for problems 5–6.

<table>
<thead>
<tr>
<th>Land Tunnels in the United States</th>
<th>Tunnel</th>
<th>State</th>
<th>Length (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liberty Tubes</td>
<td>Pennsylvania</td>
<td>5,920</td>
<td></td>
</tr>
<tr>
<td>Devil’s Side</td>
<td>California</td>
<td>3,400</td>
<td></td>
</tr>
<tr>
<td>E. Johnson Memorial</td>
<td>Colorado</td>
<td>8,959</td>
<td></td>
</tr>
<tr>
<td>Squirrel Hill</td>
<td>Pennsylvania</td>
<td>4,225</td>
<td></td>
</tr>
</tbody>
</table>

6. How much longer is the longest tunnel than Devil’s Side tunnel?

5MR1.1, 4NS3.4
Use the four-step plan to solve each problem.

1. A train left the station at 12:45. It traveled 455 miles in 7 hours. How many miles did it travel in each hour?

2. The Delgados are buying a pool that is 30 feet x 30 feet for $1,188. They plan to pay in 12 equal payments. Find the amount of each payment.

3. After shopping for school supplies, Martin came home with $4. He bought a pack of pens for $6, a calculator for $12, and a notebook for $3. How much money did he start with?

4. Julio increases the laps he runs by three laps each day. If he begins on Monday running 4 laps, how many laps will he run on Wednesday at his current rate?

Spiral Review

Find the value of each expression. (Lesson 1–3)

5. $15 - 2^3 ÷ 4$  
6. $22 - 17 + 8$

7. $23 + 4^2 ÷ 2$  
8. $64 - 12 + 7$
There are many times when you need to make an estimate in relation to a reference point. For example, at the right there are prices listed for some school supplies. You might wonder if $5 is enough money to buy a small spiral notebook and a pen. This is how you might estimate, using $5 as the reference point.

- The notebook costs $1.59 and the pen costs $3.69.
- $2 + $4 = $6.
- $0.59 and $0.69 are each more than $0.50, so $1.59 and $3.69 round up to the next dollar.

So, $5 will not be enough money.

Use the prices at the right to answer each question.

1. Jamaal has $5. Will that be enough money to buy a large spiral notebook and a pack of pencils?

2. Andreas wants to buy a three-ring binder and two packs of filler paper. Will $7 be enough money?

3. Rosita has $10. Can she buy a large spiral notebook and a pen and still have $5 left?

4. Kevin has $10 and has to buy a pen and two small spiral notebooks. Will he have $2.50 left to buy lunch?

5. What is the greatest number of erasers you can buy with $2?

6. What is the greatest amount of filler paper that you can buy with $5?

7. Select five items whose total cost is as close as possible to $10, but not more than $10.
Reteach

Algebra: Variables and Expressions

A box contains some baseballs. There are 2 baseballs on the ground. How many baseballs are there altogether?

You can draw models to show the total number of baseballs if the box contains certain numbers of baseballs.

You can also write an algebraic expression to represent the total number of baseballs.

- The number of baseballs in the box changes, so represent it with the variable, $b$.
- The number of baseballs on the ground stays the same: 2.
- Add the number of baseballs in the box and the number on the ground to find the number of baseballs altogether.

So, $b + 2$ represents the total number of baseballs.

Suppose there are 9 baseballs in the box. $b = 9$

You can find the total number of baseballs $b + 2$ by evaluating the expression. $9 + 2 = 11$ baseballs

Complete the steps to write and evaluate an expression for the situation.

1. Laura had 5 more hits than Susan. How many hits did Laura have?

What number changes? ____________________________________________

Write a variable to represent the number that changes. __________________________

What number stays the same? __________________________________________

Write the number that stays the same. _________________________

What operation do you need to use to find the number of hits Laura had? _______

Write an expression to represent the number of hits Laura had. ______________________

Suppose Susan had 2 hits. Evaluate the expression. ______________________

2. The Mustangs scored $m$ runs in the softball game. The Rangers scored 3 fewer runs than the Mustangs. How many runs did the Rangers get?

3. During the softball season, the Rangers won $y$ games. They lost 4 more games than they won. How many games did the Rangers lose during the season?
Skills Practice
Algebra: Variables and Expressions

Complete the table.

<table>
<thead>
<tr>
<th>Algebraic Expressions</th>
<th>Variables</th>
<th>Numbers</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. $3 + m$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. $8x - 3$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. $5d + 2c$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Evaluate each expression if $a = 3$ and $b = 4$.

4. $b + 8$  
7. $10 + b$  
10. $a \times b$  
13. $b \times 2$  
16. $a^2 \times b^2$

5. $a + b$  
8. $2a$  
11. $7a \times 9b$  
14. $a + 1$  
17. $ab \div 3$

6. $b - a$  
9. $4b$  
12. $8a - 9$  
15. $18 \div 2a$  
18. $15a - 4b$

Evaluate each expression if $x = 7$, $y = 15$, and $z = 8$.

19. $x + y + z$  
22. $4x$  
25. $9y$  
28. $y^2$

20. $x + 2z$  
23. $z \div 4$  
26. $x^2$  
29. $x^2 + 30$

21. $xz$  
24. $6z - 5$  
27. $y + 4 \times 6$  
30. $zx \div 4$
Evaluate each expression if $m = 3$ and $n = 15$.

1. $25 - n$
2. $2m - 4$
3. $3n + m$

4. $n - 3$
5. $60 \div n$
6. $2m + n$

7. $2n - m$
8. $6m + 3$
9. $n - 2m$

10. $3m + n$
11. $4n + m$
12. $20 - n$

Evaluate each expression if $a = 2$, $b = 12$, and $c = 8$.

13. $a^2 + 2b$
14. $2c - 3$
15. $b + 3a$

16. $2b + 6$
17. $8a - b$
18. $8c - b$

Solve. Use the four-step plan. (Lesson 1–4)

19. Kelly received $12 in change from a cashier. She bought four books that were $7 each. How much did Kelly give the cashier?
1. Jaynee’s friends ate 4 apples more than her family ate. Write an expression for how many apples Jaynee’s friends ate.

2. Ian walked 5 blocks home from school. His friend Kim walked $x$ blocks farther. Write an expression for how far Kim walked.

3. Carmen took her newspapers and aluminum cans to the recycling center. She weighed everything and found that she had 24 pounds more newspapers than cans. Write an expression for the weight of the newspapers, using $c$ as a variable. __________

Find the value of the expression if $c = 12$.

4. Hannah’s grade on her last math test was 4 points less than Mark’s grade. Write an expression for Hannah’s grade, using $m$ as a variable.

Find the value of the expression if $m = 92$.

5. Ron made cookies for the fair. His sister made candy. Four cookies were packaged together, and 6 pieces of candy were packaged together. There were 6 more packages of cookies than $p$ packages of candy. Write an expression for the number of packages of cookies. __________

Find the value of the expression if $p = 8$. __________

How many cookies and pieces of candy were taken to the bake sale?

_________ cookies

_________ pieces of candy

6. Michael went to the water park. He spent 2 hours longer on the water slides than he did in the wave pool. If $t$ represents the hours on the water slides, write an expression for the time he spent in the wave pool. __________

Find the value of the expression if $t = 4$. __________

How much time did he spend at the water park? __________ hours
You can use variables and expressions to describe patterns. These tile letters grow according to different patterns.

**Find a rule that will tell how many tiles it takes to build any size of the letter I.**

1. Look for a pattern. Describe the pattern using your own words.

2. Describe the pattern for I using variables and expressions.

Use the rule to predict the number of tiles needed for each I.

3. size 12 _________  
4. size 15 _________  
5. size 22 _________  
6. size 100 _________

7. Suppose you had 39 tiles. What is the largest size I you could make?

8. Find the pattern for the letter X. How many tiles are needed for size 16 of letter X?
A function rule describes the relationship between the input and output of a function. The inputs and outputs can be organized in a function table.

Example 1  Complete the function table.

The function rule is \( x - 3 \). So, subtract 3 from each input.

<table>
<thead>
<tr>
<th>Input ((x))</th>
<th>(x - 3)</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>9 - 3</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>8 - 3</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>6 - 3</td>
<td></td>
</tr>
</tbody>
</table>

Example 2  Find the rule for the function table.

Study the relationship between each input and output.

<table>
<thead>
<tr>
<th>Input ((x))</th>
<th>Output</th>
<th>Input ((x))</th>
<th>Output ((4 + x))</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>1</td>
<td>4 + 1</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>2</td>
<td>4 + 2</td>
</tr>
</tbody>
</table>

So, the function rule is \( 4x \).

Complete each function table.

1. | Input \((x)\) | Output \((2x)\) |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

2. | Input \((x)\) | Output \((4 + x)\) |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

3. | Input \((x)\) | Output | |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>

4. | Input \((x)\) | Output | |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>
Write a function rule to describe each situation. Tell what the variable represents.

1. Marie is sending some paperback books to her cousin. Each book weighs 4 ounces. She is mailing them in a box that weighs 6 ounces.

   Variable: ____________

   Function rule: ______________

Complete the table. Then write a function rule to describe the situation. Tell what the variable represents.

2. Steven is ordering puzzles for his friends. It costs $12.50 to buy the first one and it costs $7.50 for each additional puzzle.

<table>
<thead>
<tr>
<th>Number of Puzzles</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cost</td>
<td>$12.50</td>
<td>$20.00</td>
<td>$27.50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   Variable: ____________

   Function rule: ______________

Use the information below to solve problems 3–4.

It takes Beth 20 minutes to drive to and from a mailing service and 2 minutes to fill out a mailing label and have each package weighed.

3. Write a function rule to describe the situation. Tell what the variable represents.

   ______________

4. How long will it take Beth to mail 3 packages? Use the rule you wrote to solve the problem.

   ______________
Complete each function table.

1. | Input (x) | x − 3 | Output |
   | 5        |       |        |
   | 8        |       |        |
   | 4        |       |        |

2. | Input (x) | 3x | Output |
   | 4        |   |        |
   | 2        |   |        |
   | 9        |   |        |

Find the rule for each function table.

3. | Input (x) | Output |
   | 4        | 8     |
   | 3        | 6     |
   | 12       | 24    |

4. | Input (x) | Output |
   | 7        | 2     |
   | 15       | 10    |
   | 25       | 20    |

5. | Input (x) | Output |
   | 18       | 6     |
   | 27       | 9     |
   | 33       | 11    |

6. | Input (x) | Output |
   | 10       | 50    |
   | 12       | 60    |
   | 35       | 175   |

Spiral Review (Lesson 1–5)

7. Evaluate $13 + a$ if $a$ is 7.

8. Evaluate $x − y$ if $x$ is 87 and $y$ is 78.

Evaluate each expression if $a = 6$ and $b = 10$.

9. $b − a$

10. $b \times a$
1. **DRAGONS** The Luck Dragons that live in the Enchanted Forest weigh $4x$ pounds when they are $x$ years old. Write a function table that can be used to find the weights of 6-year old, 8-year old, and 10-year old Luck Dragons.

2. **ROLLER COASTER** Twelve people are able to ride the Serpent of Fire roller coaster at one time. Write a function table that shows the total number of people that have been on the roller coaster after 1, 2, 3, and 4 rides if the rollercoaster is full each time.

3. **MOVIES** At the local movie theater it costs $10 for 2 students to see a movie. It costs $15 for 3 students, and it costs $20 for 4 students. Let the number of students be the input. What is the function rule that relates the number of students to the cost of tickets?

4. **HOMEWORK** At Elmwood Middle School, sixth graders spend 1 hour every night doing homework. Seventh graders spend 2 hours, and eighth graders spend 3 hours. Let the students’ grade be the input. What is the function rule between the students’ grade and the amount of time the students spend on homework every night?

5. **BEADS** A bead shop sells wooden beads for $3 each and glass beads for $7 each. Write a function rule to represent the total selling price of wooden ($w$) and glass ($g$) beads.

6. Use the function rule in Exercise 5 to find the selling price of 20 wooden beads and 4 glass beads.
Function rules are often used to describe geometric patterns. In the pattern at the right, for example, do you see this relationship?

1st figure: $3 \times 1 = 3$ dots
2nd figure: $3 \times 2 = 6$ dots
3rd figure: $3 \times 3 = 9$ dots
4th figure: $3 \times 4 = 12$ dots

So the “nth” figure in this pattern would have $3 \times n$, or $3n$, dots. A function rule that describes the pattern is $3n$.

**Write a function rule to describe each dot pattern.**

1. 

   1st

   2nd

   3rd

   4th

2. 

   1st

   2nd

   3rd

   4th

3. 

   1st

   2nd

   3rd

   4th

4. 

   1st

   2nd

   3rd

   4th

5. 

   1st

   2nd

   3rd

   4th

6. 

   1st

   2nd

   3rd

   4th
Guess and Check

During summer vacation, Sanjay buys keychains and postcards for his friends at home. A keychain costs $3, and a postcard costs $1. Sanjay buys gifts for 8 friends and spends $12. How many keychains and postcards did he buy?

<table>
<thead>
<tr>
<th>Step 1 Understand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Be sure you understand the problem.</td>
</tr>
<tr>
<td>Read carefully. Identify what you need to do.</td>
</tr>
<tr>
<td>What facts do you know?</td>
</tr>
</tbody>
</table>
| - A keychain costs ________ and a postcard costs ________.
| - Sanjay buys ________ gifts.
| - He spends ________.
| What do you need to find? |
| - The number of ______________________. |

<table>
<thead>
<tr>
<th>Step 2 Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make a plan.</td>
</tr>
<tr>
<td>Choose a strategy.</td>
</tr>
<tr>
<td>You can solve the problem by making a guess.</td>
</tr>
<tr>
<td>Then check the guess.</td>
</tr>
<tr>
<td>If it is not the correct answer, adjust the guess and check again until you find the correct answer.</td>
</tr>
</tbody>
</table>
### Reteach

**Problem-Solving Strategy**

**Step 3** Solve

**Follow your plan.**

Make a guess about the number of keychains and the number of postcards. Suppose you guess 4 keychains and 4 postcards.

Check the amounts for the guess.

- Keychains: $\underline{\text{猜的数字}} \times \underline{\text{猜的数字}} = \underline{\text{猜的金额}}$
- Postcards: $\underline{\text{猜的数字}} \times \underline{\text{猜的数字}} = \underline{\text{猜的金额}}$
- Total Cost: $\underline{\text{猜的金额}} + \underline{\text{猜的金额}} = \underline{\text{猜的金额}}$

Does the guess check with the total that Sanjay spent? \underline{\text{是的}}

Should you adjust the number of keychains up or down? Explain.

\underline{\text{是的}}

Adjust your guess. Check your guess.

Did the guess check? \underline{\text{是的}}

If your guess did not check, adjust it again.

