

## Grade 4, Unit Two: Place Value & Multiplication with Larger Numbers

In this unit your child will:

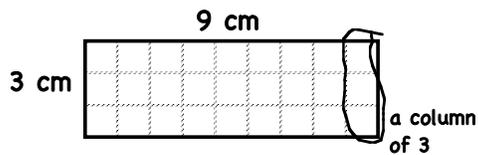
- multiply 2-digit numbers by 1- and 2-digit numbers, as well as 3-digit numbers by 1-digit numbers
- multiply any number by 10 or 100
- write and solve story problems involving multiplication of up to 2-digit by 2-digit numbers
- take measurements in centimeters
- continue mastering basic multiplication and division facts



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>Multiply these two numbers. Show your work using numbers, pictures, and/or words.</p> <p style="text-align: center;"><math>15 \times 13</math></p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px auto;"> <thead> <tr> <th style="width: 50%; text-align: center;">One Way</th> <th style="width: 50%; text-align: center;">Another Way</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;"> </td> <td style="text-align: center; padding: 5px;"> </td> </tr> </tbody> </table>	One Way	Another Way			<p>Students use the rectangular array model to multiply 2-digit numbers. The model helps them break the numbers into manageable parts to multiply them. Eventually, students will multiply with numbers alone, but the pictures help them see why certain procedures work. Using the pictures also helps them develop a strong understanding of the relationships among numbers. For example, the strategy labeled <i>Another Way</i> at left helps show why the standard algorithm (a very good way to solve problems like these) works:</p> $  \begin{array}{r}  15 \\  \times 13 \\  \hline  45 \\  + 150 \\  \hline  195  \end{array}  $
One Way	Another Way				
<p>Esteban is on the swim team. Yesterday he swam 12 laps. Each lap was 25 meters long. How many meters did he swim altogether?</p> <p><b>12 laps = 3 x 4 laps</b>  <b>25 meters/lap x 4 laps = 100 meters</b>  <b>3 x 100 meters = 300 meters</b>  <b>Esteban swam 300 meters.</b></p>	<p>Students could solve this problem by drawing an array like those above or by using the standard algorithm. However, strategies like the one shown at left can be more efficient and may be performed mentally. Students with strong computational skills and a good sense of number can choose the most efficient way to solve a particular problem.</p>				

Measure the rectangle below and find its area.



**There are 9 columns of 3 square centimeters, so:  
 $9 \text{ cm} \times 3 \text{ cm} = 27 \text{ cm}^2$**

Students use multiplication to find the areas of rectangles. Multiplying one side by the other produces the correct answer ( $3 \text{ cm} \times 9 \text{ cm} = 27 \text{ cm}^2$ ). Students can sketch the square centimeters on the rectangle or use words to explain that the area is the number of square centimeters covered by the rectangle.

## Frequently Asked Questions about Unit Two

### **Q: Why do many of the problems in this unit involve money?**

**A:** It's useful to be able to calculate with money amounts in daily life, especially if you can do it mentally. Becoming very familiar with money amounts—such as 25, 50, and 75—helps students develop efficient ways of calculating with certain number combinations. For an example, see the second problem on the previous page: the problem is about swimming laps, but thinking about 4 groups of 25 (100) helps students solve the problem quickly and efficiently. When they are used to thinking about money, many students can complete calculations like these mentally.

### **Q: Why aren't students taught the standard algorithm for multiplying larger numbers right away? Why do they use pictures and other methods instead?**

**A:** The standard algorithm (see comments for the first problem on the previous page for an example) is a reliable, efficient, and elegant way to multiply multi-digit numbers. It also works every time, no matter what pair of numbers you're multiplying, as long as it is performed correctly. Problems arise when students attempt to use the algorithm without having mastered the basic multiplication facts, when they don't understand why the algorithm works, when they forget the steps, and when they can carry out the steps yet are unable to use their estimation skills to judge whether their final answer is reasonable.

Using pictures (as in the first example on the previous page) helps students see why different strategies, including the algorithm, work. The pictures also show why multiplying two 2-digit numbers yields an answer that is so much bigger than the two original numbers. This understanding, along with mastery of basic facts and a good sense of place value, ensures that students carry out the algorithm accurately and with understanding.

### **Q: When will students learn the standard algorithm for multiplying larger numbers?**

**A:** The standard algorithm is taught and practiced in Grade 5 *Bridges*. Fourth grade teachers can use supplemental materials provided with the curriculum to teach the standard algorithm and 2-digit-by-3-digit multiplication if your state or district expects fourth graders to master these skills.