Grade 5, Unit Two: Seeing & Understanding
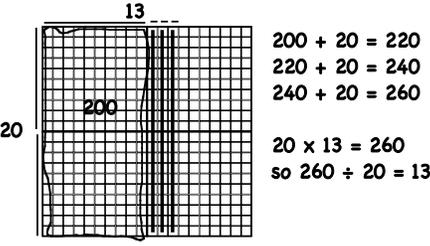# Multi-Digit Multiplication & Division

In this unit your child will:

- use multiplication and division facts through 12's fluently

- multiply and divide by multiples of 10 (e.g., 40 x 70)

- review double-digit multiplication using a variety of strategies including the standard algorithm

- divide 2- and 3-digit numbers by 1- and 2-digit numbers using a variety of strategies

- solve story problems involving multiplication and division with remainders

- measure using metric units of length (centimeters, meters, etc.), mass (grams, kilograms, etc.), and capacity (milliliters, liters, etc.) and perform conversions between units

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
Write the answer to each problem below. $\begin{array}{r}37\\ \times 10\\ \hline \textbf{370}\end{array}$ $\begin{array}{r}30\\ \times 12\\ \hline \textbf{360}\end{array}$ $\begin{array}{r}40\\ \times 20\\ \hline \textbf{800}\end{array}$	Students are able to multiply fluently by multiples of 10 when they know their basic facts and when they have a solid understanding of place value. Being able to calculate mentally with multiples of 10 is useful in and of itself, and it also helps students estimate reasonable answers before multiplying multi-digit numbers.
Write a story problem for 12 x 16. **There are 12 bottles of juice in each case. Luis bought 16 cases for his party. How many bottles of juice is that altogether?** Make a labeled sketch to solve your problem. $10 \times 16 = 160$ $2 \times 16 = 32$ $\begin{array}{r}160\\ +\ 32\\ \hline 192\end{array}$ Luis has 192 bottles of juice in all.	It is important that students are able to multiply multi-digit numbers. They must also understand the meaning of multiplication well enough to write problems that can be solved by multiplying. In this unit, students review the strategies for multiplying multi-digit numbers they learned in fourth grade: making sketches, finding and adding partial products, and using the standard algorithm. If you look closely at the labeled sketch at left, you can see how it helps students understand why the standard algorithm works. $\quad\begin{array}{r}{}^{1}16\\ \times 12\\ \hline 32\\ +160\\ \hline 192\end{array}$ Standard Algorithm

Write a story problem for this division problem.

$$260 \div 20$$

Malia's soccer team has 20 players. They have $260 to spend on team shirts. How much can they spend per shirt?

Make a labeled sketch on the grid below to solve the problem.

13

200

20

200 + 20 = 220
220 + 20 = 240
240 + 20 = 260

20 x 13 = 260
so 260 ÷ 20 = 13

They could spend $13 on each shirt.

Students use rectangles to think about division as the opposite of multiplication. They also use the pictures to solve division problems by adding equal groups until they get to the dividend (the number being divided, in this example, 260). This serves as the foundation for the numerical methods and algorithm they will learn in Unit Four.

There are 97 people on the swim team. They are riding in vans to the swim meet in another city. Each van carries 12 swimmers. How many vans will they have to take?

8 vans can carry 96 swimmers because 12 x 8 = 96. There's still one more swimmer, so they need another van. They need 9 vans altogether.

Students continue to solve division problems with remainders, as they did in fourth grade and in Unit One. In this unit, however, the problems involve larger numbers.

A student who is fluent with facts through 12's can apply that knowledge to solve this problem. Other students might add up by 12's or use a collection of related multiplication facts to solve a problem like this one.

Frequently Asked Questions about Unit Two

Q: Why do students use sketches to solve multiplication and division problems?
A: Pictures help students see why different strategies, including the algorithms, work. An algorithm is a set of steps for performing a particular calculation with specific kinds of numbers. Algorithms are important because when they are used accurately and with understanding, they are reliable, efficient, and universally applicable. Difficulties arise when students attempt to use an algorithm for multiplying or dividing without having mastered the basic facts, when they don't understand why the algorithm works, when they forget the steps, or when they can carry out the steps yet are unable to use their estimation skills to judge whether their final answer is reasonable. The understanding of number relationships that students develop by using sketches ensures that they will be able to use the algorithms correctly.

Q: When will students learn an algorithm for long division?
A: In this unit, students review and consolidate methods for multiplying multi-digit numbers, and they also gain solid foundations for understanding long division. They will learn an algorithm for long division in Unit Four.