How many keychains did Sanjay buy? \underline{\text{猜的数字}}

How many postcards did Sanjay buy? \underline{\text{猜的数字}}

**Step 4** Check

**Look back. Did you answer the question?** Is the solution reasonable? Reread the problem.

Have you answered the question? \underline{\text{是的}}

How can you check your answer? \underline{\text{是的}}

---

### Practice

1. Nelson has 7 paper bills. All the bills are $1 and $5. He has a total of $15. How many $1 bills and how many $5 bills does he have?

\underline{5\text{ \$1 bills and 2 \$5 bills}}

2. The library charges 25¢ a day for overdue videos and 5¢ a day for overdue books. Emily returns a video and a book that were due on the same day and pays a total of 90¢ in late fees. How many days late were her items?

\underline{3 \text{ days}}
Use the guess-and-check strategy to solve.

1. The Bactrian camel has two humps and the Dromedary camel has one hump. In a group of 15 camels, the total number of humps is 21. How many camels of each type are there?

2. The circus orders bicycles and unicycles for a new act. It orders a total of 12 cycles. The cycles have 16 tires altogether. How many bicycles and unicycles did the circus order?

3. Anja buys a magazine and a pizza. She spends $8.10. The magazine costs $2.40 less than the pizza. How much does the pizza cost?

4. A letter to Europe from the United States costs $0.94 to mail. A letter mailed within the United States cost $0.42. Nancy mails 5 letters for $3.14, some to Europe and some to the United States. How many letters did she send to Europe?

Use any strategy to solve.

5. Warren spent $8.50 at the store. He spent $2.40 on paper, $0.88 on pencils, and $2.65 on markers. He spent the rest on a notebook. How much did the notebook cost?

6. Ms. Baxter takes a group of 8 children to a concert. Tickets for children 12 years and older cost $3. Tickets for children under 12 cost $2. She spends a total of $19 on tickets for the children. How many children are 12 and older?

Strategy: ________________________________
Use the guess-and-check strategy to solve.

1. Jamal is thinking of four different numbers from 1 through 9 whose sum is 21. Find the numbers.

2. Mr. Thompson took his 5 children to the amusement park. Tickets for children 12 and older cost $3. Tickets for children under 12 cost $2. He spends a total of $14. How many of his children are 12 and older?

3. A cabin has room for 7 campers and 2 counselors. How many cabins are needed for a total of 49 campers and 14 counselors?

Solve. (Lesson 1–6)

4. El Capitan, in California, is 3,600 feet high. Mt. Morgan is 13,748 feet, Arrowhead Peak is 4,237 feet, and Hawkins Peak is 10,024 feet. List the mountains by height from greatest to least.

5. A department store is deducting $10 off the total purchase for shoppers from 6 A.M. to 7 A.M. Define a variable. Write a function rule that relates the final cost to the total purchase amount.

6. Sonia is buying peanuts for a party. She can buy them in bulk for $4 a pound. Define a variable. Write a function rule that relates the total cost of the peanuts to the amount she buys.
Check whether each answer is reasonable. Explain.

1. Margo’s fastest rate in her hot-air balloon was 30 miles per hour. She calculates that if she can fly at the same rate, she can travel 145 miles in about 5 hours. Is her answer reasonable? Explain.

2. Noboru is entering a hot-air balloon race. The race covers 210 miles. He wants to finish the race in 8 hours. He calculates that he must travel at an average rate of 40 miles per hour. Is his answer reasonable? Explain.

3. Olga must meet her brother at the end of the balloon race. The race is 120 miles and the record for the race is 23 miles per hour. She decides that she should be at the finish line 12 hours after the race begins. Is her answer reasonable? Explain.

4. Adam is starting a business to take people on hot-air balloon rides. He knows that to carry 2 people, the balloon must have a volume of about 60,000 cubic feet. For his business, he wants a balloon that will carry 4 people. He calculates that the balloon must have a volume of 120,000 cubic feet. Is his answer reasonable? Explain.

5. Marta’s family is planning a trip through the mountains. They expect to travel 210 miles in about $5\frac{1}{2}$ hours on the mountain roads. Marta calculates that they will be traveling about 100 miles per hour. Is her answer reasonable? Explain.
An equation is a sentence that contains an equals sign, =. Sometimes equations contain variables and we need to solve for the variable.

<table>
<thead>
<tr>
<th>Equation</th>
<th>Equation Containing a Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>$3 + 4 = 7$</td>
<td>$3 + x = 7$</td>
</tr>
</tbody>
</table>

When you replace a variable with a number that makes the sentence true, you solve the equation. The solution of the equation is the value of the variable.

1. $6 + c = 18$; 11, 12, 13 ______
2. $9 \div w = 3$; 3, 4, 5 ______

Solve each equation mentally.

3. $10j = 40$ ______
4. $45 = 5b$ ______

Identify the solution of each equation from the list given.

5. $3 + x = 7$; 3, 4, 5 ______

Find the solution of an equation.

Is 6, 7, or 8 the solution of the equation $b + 8 = 15$?

<table>
<thead>
<tr>
<th>Value of $b$</th>
<th>$b + 8 = 15$</th>
<th>Are Both Sides Equal?</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>6 + 8 = 15</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>14 ≠ 15</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7 + 8 = 15</td>
<td>yes ✓</td>
</tr>
<tr>
<td></td>
<td>15 = 15</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>8 + 8 = 15</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>16 ≠ 15</td>
<td></td>
</tr>
</tbody>
</table>

The solution is 7 since replacing $b$ with 7 results in a true sentence.
Identify the solution of each equation from the list given.

1. \(3 + f = 12; 7, 8, 9\)
2. \(6g = 36; 6, 7, 8\)
3. \(8 - c = 2; 5, 6, 7\)
4. \(3b = 30; 10, 11, 12\)
5. \(18 \div x = 3; 4, 5, 6\)
6. \(12 + z = 29; 15, 16, 17\)

Solve each equation mentally. Check your answer.

7. \(13 - g = 12\)
8. \(14h = 28\)
9. \(21 - v = 16\)
10. \(88 \div p = 11\)
11. \(9k = 36\)
12. \(19 - e = 7\)
13. \(123 - r = 88\)
14. \(78 + s = 133\)
15. \(8d = 72\)
16. \(125 \div p = 25\)
17. \(14u = 70\)
18. \(33 \div d = 11\)

19. The high temperature one day in San Diego was 80°F. That temperature was 14°F greater than the low temperature. Solve the equation \(t + 14 = 80\) to find \(t\), the low temperature.

20. Tanya started with \(d\) dollars. After she spent $19, she had $12 left. Solve the equation \(d - $19 = $12\) to find \(d\), the amount of money Tanya started with.

21. The Martinez family paid $40 for 5 movie passes. Solve the equation \(5c = $40\) to find the cost in dollars, \(c\), of each movie pass.

22. Three friends split the cost of a gift equally. Each paid $4. Solve \(t \div 3 = $4\) to find \(t\), the cost in dollars of the gift.
### Homework Practice

**Algebra: Equations**

Identify the solution of each equation from the list given.

1. \( m - 7 = 23; \) 29, 30, 31
2. \( 4p = 28; \) 6, 7, 8
3. \( 8 + n = 32; \) 23, 24, 25
4. \( 48 \div w = 8; \) 4, 5, 6

Solve each equation mentally.

5. \( 4 + x = 12 \)
6. \( 16 - p = 3 \)
7. \( 15 \div b = 3 \)
8. \( 8 = 4f \)
9. \( 10k = 50 \)
10. \( 64 \div g = 8 \)
11. \( j - 14 = 6 \)
12. \( 4s = 24 \)
13. \( 18 \div t = 3 \)

#### Spiral Review

Copy and complete each function table. (Lesson 1–6)

14. | Input \((x)\) | \(x + 2\) | Output |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15. | Input \((x)\) | \(x - 4\) | Output |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Find the rule for each function table.

16. | Input \((x)\) | Output |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>9</td>
<td>12</td>
</tr>
</tbody>
</table>

17. | Input \((x)\) | Output |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>13</td>
</tr>
<tr>
<td>20</td>
<td>8</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
</tr>
</tbody>
</table>
For Exercises 1–3, use the table that gives the average lengths of several unusual insects in centimeters.

<table>
<thead>
<tr>
<th>Insect</th>
<th>Length (cm)</th>
<th>Insect</th>
<th>Length (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking stick</td>
<td>15</td>
<td>Giant water bug</td>
<td>6</td>
</tr>
<tr>
<td>Goliath beetle</td>
<td>15</td>
<td>Katydid</td>
<td>5</td>
</tr>
<tr>
<td>Giant weta</td>
<td>10</td>
<td>Silkworm moth</td>
<td>4</td>
</tr>
<tr>
<td>Harlequin beetle</td>
<td>7</td>
<td>Flower mantis</td>
<td>3</td>
</tr>
</tbody>
</table>

1. The equation $15 - x = 12$ gives the difference in length between a walking stick and one other insect. If $x$ is the other insect, which insect is it?

2. The equation $7 + y = 13$ gives the length of a Harlequin beetle and one other insect. If $y$ is the other insect, which insect makes the equation a true sentence?

3. Bradley found a silkworm moth that was 2 centimeters longer than average. The equation $m - 4 = 2$ represents this situation. Find the length of the silkworm moth that Bradley found.

4. A Monarch butterfly flies about 80 miles per day. So far it has flown 60 miles. In the equation $80 - m = 60$, $m$ represents the number of miles it has yet to fly that day. Find the solution to the equation.

5. The nymphs of some cicadas can live among tree roots for 17 years before they develop into adults. One nymph developed into an adult after only 13 years. The equation $17 - x = 13$ describes the number of years less than 17 that it lived as a nymph. Find the value of $x$ in the equation to tell how many years less than 17 years it lived as a nymph.

6. A harlequin beetle lays eggs in trees. She can lay up to 20 eggs over 3 days. After the first day, the beetle has laid 9 eggs. If she lays 20 eggs in all, how many eggs will she lay during the second and third days?
In an equation chain, you use the solution of one equation to help you find the solution of the next equation in the chain. The last equation in the chain is used to check that you have solved the entire chain correctly.

Complete each equation chain.

1. \(5 + a = 12\), so \(a = \underline{\phantom{0}}\).
   \(ab = 14\), so \(b = \underline{\phantom{0}}\).
   \(16 \div b = c\), so \(c = \underline{\phantom{0}}\).
   \(14 - d = c\), so \(d = \underline{\phantom{0}}\).
   \(e \div d = 3\), so \(e = \underline{\phantom{0}}\).
   \(a + e = 25 \leftarrow \text{Check:}\)

2. \(9f = 36\), so \(f = \underline{\phantom{0}}\).
   \(g = 13 - f\), so \(g = \underline{\phantom{0}}\).
   \(63 \div g = h\), so \(h = \underline{\phantom{0}}\).
   \(h + i = 18\), so \(i = \underline{\phantom{0}}\).
   \(j - i = 9\), so \(j = \underline{\phantom{0}}\).
   \(j \div f = 5 \leftarrow \text{Check:}\)

3. \(m \div 4 = 8\), so \(m = \underline{\phantom{0}}\).
   \(m - n = 12\), so \(n = \underline{\phantom{0}}\).
   \(np = 100\), so \(p = \underline{\phantom{0}}\).
   \(q = 40 + p\), so \(q = \underline{\phantom{0}}\).
   \(p + q - 10 = r\), so \(r = \underline{\phantom{0}}\).
   \(r - m = 8 \leftarrow \text{Check:}\)

4. \(18 = v - 12\), so \(v = \underline{\phantom{0}}\).
   \(v \div w = 3\), so \(w = \underline{\phantom{0}}\).
   \(80 = wx\), so \(x = \underline{\phantom{0}}\).
   \(w + x = 2y\), so \(y = \underline{\phantom{0}}\).
   \(xy - z = 40\), so \(z = \underline{\phantom{0}}\).
   \(z - v = 2 \leftarrow \text{Check:}\)

5. Create your own equation chain using these numbers for the variables: \(a = 10\), \(b = 6\), \(c = 18\), and \(d = 3\).
Area is the number of square units needed to cover the inside of a region or plane figure. To find the area of a rectangle or square, you can multiply its length times its width. This can be shown by a formula.

Find the area of the rectangle.
Use the formula $A = lw$, where $A =$ area, $l =$ length, and $w =$ width.

$A = lw$

$A = 13 \times 4$

$A = 52$ square inches

Find the area of the square.
Use the formula $A = s^2$, where $A =$ area and $s =$ length of a side.

$A = s^2$

$A = 3 \times 3$

$A = 9$ square meters

Find the area of each rectangle.

1. $A = lw$

$A = 4 \times 13$

$A = 52$ square inches

2. $A = s^2$

$A = 5 \times 5$

$A = 25$ square feet

3. $A = lw$

$A = 10 \times 25$

$A = 250$ square inches

4. $A = lw$

$A = 8 \times 12$

$A = 96$ square meters

5. $A = lw$

$A = 49 \times 76$

$A = 3724$ square feet
Skills Practice
Algebra: Area Formulas

Find the area of each rectangle.

1. \[ \text{4 in.} \times \text{8 in.} \]
   \[ A = \ \] 
2. \[ \text{16 cm} \times \text{21 cm} \]
   \[ A = \ \] 
3. \[ \text{9 ft} \times \text{9 ft} \]
   \[ A = \ \]

4. \[ \text{3 cm} \times \text{3 cm} \]
   \[ A = \ \]
5. \[ \text{6 cm} \times \text{1 cm} \]
   \[ A = \ \]
6. \[ \text{25 in.} \times \text{25 in.} \]
   \[ A = \ \]

Find each missing measurement.

7. \[ \text{12 cm} \times z \]
   \[ A = 48 \text{ square centimeters} \]
   \[ z = \ \]
8. \[ b \times b \]
   \[ A = 16 \text{ square feet} \]
   \[ b = \ \]
9. \[ p \times 4 \text{ in.} \]
   \[ A = 72 \text{ square inches} \]
   \[ p = \ \]

Solve.

10. A family room is 24 feet long and 18 feet wide. What is the area of the family room?

11. A square carpet is 3 meters on each side. What area will the carpet cover?

_______________
Solve.

1. Find the area of a square with a side length of 14 inches.

Find the area of each rectangle.

2. 7 in. 4 in.

3. 12 ft 2 ft

Find the area of the following squares and rectangles.

4. a square with sides of 5 ft

5. a rectangle with a length of 13 inches and a width of 3 inches

6. a square with sides of 8 ft

7. a rectangle with a length of 14 inches and a width of 4 inches

8. a square with sides measuring 9 ft

Solve each equation mentally. (Lesson 1–8)

9. \( m + 15 = 27 \)

10. \( n + 35 = 42 \)

11. \( 7b = 35 \)

12. \( g \div 3 = 4 \)

13. \( 4p = 16 \)

14. \( 12 \div c = 6 \)

15. \( y - 5 = 24 \)

16. \( r - 7 = 2 \)
Solve.

1. Felicia wants to clean the rug in her room. She buys carpet cleaner that will clean 40 square feet. Find the area of her rug. Will she have enough carpet cleaner?

