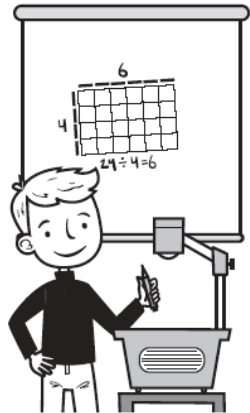


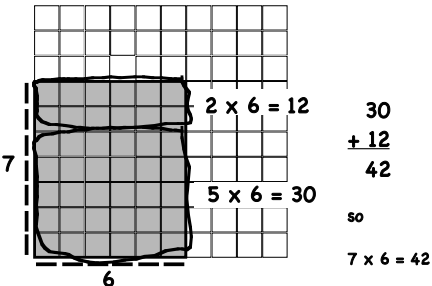
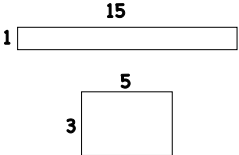
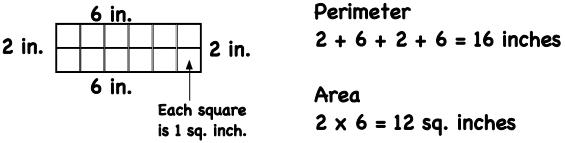
# Grade 4, Unit One: Multiplication & Division Models

In this unit your child will:

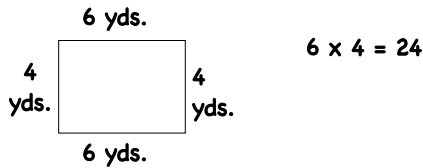
- use rectangles to think about multiplication and division
- use strategies to recall basic multiplication facts
- find all the factors of a number and identify it as prime or composite
- find the area and perimeter of rectangles
- solve word problems that involve multiplication and division



Your child will learn and practice these skills by solving problems like those shown below. Keep this sheet for reference when you're helping with homework.

| Problem  | Comments  |
|--|---|
| <p>Fill in the rectangular array and find its area.</p>    | <p>Students use arrays to think about multiplication. This visual model helps them understand and use the following ideas to solve problems and master the basic facts:</p> <ul style="list-style-type: none"> <li>• the commutative property (<math>7 \times 6</math> is the same as <math>6 \times 7</math>)</li> <li>• partial products (<math>7 \times 6 = 5 \times 6 + 2 \times 6</math>)</li> <li>• the relationship between multiplication and division</li> </ul> |
| <p>Sketch rectangles to show all the factors of 15, and explain whether 15 is prime or composite.</p>  <p><b>15 is composite because it has four factors: 1, 15, 3, and 5. A prime number only has two factors: 1 and itself.</b></p> | <p>Students use arrays to show pairs of numbers that multiply to make a target number (15 in this example). This helps them see all the factors of a number. If they can make only one rectangle for a number (e.g., <math>1 \times 7</math>), that number is prime. If they can make more than one rectangle, as in this example, the number is composite.</p>   |
| <p>Sketch a rectangle with a perimeter of 16 inches. What is its area?</p>    | <p>Students find the perimeter and area of different rectangles. They must remember to <i>multiply</i> the two sides of the rectangle to find the area and <i>add</i> all the sides to find the perimeter.</p>  |

Imani's class planted a rectangular garden at their school. The total area of the garden was 24 square yards. One side was 6 yards long. Make a quick sketch of the garden and label the lengths of all four sides.



Students solve story problems using multiplication and division. Some of those problems include area and perimeter in different situations.

## Frequently Asked Questions about Unit One

### Q: When will my child master multiplication and division facts?

**A:** Ideally, students will master multiplication facts to  $10 \times 10$  (as well as the associated division facts) by spring break. They will practice these facts (as well as facts to  $12 \times 12$ ) through the end of this school year. Even when students have mastered the facts, they need to practice them regularly, and some students will need all of this practice to master the facts by the end of the year.

### Q: When will my child learn to multiply larger numbers?

**A:** The next unit focuses on multiplying 2-digit numbers by 1- and 2-digit numbers, and students will practice these skills throughout the year in homework and in math class. Teachers can use supplemental materials provided with the curriculum to teach the standard algorithm (see the example at right) and 2-digit-by-3-digit multiplication if mastery of these skills is expected in your state or district.

| The Standard Algorithm  |
|---|
| $\begin{array}{r} 1 \\ 15 \\ \times 13 \\ \hline 45 \\ + 150 \\ \hline 195 \end{array}$ |

### Q: Why is it useful for children to learn multiplication strategies and draw pictures of rectangles to think about multiplication?

**A:** We expect students to recall basic multiplication and division facts from memory. However, we know that students forget these facts sometimes and that strategies allow them to quickly compute the answers when needed. Some strategies also allow students to calculate mentally with larger numbers, as in the examples below. We do not expect students to use pictures of rectangles to calculate forever: the pictures illustrate relationships among numbers and show why certain procedures work. The understandings that the pictures help to develop are the foundations of students' computational skills.

| To multiply by 5, first multiply by 10 and then halve the result. |  | To multiply by 9, first multiply by 10 and then subtract a group. |  |
|---|--|---|--|
| Basic Fact Example  | Larger Number Example  | Basic Fact Example  | Larger Number Example  |
| $5 \times 8$  | $5 \times 84$  | $9 \times 6$  | $9 \times 47$  |
| $10 \times 8 = 80$<br>Half of 80 is 40<br>so $5 \times 8 = 40$    | $10 \times 84 = 840$<br>Half of 840 is 420<br>so $5 \times 84 = 420$ | $10 \times 6 = 60$<br>$60 - 6 = 54$<br>so $9 \times 6 = 54$       | $10 \times 47 = 470$<br>$470 - 47 = 423$<br>so $9 \times 47 = 423$ |

**Note** Midway through this unit, you will receive a handbook of strategies like these for all facts through  $10 \times 10$ .