Grade 4, Unit Five: Multi-Digit Multiplication

In this unit your child will:

- practice multiplication facts through 12's in the context of larger problems
- multiply 1-, 2-, and 3-digit numbers by multiples of 10, 100, and 1,000

• learn several different methods for multiplying 2-digit and 3-digit numbers by 1-digit and 2-digit numbers

• evaluate these methods with an eye to using the one that is the most efficient and effective given the situation and the numbers involved

• estimate products of single-digit and double-digit multiplication combinations

• write and solve story problems that involve multi-digit multiplication

	Pr	oblem	Comments	
Write the an 37 <u>x 10</u> 370	swer to each 12 <u>x 30</u> 360	n problem b 400 <u>x 20</u> 8000	elow. 2,000 <u>x 70</u> 14,000	Students are able to multiply fluently by multiples of 10, 100, and 1,000 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 also helps students estimate reasonable answers before multiplying multi-digit numbers.
Make a labe The kids in <i>N</i> the hallway feet long. Ho going to pai 23 × 8 8	eled sketch to	20 160 o solve this p are going f are feet is th	Sketches help students see why different strategies, including the algorithms, work. 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 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.	

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.

Here are three diff	erent ways to solv	Although 4 x 199 can be solved using the standard algorithm, it is probably		
Standard Algorithm	Partial Products	Landmark Numbers	easier and quicker to multiply 4 x 200	
33 199 <u>× 4</u> 796	$4 \times 100 = 400$ $4 \times 90 = 360$ $4 \times 9 = 36$ 400 + 360 + 36 = 796	199 is almost like 200 4 × 200 = 800 800 - 4 = 796	and subtract 4. Likewise, 37 x 4 can be solved with the algorithm, but if one is solving the problem mentally, it may	
1. Use the standard below. Then solve method. Circle the easier.	d algorithm to solv it a different way. e method that see	be easier to use partial products: "4 x 30 is 120, and 4 x 7 is 28. $120 + 28$ is 148." Most adults use mental strategies such as these to make good estimates, and to check work for accuracy. If one is using paper and pencil to calculate the product of 348 x 687, however, the		
× 4	37 <u>×4</u> 148	$ \begin{pmatrix} 4 \times 30 = 120 \\ 4 \times 7 = +28 \\ 148 \\ Partial Products \end{cases} $	standard algorithm is definitely more efficient than partial products or landmark numbers. We want our students to master several different strategies, and know when best to u them.	
Andy says the ans 800. Do you agree <i>No. because 49 is</i>	wer to the problen with Andy? Why o 49 <u>x 25</u> really close to 5	Because most students will be using calculators and computers to do basic math computations when they reach college and go into the work force, it is more important than ever that they learn to make good estimates and be alert to the reasonableness of results.		
be 1,000 so I thir	nk Andy's estimate	To this end, estimation is heavily featured in Unit 5.		

Frequently Asked Questions about Unit Five

Q: My child is struggling with some of the problems in this unit because she is not yet proficient with her basic multiplication facts. Is there anything I can do to help?

A: One good way to help your child become fluent with basic multiplication facts is to enroll in a free online program called XtraMath. David Jeshke, a computer programmer in Seattle, Washington, developed this web resource. While Mr. Jeshke was volunteering at a local elementary school, he recognized the need for an individualized math practice program. XtraMath is designed to help students master basic addition, subtraction, multiplication, and division facts, via 10-minute individualized practice periods several times a week. It is geared to use in the classroom and at home, allows students, teachers, and parents to monitor progress, and has proven to be an excellent resource. The URL is http://xtramath.org/

Q: What are partial products?

A: Partial products are the pieces of a multiplication problem we add to get the answer. When we use the standard algorithm to solve 48×37 , we're essentially finding and adding 2 partial products: $(8 \times 37) + (40 \times 37)$. It is also possible to solve the problem by finding and adding 4 partial products. We do this by breaking the multiplier and multiplicand into parts, and then multiplying:

48 = 40 + 8 and 37 = 30 + 7(40 x 30) + (40 x 7) + (8 x 30) + (8 x 7) or 1200 + 280 + 240 + 56 = 1,776.

Research has shown that students first learning double-digit multiplication work with better understanding and accuracy by using 4 instead of 2 partial products.