2. Lori wants to buy a flower mat that has seeds and fertilizer in it for her garden. She made a diagram of her garden. What is the area of the flower mat that she needs?

3. The playing area of a college’s football field measures 100 yd by 53 yd. How much area does the football team have to play on?

4. Mr. and Mrs. Wilkes want to make a patio in their yard. The patio will be 15 ft long and 10 ft wide. Each patio tile covers 1 square ft and costs $2. How much will they spend on patio tiles?

5. You have 100 ft of fencing to make a pen for your dog. You want your dog to have the biggest play area possible. What shape would you make the pen?

6. The Carsons are putting a rectangular swimming pool in their backyard. The pool will measure 20 ft by 12 ft. They plan to have a cement walkway around the pool, which should measure 4 ft wide. What is the area of the walkway?
The figure at the right is the floor plan of a family room. The plan is drawn on grid paper, and each square of the grid represents one square foot. The floor is going to be covered completely with tiles.

1. What is the area of the floor?

2. Suppose each tile is a square with a side that measures one foot. How many tiles will be needed?

3. Suppose each tile is a square with a side that measures one inch. How many tiles will be needed?

4. Suppose each tile is a square with a side that measures six inches. How many tiles will be needed?

5. Use the given information to find the total cost of tiles for the floor.

   - tile: square, 1 foot by 1 foot cost of one tile: $3.50
   - tile: square, 6 inches by 6 inches cost of one tile: $0.95
   - tile: square, 4 inches by 4 inches cost of one tile: $0.50
   - tile: square, 2 feet by 2 feet cost of one tile: $12
   - tile: square, 1 foot by 1 foot cost of two tiles: $6.99
   - tile: rectangle, 1 foot by 2 feet cost of one tile: $7.99

11. Refer to your answers in Exercises 5–10. Which way of tiling the floor costs the least? the most?
Reteach

Algebra: The Distributive Property

You can use place-value models to show the Distributive Property.

Multiply $3 \times 26$.

Multiply and add $(3 \times 20) + (3 \times 6)$.

$3 \times 26 = 3 \times (20 + 6)$

$3 \times 26 = 3 \times (20 + 6) = (3 \times 20) + (3 \times 6)$

$= 60 + 18$

$= 78$

Find each product. You can draw place-value models to help you multiply.

1. $5 \times 39 = 5 \times (\underline{\hspace{1cm}} + \underline{\hspace{1cm}})$
   
   $= (5 \times \underline{\hspace{1cm}}) + (5 \times \underline{\hspace{1cm}})$
   
   $= \underline{\hspace{1cm}} + \underline{\hspace{1cm}}$
   
   $= \underline{\hspace{1cm}}$

2. $8 \times 46 = 8 \times (\underline{\hspace{1cm}} + \underline{\hspace{1cm}})$
   
   $= (8 \times \underline{\hspace{1cm}}) + (8 \times \underline{\hspace{1cm}})$
   
   $= \underline{\hspace{1cm}} + \underline{\hspace{1cm}}$
   
   $= \underline{\hspace{1cm}}$

3. $3 \times 54 = \underline{\hspace{1cm}} \times (\underline{\hspace{1cm}} + \underline{\hspace{1cm}})$
   
   $= (\underline{\hspace{1cm}} \times \underline{\hspace{1cm}}) + (\underline{\hspace{1cm}} \times \underline{\hspace{1cm}})$
   
   $= \underline{\hspace{1cm}} + \underline{\hspace{1cm}}$
   
   $= \underline{\hspace{1cm}}$

4. $6 \times 64 = \underline{\hspace{1cm}} \times (\underline{\hspace{1cm}} + \underline{\hspace{1cm}})$
   
   $= (\underline{\hspace{1cm}} \times \underline{\hspace{1cm}}) + (\underline{\hspace{1cm}} \times \underline{\hspace{1cm}})$
   
   $= \underline{\hspace{1cm}} + \underline{\hspace{1cm}}$
   
   $= \underline{\hspace{1cm}}$

5. $2 \times 48 = \underline{\hspace{1cm}}$

6. $4 \times 72 = \underline{\hspace{1cm}}$

7. $9 \times 27 = \underline{\hspace{1cm}}$

8. $7 \times 45 = \underline{\hspace{1cm}}$
Rewrite each expression using the Distributive Property.

1. \(3 \times 13\)  
   \[_______________\]

2. \(8 \times 68\)  
   \[_______________\]

3. \(7 \times 32\)  
   \[_______________\]

4. \(9 \times 35\)  
   \[_______________\]

5. \(8 \times 17\)  
   \[_______________\]

6. \(4 \times 71\)  
   \[_______________\]

7. \(5 \times 25\)  
   \[_______________\]

8. \(6 \times 84\)  
   \[_______________\]

Find each product mentally. Use the Distributive Property.

9. \(7 \times 19 = _________\)

10. \(6 \times 22 = _________\)

11. \(8 \times 58 = _________\)

12. \(5 \times 13 = _________\)

13. \(4 \times 76 = _________\)

14. \(2 \times 27 = _________\)

15. \(9 \times 56 = _________\)

16. \(3 \times 71 = _________\)

17. \(7 \times 33 = _________\)

18. \(8 \times 34 = _________\)

19. \(4 \times 83 = _________\)

20. \(3 \times 27 = _________\)

21. \(6 \times 88 = _________\)

22. \(9 \times 98 = _________\)

23. \(5 \times 65 = _________\)

24. \(5 \times 36 = _________\)

25. \(3 \times 98 = _________\)

26. \(2 \times 97 = _________\)
Homework Practice
Algebra: The Distributive Property

Find each product mentally. Use the Distributive Property.

1. $10 \times 41$  
2. $5 \times 32$  
3. $3 \times 57$  
4. $18 \times 3$  
5. $14 \times 5$  
6. $2 \times 26$  

Rewrite each expression using the Distributive Property.

7. $5 \times (14 - 3)$  
8. $6 \times (9 + 2)$  
9. $7 \times (2 - 1)$  
10. $9 \times (3 + 4)$

Rewrite each expression using the Distributive Property. Then evaluate.

11. $4 \times (8 + 2)$  
12. $8 \times (9 + 3)$  
13. $3 \times (12 + 4)$

Spiral Review

14. Find the area of a square whose sides are 19 inches long.

Solve each equation mentally.

15. $a + 13 = 18$  
16. $43 - b = 24$  
17. $49 = 7x$  
18. $39 - k = 12$
1. Ray needs to multiply $5 \times 26$ to find the area of a rectangle. Fill in the blanks using the Distributive Property.

$$5 \times 26 = 5 \times (\quad + 6)$$

$$= (5 \times \quad) + (5 \times 6)$$

$$= \quad + 30$$

$$= \quad$$

2. To multiply $8 \times 14$, Jana used the distributive property. Fill in the blanks to show what she did:

$$8 \times 14 = 8 \times (10 + \quad)$$

$$= (8 \times \quad) + (8 \times 4)$$

$$= \quad + 32$$

$$= \quad$$

3. Four friends went out to dinner. To cover dinner, tax, and tip, each person paid $18. How much did they pay all together?

4. The fifth-grade classes at Wilcox Elementary School are reading books during the summer. There are 76 students, and each is supposed to read 4 books. How many books will the students read in all?

5. The four Boy Scout troops in Carver City sold 1,238 buckets of popcorn to raise money. If each bucket costs $4, how much money did the troops raise?

6. James builds and sells furniture. Last month he sold 9 bookcases and 6 coffee tables. If each bookcase costs $310, and each coffee table costs $275, how much did James make?
Enrich

Algebra: The Distributive Property

You can use other properties of addition to help you add numbers.

**Commutative Property**
The order of the addends does not change the sum.

\[ 3 + 2 = 2 + 3 \]

**Associative Property**
The way the addends are grouped does not change the sum.

\[ 3 + (2 + 4) = (3 + 2) + 4 \]

**Identity Property**
The sum of any number and 0 equals the number.

\[ 3 + 0 = 3 \]

Add: \( 4.7 + 5.6 \) = 

*Think:* Break the numbers into whole numbers and decimals. Group whole numbers with each other. Group decimals with each other.

\[
= (4 + 0.7) + (5 + 0.6) \\
= 4 + (0.7 + 5) + 0.6 \quad \leftarrow \text{Associative Property} \\
= 4 + (5 + 0.7) + 0.6 \quad \leftarrow \text{Commutative Property} \\
= (4 + 5) + (0.7 + 0.6) \quad \leftarrow \text{Associative Property} \\
= 9 + 1.3 \\
= 10.3
\]

**Identify the addition property used to rewrite each problem.**

1. \( 5 + 0 = 5 \) ________________
2. \( 26 + (4 + 19) = (26 + 4) + 19 \) ________________
3. \( 57 + 43 = 43 + 57 \) ________________

**Add or subtract. Use properties of addition.**

4. \( 3.8 + 5.1 = \) ______ 5. \( 12.3 + 4.8 = \) ______
6. \( 4.6 + 6.6 = \) ______ 7. \( 7.2 + 20.7 = \) ______
8. \( 42.56 + 14.03 = \) ______ 9. \( \$27.83 + \$7.92 = \) ______
Read each question carefully. Fill in the correct answer in the space provided.

1. Order the numbers from greatest to least.
   83,083; 38,803; 38,830; 83,308

2. $310.75 + $28.09

3. Complete the equation to make it balanced.
   3 quarters + 1 dime + 7 pennies = 2 quarters + □

4. Write a rule as an equation to describe the pattern in the table.

<table>
<thead>
<tr>
<th>Input (x)</th>
<th>Output (y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>20</td>
<td>18</td>
</tr>
</tbody>
</table>

5. Look at the line graph below.
   In what month were the most cones sold?

6. Jeremy’s math test scores are listed below.
   {99, 81, 81, 99, 90, 99, 73}
   What is the mode of Jeremy’s math test scores?

7. What two composite numbers are greater than 22 and less than 26?

8. Find the value of $4 + 3 \times t$ if $t = 3$.

   If Benito has 14 grapes left, how many grapes did he have originally?
10. Find the value of \( y \) if \( 709 \times 51 = y \).

11. \( 8 \div 971 \)

12. There are 103 students in fifth grade at Dane’s school. The students are divided among 4 classes. About how many students are in each class?

13. A triangle has sides that each measure 3 centimeters. All three of its angles measure 60°. Identify the triangle as isosceles, equilateral, or scalene. Also identify it as acute, right, or obtuse.

14. A rectangular gymnasium has an area of 96 square feet and a width of 8 feet. What is the length of the gymnasium?

15. Look at the coordinate plane. What ordered pair names point \( A \)?

16. Find the value of \( x \) if \( \frac{14}{35} = \frac{2}{x} \).

17. Write \( \frac{11}{2} \) as a mixed number.

18. Write \( \frac{7}{100} \) as a decimal.

19. 59.07 \(-\) 19.8

20. Lexi tosses 2 quarters. What is the probability that both coins will land on heads?
**Individual Progress Checklist**

<table>
<thead>
<tr>
<th>B</th>
<th>D</th>
<th>M</th>
<th>Goal</th>
<th>Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>find the prime factorization of a composite number</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>use powers and exponents in expressions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>find the value of expressions using the order of operations</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>evaluate algebraic expressions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>complete function tables and find function rules</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>solve equations using mental math</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>find the area of squares and rectangles</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>use the Distributive Property in equations and expressions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>solve problems using the guess-and-check strategy</td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Chapter Diagnostic Assessment

Write your answer on the line provided.

Add.
1. $73 + 98$
2. $78 + 35$
3. $66 + 44$
4. $92 + 99$
5. $49 + 58$

Subtract.
6. $75 - 31$
7. $63 - 42$
8. $77 - 69$
9. $135 - 49$
10. $234 - 187$

Multiply.
11. $67 \times 32$
12. $48 \times 33$
13. $40 \times 19$
14. $22 \times 64$
15. $39 \times 20$

Divide.
16. $64 \div 8$
17. $44 \div 11$
18. $144 \div 6$
19. $95 \div 5$
20. Philippe bought three CDs for a total of $39.99. If one CD costs $8.99 and another costs $15.06, how much did the third cost?
Tell whether each number is **prime, composite, or neither**.

1. 81

2. 7

3. Write the product of $3 \times 3 \times 3 \times 3$ using an exponent.

4. Write the prime factorization of 36 using exponents.

5. Write $5 \times 5 \times 5 \times 5$ using an exponent. Then find its value.

6. Find the value of $12 - 6 + 8$.

7. Evaluate the expression $12n + 1$, if $n = 3$.

8. Complete the function table.

<table>
<thead>
<tr>
<th>Input ($x$)</th>
<th>Output ($x - 3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

9. Find the area of a square whose sides are 14 inches long.

10. Rewrite the expression below using the Distributive Property. Then evaluate.

$$3 \times (20 - 4)$$
Tell whether each number is *prime*, *composite*, or *neither*.

1. 11
2. 48
3. 53
4. 57

5. $4 \times 4 \times 4$
6. $5 \times 5 \times 5 \times 5 \times 5$

Find the value of each expression.

7. $4^2 + 8 - 2$
8. $66 \times (6 \div 2) + 1$
9. $15 - 2^3 \div 4$

10. Juan is making cookies for 15 friends. He has made 3 dozen cookies so far. If he wants each friend to have exactly 3 cookies, write an expression to find how many more cookies he should make. Then find the value of the expression.
Quiz 2 (Lessons 1–4 through 1–6)

Solve.

1. A train departed at 12:30 P.M. It traveled 360 miles in 4 hours. How many miles did it travel each hour?

2. Sarah bought a new laptop computer for $1,200. She plans to pay for it in three equal payments. What is the amount of each payment?

3. After a day at the amusement park, you come home with $2. You spent $15 on admission to the park, $10 on snacks, and $5 dollars on a stuffed animal. How much money did you start with?

4. Evaluate the expression $m + 5$ if $m = 4$.

5. Evaluate the expression $n - 3$ if $n = 6$.

6. Evaluate the expression $c - 5$ if $c = 12$.

7. Complete the function table.

<table>
<thead>
<tr>
<th>Input ($x$)</th>
<th>Output ($x + 5$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

8. Complete the function table.

<table>
<thead>
<tr>
<th>Input ($x$)</th>
<th>Output ($x - 7$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

9. Juan can swim 2 miles in one hour. At this rate, find the total number of miles he can swim in three hours. Let $h$ represent the number of hours.

9. ________________
1. The sum of two prime numbers is 15. What are the numbers?

2. When is it best to use the **guess and check** problem-solving strategy?

3. Solve the equation mentally.  
   \[ m + 12 = 20 \]

4. Solve the equation mentally.  
   \[ n - 3 = 9 \]

5. Solve the equation mentally.  
   \[ c - 5 = 25 \]

6. Suppose there are 15 muffins in a box and some number of bananas, represented by the variable \( x \), in the box. There are a total of 30 items in the box. Solve the equation \( 15 + x = 30 \) mentally to find the number of bananas.

7. Find the area of a square with sides that are 4 feet long.

8. If \( A \) represents the area of a square, write an equation that shows the relationship between the area and the side length \( s \).

9. Find the area of a rectangle with a length of 8 feet and a width of 6 feet.

10. Find \( 5 \times 68 \) mentally using the Distributive Property. Show the steps you used.

11. Find \( 3 \times 27 \) mentally using the Distributive Property. Show the steps you used.
1. Sergio can run one mile in 5 minutes. At this rate, how long will it take him to run 10 miles?
   A. 50 minutes   C. 5 minutes
   B. 30 minutes   D. 1 hour

2. Which of these numbers is prime?
   F. 21   H. 4
   G. 8   J. 2

3. Which of these numbers is composite?
   A. 14   C. 3
   B. 7   D. 1

4. Find the prime factorization of 75.
   F. $3 \times 4 \times 4$   H. $25 \times 3$
   G. $3 \times 5 \times 5$   J. $3 \times 3 \times 5$

5. Find the value of $9^3$.

6. Find the value of $20 \div 5 + 10 \times (8 - 4)$.

7. Find the value of $10 - 5 + 3$.

8. Find the value of $25 \div 5 + 20 \times (10 - 5)$.

9. Tell whether the number 3 is prime, composite, or neither.

10. Write the prime factorization of 49 using exponents.

11. Your local bakery has $3^3 + 4$ flavors of bagels. How many bagels does the shop have?

12. How do you know that a number is prime?
Using the word bank below, complete each sentence by writing the correct word or words on the line provided.

area  evaluate  equation
algebra  function  variable
prime numbers  algebraic expressions

1. Every composite number can be expressed as a product of ______.

2. When you find the value of an algebraic expression by replacing variables with numbers, you ______ the expression.

3. A ______ is a relationship that assigns exactly one output value to one input value.

4. A letter or symbol used to represent an unknown quantity is a ______.

5. ______ is a language of symbols.

6. ______ is the number of square units needed to cover the inside of a region or plane figure.

7. ______ are combinations of variables, numbers, and at least one operation.

8. $2y + x = 7$ is an example of an ______.
Oral Assessment

Read each question aloud to the student. Then write the student’s answers on the lines below the question.

1. Show the student this diagram.

2. What is the length of this side?

3. What is the length of this side?

4. Which side is longer?

5. Tell how you got your answer.

6. To find the area of the rectangle, what would you do?
7. What happens when you multiply the two sides?


8. How did you get your answer?


9. Now you draw a rectangle and label the sides.


10. How would you get the area of the rectangle you drew?


11. What is the area of the rectangle you drew?


# Chapter Project Rubric

<table>
<thead>
<tr>
<th>Score</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| 3     | Student successfully completed the chapter project.  
       | Student demonstrated appropriate use of chapter information in completing the chapter project. |
| 2     | Student completed the chapter project with partial success.  
       | Student partially demonstrated appropriate use of chapter information in completing the chapter project. |
| 1     | Student completed the chapter project with little success.  
       | Student demonstrated very little appropriate use of chapter information in completing the chapter project. |
| 0     | Student did not complete the chapter project.  
       | Student demonstrated inappropriate use of chapter information in completing the chapter project. |
## Foldables Rubric

### Number Sense, Algebra, and Functions

#### Layered Look Foldables

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

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

1. Which number is prime?
   A. 14  B. 24  C. 26  D. 29  1. _____

2. Which number is composite?
   F. 50  G. 47  H. 43  J. 41  2. _____

3. Write using an exponent.
   \(7 \times 7 \times 7 \times 7 \times 7\)
   A. \(6^7\)  B. \(7^6\)  C. \(7^7\)  D. \(70^3\)  3. _____

4. Write using an exponent.
   \(3 \times 3 \times 3 \times 3\)
   F. \(3^3\)  G. \(3^4\)  H. \(3^5\)  J. \(30^2\)  4. _____

5. Find the value of \(6^3\).
   A. 36  B. 206  C. 216  D. 1,296  5. _____

6. Find the value of \(10^4\).
   F. 400  G. 4,000  H. 10,000  J. 100,000  6. _____

7. Find the value of \(4 \times (3 + 9) - 3 \times 5\).
   A. 30  B. 33  C. 90  D. 93  7. _____

8. Find the value of \(9 - 24 \div 8 + (6 \times 5)\).
   F. 3  G. 13  H. 17  J. 36  8. _____

9. Find the value of \(2x + 18 \div 3\) if \(x = 8\).
   A. 11  B. 14  C. 22  D. 26  9. _____
10. Which situation could be described by the expression $c + 237$?
   F. Tom drove $c$ miles on Tuesday and 237 miles fewer on Wednesday.
   G. Tom drove 237 miles on Tuesday and $c$ miles fewer on Wednesday.
   H. Tom drove 237 miles on Tuesday and $c$ times as many miles on Wednesday.
   J. Tom drove 237 miles on Tuesday and $c$ miles farther on Wednesday.

11. Which expression represents the product of $b$ and 45?
   A. $45 + b$
   B. $b - 45$
   C. $45 - b$
   D. $45b$

12. Terri charges $12 to rake a yard. How much will she earn from raking 7 yards?
   F. $84$
   G. $42$
   H. $38$
   J. $19$

13. Find the area.
   A. 36 square yards
   B. 32 square yards
   C. 18 square yards
   D. 13 square yards

14. Jade and her father planted a rectangular garden in their backyard. The garden is 4 feet long by 3 feet wide. What is the area of the garden?
   F. 7 square feet
   G. 9 square feet
   H. 12 square feet
   J. 16 square feet

15. Tino orders five bowls of chili. Each bowl costs $2. If he pays with a $20 bill, how much change does he receive?
   A. $10
   B. $5
   C. $2
   D. $0

16. Tickets to a magic show cost $5 each. If $400 was collected, how many tickets were sold? Use the four-step plan to solve.
   F. 20
   G. 75
   H. 80
   J. 400
Read each question carefully. Write your answer on the line provided.

1. Which number is prime?
   A. 4       B. 26       C. 31       D. 34

2. Which number is composite?
   F. 2       G. 23       H. 25       J. 37

3. Write using an exponent.
   \(8 \times 8 \times 8 \times 8 \times 8\)
   A. \(7^7\)       B. \(8^6\)       C. \(8^7\)       D. \(80^3\)

4. Write using an exponent.
   \(4 \times 4 \times 4 \times 4\)
   F. \(4^3\)       G. \(4^4\)       H. \(4^5\)       J. \(40^4\)

5. Find the value of \(5^4\).
   A. 25       B. 620       C. 625       D. 6,025

6. Find the value of \(12^2\).
   F. 24       G. 144       H. 2,400       J. 144,000

7. Find the value of \(5 \times (2 + 8) - 2 \times 5\).
   A. 30       B. 40       C. 89       D. 91

8. Find the value of \(9 - 32 \div 8 + (5 \times 5)\).
   F. 11       G. 25       H. 31       J. 30

9. Find the value of \(3x + 12 \div 4\) if \(x = 4\).
   A. 6       B. 11       C. 15       D. 63
10. Which situation could be described by the expression $s + 42$?
   F. Max drove $s$ miles on Tuesday and 42 miles fewer on Wednesday.
   G. Max drove 42 miles on Tuesday and $s$ miles fewer on Wednesday.
   H. Max drove 42 miles on Tuesday and $s$ times as many miles on Wednesday.
   J. Max drove 42 miles on Tuesday and $s$ miles farther on Wednesday.

11. Which expression represents the product of $s$ and 123?
   A. $123 + s$
   B. $s - 123$
   C. $123 - s$
   D. $123s$

12. Antonio charges $15 to rake a yard. How much did he earn raking 6 yards?
   F. $90$
   G. $50$
   H. $85$
   J. $19$

13. Find the area.
   A. 32 square yards
   B. 36 square yards
   C. 12 square yards
   D. 13 square yards

14. Peter and his mother are planning a garden in their backyard. The garden will be 13 feet long and 2 feet wide. What will be the area of the garden?
   F. 15 square feet
   G. 26 square feet
   H. 28 square feet
   J. 132 square feet

15. Sheila orders four cups of coffee. Each cup costs $2. If she pays with a $10 bill, how much change does she receive?
   A. $1
   B. $2
   C. $3
   D. $4

16. Tickets to a concert cost $15 each. If $1,200 was collected, how many tickets were sold? Use the four-step plan to solve.
   F. 19
   G. 75
   H. 80
   J. 400
Chapter Test, Form 2B

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

1. Which number is prime?
   A. 2  B. 6  C. 21

2. Which number is composite?
   F. 2  G. 4  H. 11

   \(2 \times 2 \times 2\)
   A. \(2^4\)  B. \(2^3\)  C. 32

4. Rewrite. Use an exponent.
   \(7 \times 7 \times 7 \times 7\)
   F. \(7^3\)  G. \(7^4\)  H. \(7^5\)

5. Find the value of \(4^3\).
   A. 16  B. 48  C. 64

6. Find the value of \(6^2\).
   F. 12  G. 36  H. 2,400

7. Find the value of \(4 \times (3 + 7) - 1 \times 4\).
   A. 30  B. 36  C. 89

8. Find the value of \(8 - 36 \div 6 + (4 \times 5)\).
   F. 22  G. 25  H. 31

9. Solve \(4x + 10 \div 2\) if \(x = 2\).
   A. 5  B. 13  C. 15

10. Which expression describes this situation?
    Will bought \(x\) apples on Tuesday and 3 more on Wednesday.
    F. \(x + 3\)  G. \(x - 3\)  H. \(3x\)
11. Which of these is the product of 49 and \( d \)?
   A. \( 49 + d \)  
   B. \( d - 49 \)  
   C. \( 49d \)  

12. Ernesto earns $10 to mow a lawn. How much will he earn if he mows 6 yards?
   F. $50  
   G. $60  
   H. $85  

13. Find the area.
   A. 25 square yards  
   B. 36 square yards  
   C. 10 square yards

14. Kayla and her father are planting a garden. It will be 6 feet long and 3 feet wide. What will be the area of the garden?
   F. 9 square feet  
   G. 18 square feet  
   H. 36 square feet

15. Enrique orders five sodas. Each soda costs $1. If he pays with a $10 bill, how much change will he receive?
   A. $3  
   B. $4  
   C. $5

16. If every ticket costs $5, which table correctly shows the price of admission for 1, 2, 3, or 4 children?

   F. 
<table>
<thead>
<tr>
<th>Number of children</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>$5</td>
<td>$11</td>
<td>$16</td>
<td>$30</td>
</tr>
</tbody>
</table>

   G. 
<table>
<thead>
<tr>
<th>Number of children</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>$5</td>
<td>$10</td>
<td>$15</td>
<td>$20</td>
</tr>
</tbody>
</table>

   H. 
<table>
<thead>
<tr>
<th>Number of children</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>$6</td>
<td>$13</td>
<td>$15</td>
<td>$20</td>
</tr>
</tbody>
</table>

17. Tickets to a movie cost $8 each. If $640 was collected, how many tickets were sold?
   A. 75  
   B. 5,120  
   C. 80
Chapter Test, Form 2C

Read each question carefully. Answer on the line provided.

1. Write one prime number. 1. _______________

2. Write one composite number. 2. _______________

3. Write using an exponent. 3. _______________
   \[ 2 \times 2 \times 2 \times 2 \times 2 \times 2 \]

4. Write using an exponent. 4. _______________
   \[ 9 \times 9 \times 9 \times 9 \]

5. Find the value of \( 4^3 \). 5. _______________

6. Find the value of \( 8^3 \). 6. _______________

7. Find the value of \( 4 \times (3 + 9) - 3 \times 5 \). 7. _______________

8. Find the value of \( 9 - 24 \div 8 + (6 \times 5) \). 8. _______________

9. Find the value of \( 2x + 18 \div 3 \) if \( x = 8 \). 9. _______________

10. Find the value of \( t + 4^2 - 42 \div 7 \) if \( t = 3 \). 10. _______________

11. Write an expression that could describe the situation. 11. _______________
   Ned drove 45 miles on Tuesday and \( c \) miles farther on Wednesday.

12. Terri charges $15 to rake a yard. How much will she earn if she rakes 7 yards? 12. _______________

13. Find the area. 13. _______________
   \[
   \begin{array}{c}
   \text{8 yd} \\
   \hline
   \text{3 yd}
   \end{array}
   \]
14. Find the area.

15. Alex and his brother are planning a garden in their backyard. The garden will be 5 feet long and 3 feet wide. What will the area of the garden be?

16. John orders four cheeseburgers. Each burger costs $2. If he pays with a $10 bill, how much change does he receive?

17. Suppose each ticket to a show costs $8. What is the price of admission for 1, 2, 3, and 4 children?

18. Complete the function table.

<table>
<thead>
<tr>
<th>Input (x)</th>
<th>Output (x + 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

19. Complete the function table.

<table>
<thead>
<tr>
<th>Input (x)</th>
<th>Output (x - 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

20. Tickets to the circus cost $15 each. If $3,000 was collected, how many tickets were sold? Use the four-step plan to solve the problem.
1. Write one prime number.
2. Write one composite number.
3. Write using an exponent.
   \[ 2 \times 2 \times 2 \times 2 \times 2 \times 2 \]
4. Write using an exponent.
   \[ 5 \times 5 \times 5 \]
5. Find the value of \( 2^3 \)
6. Find the value of \( 8^3 \)
7. Find the value of \( 4 \times (3 + 9) - 3 \times 5 \).
8. Find the value of \( 9 - 24 \div 8 + (6 \times 5) \).
9. Find the value of \( 2x + 18 \div 3 \) if \( x = 8 \).
10. Find the value of \( t + 4^2 - 42 \div 7 \) for \( t = 3 \).
11. Write an expression that could describe the situation.
    Eva read \( r \) pages in her book last night and 14 pages in her book tonight.
12. Terri charges $15 to rake a yard. How much will she earn if she rakes 7 yards?
13. Find the area.
    \[
    \begin{array}{c}
    8 \text{ yd} \\
    \hline
    3 \text{ yd}
    \end{array}
    \]
14. Find the area.
    \[
    \begin{array}{c}
    6 \text{ ft} \\
    \hline
    6 \text{ ft}
    \end{array}
    \]
15. Eric is planning a garden in his backyard. His garden will be 3 feet long by 2 feet wide. What will the area of his garden be?

16. John orders four cheeseburgers. Each burger costs $1. If he pays with a $10 bill, how much change does he receive?

17. Each ticket to a show costs $8. What is the price for 1, 2, 3, and 4 tickets?

18. Complete the function table.

<table>
<thead>
<tr>
<th>Input (x)</th>
<th>Output ((x - 5))</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

19. Complete the function table.

<table>
<thead>
<tr>
<th>Input (x)</th>
<th>Output ((x + 3))</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

20. Tickets to the circus cost $15 each. If $3,000 was collected, how many tickets were sold? Use the four-step plan to solve the problem.
1. Write a prime number.

2. Write a composite number.

3. Rewrite using an exponent.
   \[ 2 \times 2 \times 2 \times 2 \times 2 \times 2 \]

4. Rewrite using an exponent.
   \[ 5 \times 5 \times 5 \]

5. Find the value of \( 4^2 \).

6. Find the value of \( 9^3 \).

7. Evaluate \( 4 \times (8 + 9) - 2 \times 6 \).

8. Evaluate \( 9 - 24 \div 8 + (6 \times 5) \).

9. Evaluate \( 2x + 18 \div 3 \) if \( x = 8 \).

10. Evaluate \( t + 4^2 - 42 \div 7 \) for \( t = 3 \).

11. Write an expression that could describe the situation.
    Anna read \( p \) pages in her book last night and 23 pages in her book tonight.

12. Terri charges $17 to rake a yard. How much will she earn from raking 9 yards?

13. Determine the area.

   \[ \text{8 yd} \]

   \[ \text{3 yd} \]

14. Determine the area.

   \[ \text{6 ft} \]

   \[ \text{6 ft} \]
15. Will and his father are planting a garden in their backyard. It will be 4 feet long and 3 feet wide. What will the area of the garden be?

16. John orders four cheeseburgers. Each burger costs $3. If he pays with a $20 bill, how much change does he receive?

17. Suppose each ticket to a show costs $8. What is the price of admission for 1, 2, 3, and 4 children?

18. Complete the function table.

<table>
<thead>
<tr>
<th>Input (x)</th>
<th>Output (x + 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

19. Complete the function table.

<table>
<thead>
<tr>
<th>Input (x)</th>
<th>Output (x - 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

20. Tickets to the circus cost $15 each. If $3,000 was collected, how many tickets were sold? Use the four-step plan to solve the problem.
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. Name in order the four steps of the problem-solving plan. Tell what you do at each step.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

2. Write the order of operations in your own words.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

3. Tell how to find the prime factorization of a number.

__________________________________________________________________________

__________________________________________________________________________
Student Recording Sheet

Use this recording sheet with pages 68–69 of the Student Edition.

Read each question. Then fill in the correct answer.

1. A B C D

2. F G H J

3. A B C D

4. F G H J

5. A B C D

6. F G H J

7. A B C D

8. F G H J

9. A B C D
TEST EXAMPLE

The table shows the ages of Marissa and Pablo over 4 consecutive years.

<table>
<thead>
<tr>
<th>Marissa’s Age, x (years)</th>
<th>Pablo’s Age, y (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>7</td>
<td>9</td>
</tr>
</tbody>
</table>

Which expression best represents Pablo’s age in terms of Marissa’s age?

A. \( y + 2 \)  
B. \( 2x \)  
C. \( x + 2 \)  
D. \( 2y \)

Read the Question.

You need to find the expression that best represents Pablo’s age in terms of Marissa’s age.

Solve the Question.

Study the relationship between Pablo’s age and Marissa’s age. 
Pablo’s age is 2 years more than Marissa’s age, \( x \) years.

So, \( x + 2 \) best represents Pablo’s age in terms of Marissa’s age. 
The answer is C.

Choose the best answer.

1. Which represents the product of \( p \) and 15?
   A. \( 15p \)  
   B. \( 15 - p \)  
   C. \( p + 15 \)  
   D. \( p - 15 \)  

1. _____
2. The cost of renting skates is $5 plus an additional $2.50 for each hour the skates are rented. Which equation can be used to find \( c \), the cost in dollars of the rental for \( h \) hours?

- **F.** \( c = 5h + 2.50 \)
- **G.** \( c = 2.50 - 5h \)
- **H.** \( c = 2.50h + 5 \)
- **J.** \( c = 2.50(h + 5) \)

3. Which situation could be described by the expression \( f + 543 \)?

- **A.** Henry drove \( f \) miles on Saturday and 543 fewer miles on Sunday
- **B.** Henry drove 543 miles on Saturday and \( f \) fewer miles on Sunday
- **C.** Henry drove 543 miles on Saturday and \( f \) times as many miles on Sunday
- **D.** Henry drove \( f \) miles on Saturday and 543 miles farther on Sunday

4. A restaurant is keeping track of the number of drinks sold each day.

<table>
<thead>
<tr>
<th>Day</th>
<th>Number of Drinks Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>56</td>
</tr>
<tr>
<td>Tuesday</td>
<td>113</td>
</tr>
<tr>
<td>Wednesday</td>
<td>67</td>
</tr>
<tr>
<td>Thursday</td>
<td>88</td>
</tr>
<tr>
<td>Friday</td>
<td>90</td>
</tr>
</tbody>
</table>

About how many drinks were sold during that week?

- **F.** 140
- **G.** 400
- **H.** 500
- **J.** 580

5. At the art school that Gigi attends, there are 18 classes with approximately 12 students in each class. How many students attend the art school?

- **A.** 26
- **B.** 60
- **C.** 200
- **D.** 216

6. What value for \( y \) makes the following equation true?

\[ 5 \times 5 = (3 \times 2) + (15 + y) \]

- **F.** 4
- **G.** 5
- **H.** 10
- **J.** 40
7. Which is the prime factorization of 48?
   A. 3 × 2 × 2
   B. 3 × 3 × 2 × 2 × 2
   C. 3 × 2 × 2 × 2 × 2
   D. 12 × 4
   7. _____

8. Alissa painted a square design on her bedroom wall. The length of each side of the design was 7 feet. What is the area of her design?
   F. 14 square feet
   G. 42 square feet
   H. 49 square feet
   J. 50 square feet
   8. _____

9. What value for p makes the following equation true?
   9 + 9 = (2^2 + p) + 4
   A. 1
   B. 9
   C. 10
   D. 11
   9. _____

10. Ricardo planted a rectangular garden in his backyard. The length of his garden was 14 feet. The width of his garden was 7 feet. Find the area of Ricardo’s garden.
    F. 14 square feet
    G. 96 square feet
    H. 98 square feet
    J. 112 square feet
    10. _____

Use the guess and check strategy to solve.

11. Kelly bought a snack for $3.85 and paid with a $5-bill. Her change included nine coins, including three quarters, two dimes, and four other coins. What is the value of the four other coins?
    11. _____

12. Harold is helping his brother move a sofa into the living room. The sofa is 108 inches long. One wall of the living room is 9 feet long. Another wall is 7 feet long. Along which wall should Harold and his brother put the sofa?
    12. _____

13. Selena bought 5 notebooks on sale. The original price for each notebook was $0.75, and they were on sale for $0.05 off. How much did Selena pay for the 5 notebooks?
    13. _____
Anticipation Guide

Number Sense, Algebra, and Functions

**Before you begin Chapter 1**

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

<table>
<thead>
<tr>
<th>Statement</th>
<th>Agree (A)</th>
<th>Disagree (D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Any composite number can be written as a product of prime factors.</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>2. The letter ( x ) is never used as a variable.</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>3. When the amounts on each side of a scale are equal, the scale is balanced.</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>4. An equation is a sentence that contains an equals sign.</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>5. A number greater than 1 with more than two factors is a prime number.</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>6. Every composite number can be expressed as a product of prime numbers.</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>7. A factor tree can be used to find the prime factorization of a number.</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>8. The area of a figure is the number of units needed to cover its length.</td>
<td>D</td>
<td></td>
</tr>
</tbody>
</table>

**After you complete Chapter 1**

1. Reread each statement and complete the last column by entering an A (agree) or a D (disagree).
2. Did any of your opinions about the statements change from the first column?
3. For those statements that you mark with a D, use a separate sheet of paper to explain why you disagree. Use examples, if possible.
You can make a factor tree to find the prime factors of a number. Here are two factor trees that show the prime factors of 24.

- A prime number has exactly two factors, 1 and itself.
- A composite number is a number greater than 1 with more than two factors.
- 0 and 1 are neither prime nor composite.

You get the same prime factors each way.

24 = 2 × 2 × 2 × 3

Tell whether each number is prime, composite, or neither. Find the prime factorization for the composite numbers.

1. 15
   - composite
   - 3 × 5

2. 45
   - composite
   - 3 × 3 × 5

3. 7
   - prime

4. 25
   - composite
   - 5 × 5

5. 90
   - composite
   - 3 × 3 × 5 × 2

6. 11
   - prime

Find the prime factorization of each number. Tell whether each number is prime, composite, or neither.

1. 48
   - 2 × 2 × 2 × 2 × 3
2. 56
   - 2 × 2 × 2 × 7
3. 36
   - 2 × 2 × 3 × 3

4. 1
   - neither
5. 45
   - composite
   - 3 × 3 × 5
6. 18
   - composite
   - 3 × 3 × 2

7. 23
   - prime
8. 39
   - composite
   - 3 × 13
9. 55
   - composite
   - 5 × 11

10. 28
    - composite
    - 2 × 2 × 7
11. 79
    - prime
    - 1 × 79
12. 62
    - composite
    - 2 × 31

Solve.

13. There are 24 students in Mrs. Green’s class. The number of boys and the number of girls are both prime numbers. There are 2 more boys than girls. How many boys and how many girls are in the class?

   13 boys and 11 girls
**1-1 Homework Practice**

**Prime Factors**

Tell whether each number is prime, composite, or neither. Find the prime factorization for each composite number.

1. 28  
2. 36  
3. 42

<table>
<thead>
<tr>
<th>2 × 2 × 7</th>
<th>2 × 2 × 3 × 3</th>
<th>2 × 3 × 7</th>
</tr>
</thead>
</table>

4. 11  
5. 34  
6. 7

<table>
<thead>
<tr>
<th>prime</th>
<th>composite</th>
<th>prime</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 × 17</td>
<td></td>
</tr>
</tbody>
</table>

7. 72  
8. 23  
9. 12

<table>
<thead>
<tr>
<th>composite</th>
<th>prime</th>
<th>composite</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 × 2 × 2 × 3 × 3</td>
<td>2 × 2 × 3</td>
<td></td>
</tr>
</tbody>
</table>

**Spiral Review**

Create a table to show the possible outcomes for the situation. Then, use the table to describe the probability of the event taking place.

10. Sonja has a bag of canned food. She has two cans of peas, five cans of plum tomatoes, and one can of soup. She grabs a can out of the bag without looking. Describe the probability of Sonja grabbing a can of peas.

<table>
<thead>
<tr>
<th>Food</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peas</td>
<td>2</td>
</tr>
<tr>
<td>Plum tomatoes</td>
<td>5</td>
</tr>
<tr>
<td>Soup</td>
<td>1</td>
</tr>
</tbody>
</table>

**Not likely: there are more cans of other kinds of food.**
Sometimes when you multiply, you use the same number as a factor more than once. You can use exponent form to show this.

Write the number of times the factor is used as the exponent.

\[3 \times 3 \times 3 \times 3 \times 3 = 3^6\]

Write the factor as the base.

To write \(3 \times 3 \times 3 \times 3 \times 3\), or \(3^6\), in standard form, multiply 3 six times.

\(3 \times 3 \times 3 \times 3 \times 3 = 729\)

Write each product using an exponent.

1. \(4 \times 4 \times 4\)

Exponent Form: \(4^3\)

What is the base? \(4\)

What is the exponent? \(3\)

2. \(2 \times 2 \times 2 \times 2 \times 2 \times 2\)

Exponent Form: \(2^7\)

What is the base? \(2\)

What is the exponent? \(7\)

3. \(10 \times 10 \times 10 \times 10\)

Exponent Form: \(10^4\)

What is the base? \(10\)

What is the exponent? \(4\)

4. \(5 \times 5\)

Exponent Form: \(5^2\)

What is the base? \(5\)

What is the exponent? \(2\)

5. \(3 \times 3 \times 3 \times 3\)

Exponent Form: \(3^4\)

What is the base? \(3\)

What is the exponent? \(4\)

6. \(7 \times 7 \times 7 \times 7\)

Exponent Form: \(7^4\)

What is the base? \(7\)

What is the exponent? \(4\)
Skills Practice
Powers and Exponents

Complete the table.

<table>
<thead>
<tr>
<th>Exponent</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>(4^4) (= 4 \times 4 \times 4 \times 4 \times 4)</td>
</tr>
<tr>
<td>2.</td>
<td>(6^2) (= 6 \times 6)</td>
</tr>
<tr>
<td>3.</td>
<td>(1^7) (= 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1)</td>
</tr>
<tr>
<td>4.</td>
<td>(5^1) (= 5)</td>
</tr>
<tr>
<td>5.</td>
<td>(6^4) (= 6 \times 6 \times 6 \times 6)</td>
</tr>
<tr>
<td>6.</td>
<td>(10^3) (= 10 \times 10 \times 10)</td>
</tr>
<tr>
<td>7.</td>
<td>(2^6) (= 2 \times 2 \times 2 \times 2 \times 2 \times 2)</td>
</tr>
<tr>
<td>8.</td>
<td>(3^3) (= 3 \times 3 \times 3)</td>
</tr>
<tr>
<td>9.</td>
<td>(8^2) (= 8 \times 8)</td>
</tr>
<tr>
<td>10.</td>
<td>(2^1) (= 2)</td>
</tr>
<tr>
<td>11.</td>
<td>(5^4) (= 5 \times 5 \times 5 \times 5)</td>
</tr>
<tr>
<td>12.</td>
<td>(10^6) (= 10 \times 10 \times 10 \times 10 \times 10 \times 10)</td>
</tr>
<tr>
<td>13.</td>
<td>(7^4) (= 7 \times 7 \times 7 \times 7)</td>
</tr>
<tr>
<td>14.</td>
<td>(2^1) (= 2 \times 2 \times 2)</td>
</tr>
<tr>
<td>15.</td>
<td>(9^1) (= 9)</td>
</tr>
<tr>
<td>16.</td>
<td>(3^0) (=) 1</td>
</tr>
</tbody>
</table>

Problem Solving.

Solve.

17. There are 10 boxes of postcards. Each box contains 10 bundles of 10 postcards. How many postcards are there altogether? How do you write this number in exponent form?

1,000 postcards; \(10^3\)

18. A school has a telephone system for letting families know about emergency school closings. The system is a pyramid with 5 layers. Three parents are on the top layer of the pyramid. Each parent in each layer calls three different parents. How many parents are in the chain?

363 parents
Problem-Solving Practice

1. Lou wrote $3^2$ in standard form. What was the number?

   $81$

2. Heidi’s family drove 1,000 mi on vacation. Write this number using a base and an exponent. Use 10 as the base.

   $10^3$

3. Halle’s family is buying new carpet for her bedroom. The room is 4 yards long and 4 yards wide. Write the area using a base and an exponent. Remember that area is calculated by multiplying the length times the width.

   $4^2$ square yards

4. Lupe emptied her bank and has 144 pennies and 121 nickels. Write each of these numbers using a base and an exponent. For the pennies use 12 as the base. For the nickels use 11 as the base.

   $12^2$ pennies; $11^2$ nickels

5. For a punch bowl, Carin needs a block of ice with a volume of at least 125 cubic inches. She has a cube of ice that is five inches on each side. Write the volume of the cube using a base and exponents. Then write it in standard form. Is the block of ice big enough? Remember that volume is calculated by multiplying length times width times height.

   $5^3$ cubic inches, 125 cubic inches, yes

6. Very large and very small numbers in science are often written using bases and exponents. For example, the sun is approximately $1.5 \times 10^8$ km from Earth. Write $10^5$ in standard form.

   $100,000,000$

Enrich

Making Models for Numbers

Have you wondered why we read the number $3^2$ as three squared? The reason is that a common model for $3^2$ is a square with sides of length 3 units. As you see, the figure that results is made up of 9 square units.

### Exercises 5 and 6 refer to the figure to the right.

7. CHALLENGE In the space at the right, draw a model for the expression $4^3$.
Reteach

Order of Operations

You can use a phrase to help you remember the order of operations.

Please
Excuse
My
Dear
Aunt
Sally
Parentheses
Exponents
Multiply
Divide
Add
Subtract

Evaluate.

1. $6^2 - 10 + 5 \times (2 - 1)$

2. $6 \times (9 - 4) + 3^2$

Find the value of each expression. Follow the steps in the order of operations.

1. $6^2 - 10 + 5 \times (2 - 1)$

2. $6 \times (9 - 4) + 3^2$

3. $7 \times (3 + 9)$

4. $(12 + 3) - 2 + 3 \times 7$

5. $3 \times 4^2 + 8 - 5$

6. $100 + 10^2 \times (6 - 3)$

7. $36 \times 3 - 10$

8. $5^2 \times 2 + 4$

9. $6^2 \div (9 - 5) + 7$

10. $25 - 2 \times 6 + 4^2$

11. $9 \times (14 - 3) \div 3$

12. $63 \div 9 + 2 \times 5$

Find the value of each expression.

1. $44 + 7 \times 3$

2. $48 \div (8 - 2)$

3. $(3 + 4) \times 8 \div 2$

4. $18 + 12 \div 2 + 3$

5. $4^2 \times 2 - 10$

6. $(6 \div 3) + (8 \times 5)$

7. $(3 + 2) \times 3^2$

8. $24 \div 6 \times 3 + 52$

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

10. $96 \div (3 \times 4) \div 2$

11. $100 - 8^2 + 4 \div 4$

12. $(200 - 50) \div (12 - 9)$

13. $47 + 3 \times 11 - 36 + 3$

14. $(7 + 6) \times (7 - 3)$

15. $50 - (4 + 1)^2 \div 9$

16. $6^2 - 9 \times 4 \div (1 + 2)^3$

Solve.

17. Tickets to the school play cost $4 for adults and $2 for students. If 255 adults and 382 students attended the play, write an expression that shows the total amount of money made on ticket sales. Then simplify the expression.

$(\$4 \times 255) + (\$2 \times 382)$

$1,784$

18. At the school play, popcorn costs $1 and juice costs $2. Suppose 235 people buy popcorn and 140 people buy juice. Write an expression that shows the total amount of money made by selling refreshments. Then simplify the expression.

$(\$1 \times 235) + (\$2 \times 140)$

$\$515$
1. Ted evaluated the expression $2 + 4 \times 6$. What was his answer?

He multiplied before evaluating the term with the exponent

What is the correct answer?

2. Frank evaluated the expression $8^2 - (2 \times 6 + 3)$. What was his answer?

3. Francisco wrote the number $3 \times 10^2$ in standard form. His answer was 900. What mistake did he make in order of operations?

4. Glenn ate 2 apples a day for a week. In addition to the apples, he ate 3 pears during the week. Write the expression that shows how many pieces of fruit he ate during the week.

He multiplied before evaluating the term with the exponent

What is the correct answer?

5. Create an expression whose value is 12. It should contain four numbers and two different operations.

6. Keiko’s class collected coins to buy food for a local family. When Keiko counted the coins, there were 27 quarters, 92 dimes, 140 nickels, and 255 pennies. Her teacher offered to add an amount to the total, equal to what the students collected. What expression did he use to find out how much money they had?

Evaluate the expression.

Sample Answer: $2(27 \times .25 + 92 \times .10 + 140 \times .05 + 255 \times .01)$

Evaluate the expression. $51$
The three tallest buildings in Boston are the Prudential Tower (750 ft), the John Hancock Tower (790 ft), and the Federal Reserve Building (604 ft). How much taller is the Prudential Tower than the Federal Reserve Building?

Be sure you understand the problem.
Read carefully. Identify what you need to do.
• What do you know? • What have you been asked to do?

You can subtract the heights of the buildings.

Plan a strategy.
• Decide what actions you will take and in what order.

Solve the problem.
Follow your plan.
Subtract the height of the Federal Reserve Building from the height of the Prudential Tower.

Did you answer the question? Is the solution reasonable?
Yes, you have found the difference in heights.
3. The Andersons are buying a paddle boat for $530. They plan to pay in four equal payments. How much will their payments be?

$132.50

4. Lynn can walk two miles in 24 minutes. At this rate, how long will it take her to walk 6 miles?

72 minutes

5. Bridgit plays on the basketball team. The table shows the number of baskets she made in the first six days of practice. If the pattern continues, how many baskets will she make on the eighth day?

6. The Glenn Plaza Building in Glendale, California is 353 feet tall. The U.S. Bank Tower in Los Angeles, California is 1,017 feet tall. Which building is taller?

The U.S. Bank Tower

7. After going on vacation, you come home with $5. You spent $6 on a pair of sunglasses, $10 on snacks, $4 on a book, and $5 on arcade games. How much money did you start with?

$30

5. Which tunnel is the longest?

E. Johnson Memorial

6. How much longer is the longest tunnel than Devil’s Side tunnel?

5,559 feet
Use the four-step plan to solve each problem.

1. A train left the station at 12:45. It traveled 455 miles in 7 hours. How many miles did it travel in each hour?
   
   **65 miles**

2. The Delgados are buying a pool that is 30 feet x 30 feet for $1,188. They plan to pay in 12 equal payments. Find the amount of each payment.
   
   **$99**

3. After shopping for school supplies, Martin came home with $4. He bought a pack of pens for $6, a calculator for $12, and a notebook for $3. How much money did he start with?
   
   **$25**

4. Julio increases the laps he runs by three laps each day. If he begins on Monday running 4 laps, how many laps will he run on Wednesday at his current rate?
   
   **10 laps**

Find the value of each expression. (Lesson 1–3)

5. \( 15 - 2^3 ÷ 4 \)  
   
   **13**

6. \( 22 - 17 + 8 \)  
   
   **13**

7. \( 23 + 4^2 ÷ 2 \)  
   
   **31**

Use the prices at the right to answer each question.

1. Jamaal has $5. Will that be enough money to buy a large spiral notebook and a pack of pencils?
   
   **Yes**

2. Andreas wants to buy a three-ring binder and two packs of filler paper. Will $7 be enough money?
   
   **No**

3. Rosita has $10. Can she buy a large spiral notebook and a pen and still have $5 left?
   
   **No**

4. Kevin has $10 and has to buy a pen and two small spiral notebooks. Will he have $2.50 left to buy lunch?
   
   **Yes**

5. What is the greatest number of erasers you can buy with $2?
   
   **3 erasers**

6. What is the greatest amount of filler paper that you can buy with $5?
   
   **3 packs**

7. Select five items whose total cost is as close as possible to $10, but not more than $10.
   
   - small notebook, pen, eraser, paper, pencils
A box contains some baseballs. There are 2 baseballs on the ground. How many baseballs are there altogether?

You can draw models to show the total number of baseballs if the box contains certain numbers of baseballs.

<table>
<thead>
<tr>
<th>5 baseballs</th>
<th>6 baseballs</th>
<th>7 baseballs</th>
<th>8 baseballs</th>
</tr>
</thead>
</table>

You can also write an algebraic expression to represent the total number of baseballs.
- The number of baseballs in the box changes, so represent it with the variable, $b$.
- The number of baseballs on the ground stays the same: 2.
- Add the number of baseballs in the box and the number on the ground to find the number of baseballs altogether.

So, $b + 2$ represents the total number of baseballs.

Suppose there are 9 baseballs in the box. $b = 9$

You can find the total number of baseballs by evaluating the expression. $9 + 2 = 11$ baseballs

Complete the steps to write and evaluate an expression for the situation.

1. Laura had 5 more hits than Susan. How many hits did Laura have?
   - What number changes? $s$
   - How many more hits Laura had than Susan $5$
   - What number stays the same? $s$
   - What operation do you need to use to find the number of hits Laura had? $s + 5$
   - Suppose Susan had 2 hits. Evaluate the expression. $2 + 5 = 7$ hits

2. The Mustangs scored $m$ runs in the softball game. The Rangers scored 3 fewer runs than the Mustangs. How many runs did the Rangers get?
   - $m - 3$

3. During the softball season, the Rangers won $y$ games. They lost 4 more games than they won. How many games did the Rangers lose during the season?
   - $y + 4$

Evaluate each expression if $a = 3$ and $b = 4$.

4. $b + 8$ $12$
5. $a + b$ $7$
6. $b - a$ $1$
7. $10 + b$ $14$
8. $2a$ $6$
9. $4b$ $16$
10. $a 	imes b$ $12$
11. $7a 	imes 9b$ $756$
12. $8a - 9$ $15$
13. $b 	imes 2$ $8$
14. $a + 1$ $4$
15. $18 + 2a$ $3$
16. $a^2 	imes b^2$ $144$
17. $ab ÷ 3$ $4$
18. $15a - 4b$ $29$

Evaluate each expression if $x = 7$, $y = 15$, and $z = 8$.

19. $x + y + z$ $30$
20. $x + 2z$ $23$
21. $xz$ $56$
22. $4x$ $28$
23. $z ÷ 4$ $2$
24. $6x - 5$ $43$
25. $9y$ $135$
26. $x^2$ $49$
27. $y + 4 	imes 6$ $39$
28. $y^2$ $225$
29. $x^2 + 30$ $79$
30. $zx ÷ 4$ $14$
1. Jaynee's friends ate 4 apples more than her family ate. Write an expression for how many apples Jaynee's friends ate.

2. Carmen took her newspapers and aluminum cans to the recycling center. She weighed everything and found that she had 24 pounds more newspapers than cans. Write an expression for the weight of the newspapers, using \( c \) as a variable.

3. Find the value of the expression if \( c = 12 \).

4. Ron made cookies for the fair. His sister made candy. Four cookies were packaged together, and 6 pieces of candy were packaged together. There were 6 more packages of cookies than \( p \) packages of candy. Write an expression for the number of packages of cookies. \( p + 6 \)

5. Find the value of the expression if \( p = 8 \).

6. How many cookies and pieces of candy were taken to the bake sale?

7. How much time did he spend at the water park?

8. How many apples did Jaynee's family eat?

9. How many newspapers and aluminum cans did Carmen take to the recycling center?

10. How many packages of cookies did Ron make?
Answers (Lessons 1–5 and 1–6)

**Enrich**

Algebra: Variables and Expressions

You can use variables and expressions to describe patterns. These tile letters grow according to different patterns.

Find a rule that will tell how many tiles it takes to build any size of the letter I.

1. Look for a pattern. Describe the pattern using your own words.

**6 tiles for the ends plus the tiles in the middle**

2. Describe the pattern for I using variables and expressions.

\[6 + m\]

Use the rule to predict the number of tiles needed for each I.

3. size 12 18

4. size 15 21

5. size 22 28

6. size 100 106

7. Suppose you had 39 tiles. What is the largest size I you could make?

### size 33

8. Find the pattern for the letter X. How many tiles are needed for size 16 of letter X?

\[4x + 1; 65\text{ tiles}\]

**Reteach**

Algebra: Functions

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

**Example 1**

Complete the function table.

The function rule is \(x - 3\). So, subtract 3 from each input.

<table>
<thead>
<tr>
<th>Input ((x))</th>
<th>(x - 3)</th>
<th>Output ((_______))</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>8</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

**Example 2**

Find the rule for the function table.

Study the relationship between each input and output.

<table>
<thead>
<tr>
<th>Input ((x))</th>
<th>Output ((_______))</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>

**Complete each function table.**

1. \[\text{Input} \(x\) | \text{Output} \((2x)\)\]

<table>
<thead>
<tr>
<th>Input ((x))</th>
<th>Output ((2x))</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

2. \[\text{Input} \(x\) | \text{Output} \((x + 5)\)\]

<table>
<thead>
<tr>
<th>Input ((x))</th>
<th>Output ((x + 5))</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

3. \[\text{Input} \(x\) | \text{Output} \((x + 2)\)\]

<table>
<thead>
<tr>
<th>Input ((x))</th>
<th>Output ((x + 2))</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>

4. \[\text{Input} \(x\) | \text{Output} \((x ÷ 2)\)\]

<table>
<thead>
<tr>
<th>Input ((x))</th>
<th>Output ((x ÷ 2))</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>
Complete each function table.

1. \( x = \text{number of books} \)
   - Function rule: \( 4x + 6 \)

2. \( x = \text{number of puzzles} \)
   - Function rule: \( 12.50 + 7.50(x - 1) \)

Find the rule for each function table.

3. \( x = \text{number of packages} \)
   - Function rule: \( 20 + 2x \)

4. \( x = \text{number of packages} \)
   - Function rule: \( 20 + 2x \)

Use the information below to solve problems 3–4.

It takes Beth 20 minutes to drive to and from a mailing service and 2 minutes to fill out a mailing label and have each package weighed.

3. Write a function rule to describe the situation. Tell what the variable represents.
   - Function rule: \( 20 + 2x \)

4. How long will it take Beth to mail 3 packages? Use the rule you wrote to solve the problem.
   - \( 20 + 2(3) = 26 \text{ min} \)

Evaluate each expression if \( a = 6 \) and \( b = 10 \).

9. \( b - a \)
   - 4

10. \( b \times a \)
    - 60
Lesson 1–6

**Problem-Solving Practice**

**Algebra: Functions**

1. **DRAGONS** The Luck Dragons that live in the Enchanted Forest weigh 4x pounds when they are x years old. Write a function table that can be used to find the weights of 6-year old, 8-year old, and 10-year old Luck Dragons.

<table>
<thead>
<tr>
<th>x</th>
<th>4x</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>10</td>
<td>40</td>
</tr>
</tbody>
</table>

2. **ROLLER COASTER** Twelve people are able to ride the Serpent of Fire roller coaster at one time. Write a function table that shows the total number of people that have been on the roller coaster after 1, 2, 3, and 4 rides if the roller coaster is full each time.

<table>
<thead>
<tr>
<th>x</th>
<th>12x</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>24</td>
</tr>
<tr>
<td>3</td>
<td>36</td>
</tr>
<tr>
<td>4</td>
<td>48</td>
</tr>
</tbody>
</table>

3. **MOVIES** At the local movie theater it costs $10 for 2 students to see a movie. It costs $15 for 3 students, and it costs $20 for 4 students. Let the number of students be the input. What is the function rule that relates the number of students to the cost of tickets?

   \[ 5x \]

4. **HOMEWORK** At Elmwood Middle School, sixth graders spend 1 hour every night doing homework. Seventh graders spend 2 hours, and eighth graders spend 3 hours. Let the students’ grade be the input. What is the function rule between the students’ grade and the amount of time the students spend on homework every night?

   \[ x - 5 \]

5. **BEADS** A bead shop sells wooden beads for $3 each and glass beads for $7 each. Write a function rule to represent the total selling price of wooden (w) and glass (g) beads.

   \[ 3w + 7g \]

6. Use the function rule in Exercise 5 to find the selling price of 20 wooden beads and 4 glass beads.

   \$88\]

**Enrich**

**Algebra: Functions**

Function rules are often used to describe geometric patterns. In the pattern at the right, for example, do you see this relationship?

1st figure: \( 3 \times 1 = 3 \) dots
2nd figure: \( 3 \times 2 = 6 \) dots
3rd figure: \( 3 \times 3 = 9 \) dots
4th figure: \( 3 \times 4 = 12 \) dots

So the \( \text{"nth" figure} \) in this pattern would have \( 3 \times n \), or \( 3n \), dots. A function rule that describes the pattern is \( 3n \).

Write a function rule to describe each dot pattern.

1. \[ 4n \]

2. \[ n + 3 \]

3. \[ 3n - 1 \]

4. \[ n^2 \]

5. \[ n^2 + 1 \]

6. \[ n^2 + n \text{ or} \frac{n(n + 1)}{} \]
Guess and Check

During summer vacation, Sanjay buys keychains and postcards for his friends at home. A keychain costs $3, and a postcard costs $1. Sanjay buys gifts for 8 friends and spends $12. How many keychains and postcards did he buy?

Step 1 Understand
Be sure you understand the problem. Read carefully. Identify what you need to do.
What facts do you know?

- A keychain costs $3.
- A postcard costs $1.
- Sanjay buys 8 gifts.
- He spends $12.

What do you need to find?

- The number of keychains and postcards he bought.

Step 2 Plan
Make a plan.
Choose a strategy. You can solve the problem by making a guess. Then check the guess.
If it is not the correct answer, adjust the guess and check again until you find the correct answer.

Step 3 Solve
Follow your plan.
Make a guess about the number of keychains and the number of postcards. Suppose you guess 4 keychains and 4 postcards.
Check the amounts for the guess.
Keychains: $4 \times 3 = 12$
Postcards: $4 \times 1 = 4$
Total Cost: $12 + 4 = 16$

Does the guess check with the total that Sanjay spent? No.

Should you adjust the number of keychains up or down? Explain.
Adjust the number of keychains down because the total is too much.

Adjust your guess. Check your guess. Did the guess check? Answers may vary.
If your guess did not check, adjust it again. How many keychains did Sanjay buy? 2 keychains.
How many postcards did Sanjay buy? 6 postcards.

Step 4 Check
Look back. Did you answer the question? Is the solution reasonable? Reread the problem.
Have you answered the question? Yes. Answers may vary.
How can you check your answer? Possible answer: check the total cost for the keychains and postcards.

Practice
1. Nelson has 7 paper bills. All the bills are $1 and $5. He has a total of $15. How many $1 bills and how many $5 bills does he have?

   - five $1 bills and two $5 bills

2. The library charges 25¢ a day for overdue videos and 5¢ a day for overdue books. Emily returns a video and a book that were due on the same day and pays a total of 90¢ in late fees. How many days late were her items?

   - 3 days
Answers (Lessons 1–7)

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Jamal is thinking of four different numbers from 1 through 9 whose sum is 21. Find the numbers.</td>
<td>Sample answer: 2, 3, 7, 9</td>
</tr>
<tr>
<td>2. Mr. Thompson took his 5 children to the amusement park. Tickets for children 12 and older cost $3. Tickets for children under 12 cost $2. He spends a total of $14. How many of his children are 12 and older?</td>
<td>4</td>
</tr>
<tr>
<td>3. A cabin has room for 7 campers and 2 counselors. How many cabins are needed for a total of 49 campers and 14 counselors?</td>
<td>7</td>
</tr>
</tbody>
</table>

**Spiral Review**

Solve. (Lesson 1–6)

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. El Capitan, in California, is 3,600 feet high. Mt. Morgan is 13,748 feet, Arrowhead Peak is 4,237 feet, and Hawkins Peak is 10,024 feet. List the mountains by height from greatest to least.</td>
<td>Mt. Morgan; Hawkins Peak; Arrowhead Peak; El Capitan</td>
</tr>
<tr>
<td>5. A department store is deducting $10 off the total purchase for shoppers from 6 a.m. to 7 a.m. Define a variable. Write a function rule that relates the final cost to the total purchase amount.</td>
<td>Let ( p ) represent the total purchase amount; ( p - 10 )</td>
</tr>
<tr>
<td>6. Sonia is buying peanuts for a party. She can buy them in bulk for $4 a pound. Define a variable. Write a function rule that relates the total cost of the peanuts to the amount she buys.</td>
<td>Let ( p ) represent the number of pounds; ( 4p )</td>
</tr>
</tbody>
</table>
Check whether each answer is reasonable. Explain.

1. Margo’s fastest rate in her hot-air balloon was 30 miles per hour. She calculates that if she can fly at the same rate, she can travel 145 miles in about 5 hours. Is her answer reasonable? Explain.

Yes. Her speed would need to be 29 mph, which is less than 30.

2. Noboru is entering a hot-air balloon race. The race covers 210 miles. He wants to finish the race in 8 hours. He calculates that he must travel at an average rate of 40 miles per hour. Is his answer reasonable? Explain.

No. He only needs to go about 26 mph.

3. Olga must meet her brother at the end of the balloon race. The race is 120 miles and the record for the race is 23 miles per hour. She decides that she should be at the finish line 12 hours after the race begins. Is her answer reasonable? Explain.

No, the race will be over in less than 12 hours.

4. Adam is starting a business to take people on hot-air balloon rides. He knows that to carry 2 people, the balloon must have a volume of about 60,000 cubic feet. For his business, he wants a balloon that will carry 4 people. He calculates that the balloon must have a volume of 120,000 cubic feet. Is his answer reasonable? Explain.

Yes, he doubled the people, so he doubled the cubic feet.

5. Marta’s family is planning a trip through the mountains. They expect to travel 210 miles in about 5 $\frac{1}{4}$ hours on the mountain roads. Marta calculates that they will be traveling about 100 miles per hour. Is her answer reasonable? Explain.

No, they will travel about 40 mph.
Name ___________________________ Date ___________________________  

Skills Practice 

Algebra: Equations

Identify the solution of each equation from the list given.

1. \(3 + f = 12; 7, 8, 9\)  
   \(f = 9\)

2. \(6g = 36; 6, 7, 8\)  
   \(g = 6\)

3. \(8 - c = 2; 5, 6, 7\)  
   \(c = 6\)

4. \(3b = 30; 10, 11, 12\)  
   \(b = 10\)

5. \(18 + x = 3; 4, 5, 6\)  
   \(x = 6\)

6. \(12 + z = 29; 15, 16, 17\)  
   \(z = 17\)

Solve each equation mentally. Check your answer.

7. \(13 - g = 12\)  
   \(g = 1\)

8. \(14h = 28\)  
   \(h = 2\)

9. \(21 - v = 16\)  
   \(v = 5\)

10. \(88 \div p = 11\)  
    \(p = 8\)

11. \(9k = 36\)  
    \(k = 4\)

12. \(19 - e = 7\)  
    \(e = 12\)

13. \(123 - r = 88\)  
    \(r = 35\)

14. \(78 + s = 133\)  
    \(s = 55\)

15. \(8d = 72\)  
    \(d = 9\)

16. \(125 \div p = 25\)  
    \(p = 5\)

17. \(14u = 70\)  
    \(u = 5\)

18. \(33 \div d = 11\)  
    \(d = 3\)

19. The high temperature one day in San Diego was 80°F. That temperature was 14°F greater than the low temperature. Solve the equation \(t + 14 = 80\) to find \(t\), the low temperature.

   \(t = 66°F\)

20. Tanya started with \(d\) dollars. After she spent $19, she had $12 left. Solve the equation \(d - 19 = 12\) to find \(d\), the amount of money Tanya started with.

   \(d = $31\)

21. The Martínez family paid $40 for 5 movie passes. Solve the equation \(5c = 40\) to find the cost in dollars, \(c\), of each movie pass.

   \(c = $8\)

22. Three friends split the cost of a gift equally. Each paid $4. Solve \(t \div 3 = 4\) to find \(t\), the cost in dollars of the gift.

   \(t = $12\)

Homework Practice 

Algebra: Equations

Identify the solution of each equation from the list given.

1. \(m - 7 = 23; 29, 30, 31\)  
   \(m = 30\)

2. \(4p = 28; 6, 7, 8\)  
   \(p = 7\)

3. \(8 + n = 32; 23, 24, 25\)  
   \(n = 24\)

4. \(48 \div w = 8; 4, 5, 6\)  
   \(w = 6\)

Solve each equation mentally.

5. \(4 + x = 12\)  
   \(x = 8\)

6. \(16 - p = 3\)  
   \(p = 13\)

7. \(15 \div b = 3\)  
   \(b = 5\)

8. \(8 = 4f\)  
   \(f = 2\)

9. \(10k = 50\)  
   \(k = 5\)

10. \(64 \div g = 8\)  
    \(g = 8\)

11. \(j - 14 = 6\)  
    \(j = 20\)

12. \(45 = 24\)  
    \(s = 6\)

13. \(18 \div t = 3\)  
    \(t = 6\)

Spiral Review

Copy and complete each function table. (Lesson 1–6)

14. \[\begin{array}{c|c|c}
\text{Input (x)} & x + 2 & \text{Output} \\
\hline
7 & 9 \\
9 & 11 \\
11 & 13 \\
\end{array}\]

15. \[\begin{array}{c|c|c}
\text{Input (x)} & x - 4 & \text{Output} \\
\hline
4 & 0 \\
7 & 3 \\
10 & 6 \\
\end{array}\]

Find the rule for each function table.

16. \[\begin{array}{c|c}
\text{Input (x)} & \text{Output} \\
\hline
4 & 7 \\
6 & 9 \\
9 & 12 \\
\end{array}\]

Output = \((x + 3)\)

17. \[\begin{array}{c|c}
\text{Input (x)} & \text{Output} \\
\hline
25 & 13 \\
30 & 8 \\
13 & 1 \\
\end{array}\]

Output = \((x - 12)\)
1. The equation $5 + a = 12$, so $a = 7$.

2. The equation $7 + y = 13$, so $y = 6$.

3. The equation $m - 4 = 8$, so $m = 12$.

4. The equation $n - 12 = 4$, so $n = 16$.

5. The equation $p + q + r = 10$, so $r = 250$.

6. The equation $xy - z = 40$, so $z = 2$.

For Exercises 1–3, use the table that gives the average lengths of several unusual insects in centimeters.

<table>
<thead>
<tr>
<th>Insect</th>
<th>Length (cm)</th>
<th>Insect</th>
<th>Length (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking stick</td>
<td>15</td>
<td>Giant water bug</td>
<td>6</td>
</tr>
<tr>
<td>Goliath beetle</td>
<td>13</td>
<td>Katydid</td>
<td>3</td>
</tr>
<tr>
<td>Giant water bug</td>
<td>10</td>
<td>Silkworm moth</td>
<td>4</td>
</tr>
<tr>
<td>Harlequin beetle</td>
<td>7</td>
<td>Flower mantis</td>
<td>3</td>
</tr>
</tbody>
</table>

1. The equation $15 - x = 12$ gives the difference in length between a walking stick and one other insect. If $x$ is the other insect, which insect is it?

   **flower mantis**

2. The equation $7 + y = 13$ gives the length of a Harlequin beetle and one other insect. If $y$ is the other insect, which insect makes the equation a true sentence?

   **giant water bug**

3. Bradley found a silkworm moth that was 2 centimeters longer than average. The equation $m - 4 = 8$ represents this situation. Find the length of the silkworm moth that Bradley found.

   6 cm

4. A Monarch butterfly flies about 80 miles per day. So far it has flown 60 miles. In the equation $80 - m = 60$, $m$ represents the number of miles it has yet to fly that day. Find the solution to the equation.

   20 mi

5. The nymphs of some cicadas can live among tree roots for 17 years before they develop into adults. One nymph developed into an adult after only 13 years. The equation $17 - x = 13$ describes the number of years less than 17 that it lived as a nymph. Find the value of $x$ in the equation to tell how many years less than 17 years it lived as a nymph.

   4 years less

6. A harlequin beetle lays eggs in trees. She can lay up to 20 eggs over 3 days. After the first day, the beetle has laid 9 eggs. If she lays 20 eggs in all, how many eggs will she lay during the second and third days?

   **11 eggs**

In an equation chain, you use the solution of one equation to help you find the solution of the next equation in the chain. The last equation in the chain is used to check that you have solved the entire chain correctly.

Complete each equation chain.

1. $5 + a = 12$, so $a = 7$.

2. $9f = 36$, so $f = 4$.

3. $m - 4 = 8$, so $m = 12$.

4. $v = 12$, so $v = 12$.

5. $a = b + 4$, so $a = b + 4$; $3b = c$, so $3b = c$; $c + d = 6$, so $c + d = 6$; $a - d = 7$.
Answers (Lesson 1–9)

Reteach

Algebra: Area Formulas

Area is the number of square units needed to cover the inside of a region or plane figure. To find the area of a rectangle or square, you can multiply its length times its width. This can be shown by a formula.

Find the area of the rectangle.
Use the formula \( A = lw \), where \( A \) = area, \( l \) = length, and \( w \) = width.

1. \( A = 4 \times 13 \)
   \( A = 52 \) square inches

2. \( A = 3 \times 3 \)
   \( A = 9 \) square meters

Find the area of each rectangle.

1. \( A = \frac{7 \times 5}{10} \)
   \( A = 35 \) square inches

2. \( A = \frac{5 \times 5}{25} \)
   \( A = 25 \) square feet

3. \( A = \frac{250 \text{ in}^2}{48} \)

Find each missing measurement.

7. \( z = \frac{4 \text{ cm}}{} \)
   \( A = 48 \) square centimeters

8. \( b = \frac{4 \text{ ft}}{} \)
   \( A = 16 \) square feet

9. \( p = \frac{18 \text{ in.}}{} \)
   \( A = 72 \) square inches

Solve.

10. A family room is 24 feet long and 18 feet wide. What is the area of the family room?
   \( A = 432 \text{ ft}^2 \)

11. A square carpet is 3 meters on each side. What area will the carpet cover?
   \( A = 9 \text{ m}^2 \)
1. Find the area of a square with a side length of 14 inches.
   196 square inches

2. Find the area of each rectangle.
   28 square inches
   24 square ft

3. Find the area of the following squares and rectangles.
   4. a square with sides of 5 ft
      25 square ft
   5. a rectangle with a length of 13 inches and a width of 3 inches
      39 square inches
   6. a square with sides of 8 ft
      64 square ft
   7. a rectangle with a length of 14 inches and a width of 4 inches
      56 square inches
   8. a square with sides measuring 9 ft
      81 square ft

5AF1.2, 5MG1.4
1–9
Problem-Solving Practice
Algebra: Area Formulas

Solve.
1. Felicia wants to clean the rug in her room. She buys carpet cleaner that will clean 40 square feet. Find the area of her rug. Will she have enough carpet cleaner?
   6 ft
   6 ft
   36 ft²; yes

2. Lori wants to buy a flower mat that has seeds and fertilizer in it for her garden. She made a diagram of her garden. What is the area of the flower mat that she needs?
   5 ft
   9 ft
   39 square inches

3. The playing area of a college's football field measures 100 yd by 53 yd. How much area does the football team have to play on?
   5,300 yd²

4. Mr. and Mrs. Wilkes want to make a patio in their yard. The patio will be 15 ft long and 10 ft wide. Each patio tile covers 1 square ft and costs $2. How much will they spend on patio tiles?
   $300

5. You have 100 ft of fencing to make a pen for your dog. You want your dog to have the biggest play area possible. What shape would you make the pen?
   a square measuring 25 ft on each side

6. The Carsons are putting a rectangular swimming pool in their backyard. The pool will measure 20 ft by 12 ft. They plan to have a cement walkway around the pool, which should measure 4 ft wide. What is the area of the walkway?
   320 ft²
Algebra: The Distributive Property

You can use place-value models to show the Distributive Property.

Multiply $3 \times 26$.

Find each product. You can draw place-value models to help you multiply.

1. $5 \times 93 = 5 \times (30 + 9)$
   
   $(5\times 30) + (5 \times 9)$
   
   $= 150 + 45$
   
   $= 195$

2. $8 \times 46 = 8 \times (40 + 6)$
   
   $(8 \times 40) + (8 \times 6)$
   
   $= 320 + 48$
   
   $= 368$

3. $3 \times 54 = 3 \times (50 + 4)$
   
   $(3 \times 50) + (3 \times 4)$
   
   $= 150 + 12$
   
   $= 162$

4. $6 \times 64 = 6 \times (60 + 4)$
   
   $(6 \times 60) + (6 \times 4)$
   
   $= 360 + 24$
   
   $= 384$

5. $2 \times 48 = 96$

6. $4 \times 72 = 288$

7. $9 \times 27 = 243$

8. $7 \times 45 = 315$
Rewrite each expression using the Distributive Property.

9. \(7 \times 19\) = 133
10. \(6 \times 22\) = 132
11. \(8 \times 58\) = 464
12. \(5 \times 13\) = 65
13. \(4 \times 76\) = 304
14. \(2 \times 27\) = 54
15. \(9 \times 56\) = 504
16. \(3 \times 71\) = 213
17. \(7 \times 33\) = 231
18. \(8 \times 34\) = 272
19. \(4 \times 83\) = 332
20. \(3 \times 27\) = 81
21. \(6 \times 88\) = 528
22. \(9 \times 98\) = 882
23. \(5 \times 65\) = 325
24. \(5 \times 36\) = 180
25. \(3 \times 98\) = 294
26. \(2 \times 97\) = 194

Find each product mentally. Use the Distributive Property.

1. \(3 \times 13\) = \((3 \times 10) + (3 \times 3)\)
2. \(8 \times 68\) = \((8 \times 60) + (8 \times 8)\)
3. \(7 \times 32\) = \((7 \times 30) + (7 \times 2)\)
4. \(9 \times 35\) = \((9 \times 30) + (9 \times 5)\)
5. \(8 \times 17\) = \((8 \times 10) + (8 \times 7)\)
6. \(4 \times 71\) = \((4 \times 70) + (4 \times 1)\)
7. \(5 \times 25\) = \((5 \times 20) + (5 \times 5)\)
8. \(6 \times 84\) = \((6 \times 80) + (6 \times 4)\)

Rewrite each expression using the Distributive Property.

7. \(5 \times (14 - 3)\) = \(5 \times 11\)
8. \(6 \times (9 + 2)\) = \((6 \times 9) + (6 \times 2)\)
9. \(7 \times (2 - 1)\) = \((7 \times 2) - (7 \times 1)\)
10. \(9 \times (3 + 4)\) = \((9 \times 3) + (9 \times 4)\)

Rewrite each expression using the Distributive Property. Then evaluate.

11. \(4 \times (8 + 2)\) = \(4 \times 10\) = 40
12. \(8 \times (9 + 3)\) = \((8 \times 9) + (8 \times 3)\) = 96
13. \(3 \times (12 + 4)\) = \((3 \times 12) + (3 \times 4)\) = 48

Solve each equation mentally.

15. \(a + 13 = 18\) \(a = 5\)
16. \(43 - b = 24\) \(b = 19\)
17. \(49 = 7x\) \(x = 7\)
18. \(39 - k = 12\) \(k = 27\)

Spiral Review

14. Find the area of a square whose sides are 19 inches long. \(361\) square inches
1. Ray needs to multiply $5 \times 26$ to find the area of a rectangle. Fill in the blanks using the Distributive Property.

$$5 \times 26 = 5 \times (\underline{20} + 6)$$

$$= (5 \times \underline{20}) + (5 \times 6)$$

$$= 100 + 30$$

$$= 130$$

2. To multiply $8 \times 14$, Jana used the distributive property. Fill in the blanks to show what she did:

$$8 \times 14 = 8 \times (10 + \underline{\quad})$$

$$= (8 \times \underline{10}) + (8 \times \underline{\quad})$$

$$= 80 + 32$$

$$= 112$$

3. Four friends went out to dinner. To cover dinner, tax, and tip, each person paid $18. How much did they pay all together?

$\boxed{72}$

4. The fifth-grade classes at Wilcox Elementary School are reading books during the summer. There are 76 students, and each is supposed to read 4 books. How many books will the students read in all?

$\boxed{304}$ books

5. The four Boy Scout troops in Carver City sold 1,238 buckets of popcorn to raise money. If each bucket costs $4, how much money did the troops raise?

$\boxed{4,952}$

6. James builds and sells furniture. Last month he sold 9 bookcases and 6 coffee tables. If each bookcase costs $310, and each coffee table costs $275, how much did James make?

$\boxed{4,440}$

Add: $4.7 + 5.6 = \boxed{10.3}$

Think: Break the numbers into whole numbers and decimals. Group whole numbers with each other. Group decimals with each other.

Identify the addition property used to rewrite each problem.

1. $5 + 0 = \boxed{5}$ Identity Property
2. $26 + (4 + 19) = (26 + 4) + 19$ Associative Property
3. $57 + 43 = 43 + 57$ Commutative Property

Add or subtract. Use properties of addition.

4. $3.8 + 5.1 = \boxed{8.9}$
5. $12.3 + 4.8 = \boxed{17.1}$
6. $4.6 + 6.6 = \boxed{11.2}$
7. $7.2 + 20.7 = \boxed{27.9}$
8. $42.56 + 14.03 = \boxed{56.59}$
9. $27.83 + 7.92 = \boxed{35.75}$
Vocabulary Test

Using the word bank below, complete each sentence by writing the correct word or words on the line provided.

area  evaluate  equation
algebra  function  variable
prime numbers  algebraic expressions

1. Every composite number can be expressed as a product of ______

2. When you find the value of an algebraic expression by replacing variables with numbers, you ______ the expression.

3. A ______ is a relationship that assigns exactly one output value to one input value.

4. A letter or symbol used to represent an unknown quantity is a ______.

5. ______ is a language of symbols.

6. ______ is the number of square units needed to cover the inside of a region or plane figure.

7. ______ are combinations of variables, numbers, and at least one operation.

8. $2y + x = 7$ is an example of an ______.

prime numbers

1. ______

2. ______

3. ______

4. ______

5. ______

6. ______

7. ______

8. ______

Oral Assessment

Read each question aloud to the student. Then write the student’s answers on the lines below the question.

1. Show the student this diagram.

   5 ft
   4 ft

2. What is the length of this side?

   ______

   5 ft

3. What is the length of this side?

   ______

   4 ft

4. Which side is longer?

   ______

   5 ft

5. Tell how you got your answer.

   ______

   5 ft > 4 ft

6. To find the area of the rectangle, what would you do?

   Multiply the length and the width.
Oral Assessment (continued)

7. What happens when you multiply the two sides?
   
   You find the area, 20 square feet.

8. How did you get your answer?
   
   \[5 \times 4 = 20\]

9. Now you draw a rectangle and label the sides.
   
   Answers will vary.

10. How would you get the area of the rectangle you drew?
    
    Multiply length times width.

11. What is the area of the rectangle you drew?
    
    Answers will vary.
### Chapter 1 Assessment Answer Key

#### Inventory/Placement Test

**Page 58**

1. 83,308; 83,083; 38,830; 38,803
2. $338.84
3. 4 dimes
4. \( y = x - 2 \)
5. August
6. 99
7. 24 and 25
8. 13
9. 32
10. 36,159
11. 121 R3
12. 26
13. equilateral and acute
14. 12 ft
15. (4, 7)
16. 5
17. \( 5 \frac{1}{2} \)
18. 0.07
19. 39.27
20. \( \frac{1}{4} \)

#### Chapter Diagnostic Assessment

**Page 59**

1. 171
2. 113
3. 110
4. 191
5. 107
6. 44
7. 21
8. 8
9. 86
10. 47
11. 2,144
12. 1,584
13. 760
14. 1,408
15. 780
16. 8
17. 4
18. 24
19. 19
20. $15.94

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### Chapter 1 Assessment Answer Key

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<td>Page 64</td>
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</tbody>
</table>

1. **composite**
2. **prime**
3. $3^4$
4. $3^2 \times 2^2$
5. $5^4; 625$
6. 14
7. 37

**Output:** 0; 2; 4

8. 196 square inches

9. $(3 \times 20) - (3 \times 4); 48$

10. $(3 \times 15) - (3 \times 12); 9$ cookies

1. **prime**
2. **composite**
3. **prime**
4. *composite*
5. $4^3$
6. $5^5$
7. 22
8. 199
9. 13

3. $\$32$
4. 9
5. 3
6. 7
7. 17, 9, 15

8. 5, 14, 3
9. 6 miles
Chapter 1 Assessment Answer Key

Quiz 3 (1–7 through 1–10)

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1. 2 and 13 when it is easy to check the numbers in the original problem
2. 
3. 8
4. 12
5. 30
6. 15
7. 16 square feet
8. \( A = s^2 \)
9. 48 square feet
   \[ 340; 5(70 - 2) = 350 - 10 \]
10. 81; 3(30 - 3) = 90 - 9

Mid-Chapter Review
(1–1 through 1–3)

Page 66

1. A
2. J
3. A
4. G
5. 729
6. 44
7. 8
8. 105
9. prime
10. \( 7^2 \)
11. 31
   A number is prime when it has only two factors, 1 and the number itself.
12. 

Chapter Test, Form 1

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1. D
2. F
3. B
4. G
5. C
6. H
7. B
8. J
9. C

(continued on the next page)
## Chapter 1 Assessment Answer Key

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<td></td>
<td>Page 75</td>
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</tbody>
</table>

| 1. C                  |
| 2. H                  |
| 3. B                  |
| 4. G                  |
| 5. C                  |
| 6. G                  |
| 7. B                  |
| 8. J                  |
| 9. C                  |
| 10. J                 |
| 11. D                 |
| 12. F                 |
| 13. A                 |
| 14. G                 |
| 15. B                 |
| 16. H                 |
Chapter 1 Assessment Answer Key

Chapter Test, Form 2B
Page 76

1. A

2. G

3. B

4. G

5. C

6. G

7. B

8. F

9. B

10. F

11. C

12. G

13. A

14. G

15. C

16. G

17. C

Chapter Test, Form 2B
Page 77

1. 2, 3, 5, etc.

2. 2

3. 2

4. 6

5. 9

6. 9

7. 4

8. 4

9. 64

10. 512

11. 33

12. 36

13. 13

14. 2

15. 105

16. 24 yd²

17. C

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answers will vary, but may include
1. 2, 3, 5, etc.

2. 4, 10, 25, etc.

3. 2

4. 9

5. 64

6. 512

7. 33

8. 36

9. 22

10. 13

45 + c or 
c + 45

$105

24 yd²

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<th>Chapter Test, Form 2D</th>
</tr>
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<tbody>
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<td>Page 80</td>
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</tbody>
</table>

14. \(49 \text{ ft}^2\)

15. \(15 \text{ ft}^2\)

16. \(\frac{2}{5}\)

17. \(8, 16, 24, \text{ and } 32\)

18. \(7, 10, 13\)

19. \(0, 7, 15\)

20. \(200 \text{ tickets}\)

15. \(6 \text{ ft}^2\)

16. \(\frac{6}{8, 16, 24, \text{ and } 32}\)

17. \(\frac{0, 7, 15}{5, 6, 10}\)

18. \(200 \text{ tickets}\)

14. \(36 \text{ ft}^2\)
Chapter 1 Assessment Answer Key

Chapter Test, Form 3
Page 82

sample answers: 2, 3, 5, etc.

1. sample answers:

2. 4, 10, 25, etc.

3. $2^6$

4. $3^5$

5. 16

6. 729

7. 56

8. 36

9. 22

10. 13

$p + 23$ or $23 + p$

11. $p + 23$ or $23 + p$

12. $153$

13. $24\,yd^2$

14. $36\,ft^2$

15. $12\,ft^2$

16. $8$

$8, 16, 24,$

and $32$

17. $4, 7, 9$

18. $0, 7, 15$

19. $200$ tickets

20. $200$ tickets

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### Chapter 1 Assessment Answer Key

Page 84, Extended-Response Test  
Scoring Rubric

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<th>Level</th>
<th>Specific Criteria</th>
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</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>
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(continued on the next page)
Chapter 1 Assessment Answer Key

Page 84, Extended-Response Test
Sample Answers

In addition to the scoring rubric found on page A36, the following sample answers may be used as guidance in evaluating open-ended assessment items.

1. Understand. Be sure you understand the problem. What do you know? What do you need to find out. Plan: Plan a strategy for solving the problem. Solve: Use your plan to solve the problem. Check: Does the answer make sense?

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

3. Use a factor tree to find two factors of a number. Then find factors of these factors and the following factors until all the factors are prime.
Chapter 1 Assessment Answer Key
Cumulative Standardized Test Practice

1. A
2. H
3. D
4. G
5. D
6. F
7. C
8. H
9. C
10. H
11. $0.20
   Along the 9-foot wall
12. __________
13. $3.50

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