

Math: Grade 5, Lesson 11, Multiply by 1-digit Numbers

**Lesson Focus:** Multiply by 1-digit Numbers

**Practice Focus:** Students will focus on practicing multiplication and use the standard algorithm in order to solve multi-digit numbers by 1-digit numbers.

**Objective:** Students will use place value and the standard algorithm to multiply multi-digit numbers with a focus on 1-digit numbers.

**Key Vocabulary:** partial products, standard algorithm

**TN Standards:** 5.NBT.B.5

**Teacher Materials:**

- Board/marker (different colored markers if possible)
- Student Practice Packet

**Student Materials:**

- Paper and a pencil, and a surface to write on

Teacher Do	Student Do
<p><u>Opening</u> (1 min)</p> <p><b>Hello! Welcome to Tennessee’s At Home Learning Series for math! Today’s lesson is for all our 5th graders out there, though all children are welcome to tune in. This lesson is the eleventh in our series.</b></p> <p><b>My name is ____ and I’m a ____ grade teacher in Tennessee schools! I’m so excited to be your teacher for this lesson! Welcome to my virtual classroom!</b></p> <p><b>If you didn’t see our previous lesson, you can find it on the TN Department of Education’s website at <a href="http://www.tn.gov/education">www.tn.gov/education</a>. You can still tune in to today’s lesson if you haven’t see any of our others. But, it might be more fun if you first go back and watch our other lessons since we’ll be talking about things we learned previously.</b></p> <p><b>Today we will be learning about fluently multiply multi-digit whole numbers in mathematics! Before we get started, to participate fully in our lesson today, you will need:</b></p> <ul style="list-style-type: none"><li>• Paper and pencil</li><li>• The student packet for Math, Grade 5, Lesson 11 which can be found at <a href="http://www.tn.gov/education">www.tn.gov/education</a>.</li></ul> <p><b>Ok, let’s begin!</b></p>	<p>Students get materials ready for the lesson.</p>
<p><u>Intro</u> (5 min.)</p>	

Today we are going to think about multiplying numbers by 1-digit numbers. We will use the standard algorithm to multiply.

Let's start by looking at a multiplication problem.

[Read the problem aloud.]

Suppose a school ordered 7 boxes of books. There are 25 books in each box. How many books were ordered? Do not use a calculator. [Pause.]

Yes, we can multiply! In previous grades you have most likely learned to multiply using partial products. But this time, we are going to use the standard algorithm.

Let's look at this problem together.

[Write and say.]

25

x 7

What is 25 times 7? Where do we begin? [Pause.]

Yes, we begin in the ones place. Step 1 is to multiply the ones. First, we will multiply 7 times the number in the ones place. What digit is in the ones place? [Pause.]

Yes, the 5. What is 5 times 7? [Pause.]

Yes, 35. [Write and say.]

We will write the 5 in the ones column. We will need to regroup and put the 3 over the digit 2.

3

25

x 7

5

Now, step 2 multiply by the tens. We need to multiply the 7 by the digit in the tens place. What digit is in the tens place? [Pause.]

Yes, the 2. The digit 2 means we have 2 tens.

So, what is 2 times 7 tens? [Pause.]

Correct, 2 times 7 tens is 14 tens.

Plus we need to add the 3 tens that we regrouped. So, 14 tens plus 3 tens equals 17 tens. How much is 17 tens?

[Pause.] That's right! It is 170! Remember we already had 5

<p>ones. So, our final answer is 175. So, the school would need 175 boxes of books.</p> <p>[Write and say.]</p> $\begin{array}{r} 3 \\ 25 \\ \times 7 \\ \hline 175 \end{array}$	
<p><u>Teacher Model</u> (10 min.)</p> <p>Objective 1: Teacher will explicitly instruct how to multiply 2-digit numbers by 1-digit numbers using the standard algorithm in a contextual problem.</p> <p><b>Let's use what we just discussed to solve a problem multiplying a 2-digit number by 1-digit numbers.</b></p> <p><b>Listen to the problem.</b></p> <p><b>Ms. Stockton ordered 6 boxes of T-shirts with the school name on them. Each box contains 26 T-shirts. How many T-shirts did Ms. Stockton order?</b></p> <p><b>How would we solve this problem?</b> [Pause.]</p> <p><b>Correct, we need to multiply 26 times 6. You can multiply each place value in order, beginning with the ones. We will regroup if needed. Then, add any regrouped values to each place value.</b></p> <p><b>So, Step 1 is to multiply the ones. Write this problem with me.</b> [Write the problem and say aloud.]</p> <p><b>We need to start with 6 times 6. What is 6 x 6?</b> [Pause.]</p> <p><b>Yes, 36. But, we will need to regroup. So, we need to write 36 on our problem like this.</b></p> $\begin{array}{r} 3 \\ 26 \\ \times 6 \\ \hline 6 \end{array}$	<p><b>Objective #1:</b></p> <p>Students will listen to the teacher do a think aloud working a contextual problem modeling the thought process for a problem from the start of the problem through finding the solution.</p> <p>Through following along with the think aloud, students solve a problem that requires finding the product of multiplying multi-digit numbers by 1-digit numbers. The purpose of this problem is to have students use the partial products to solve problems.</p>

Now, Step 2 is to multiply the tens. What digit is in the tens place? [Pause.]

Yes, 2. We have 2 tens. So, we need to multiply 6 x 2 tens.

What does that equal? [Pause.]

Yes, 12 tens. But we regrouped earlier. We need to add the 3 tens that we regrouped.

So, 12 tens plus 3 tens = 15 tens.

$$\begin{array}{r} 3 \\ 26 \\ \times 6 \\ \hline 156 \end{array}$$

So, Ms. Stockton will need 156 T-shirts. We have solved the problem using the standard algorithm.

Objective 2: Teacher will explicitly instruct how to use the standard algorithm to multiply 3-digit numbers by 1-digit numbers in a contextual problem.

Nice job! We can also use the standard algorithm to model this problem. Let's try this together.

Ms. Arnold ordered 4 boxes of T-shirts with the school name on them. Each box contains 156 T-shirts. How many T-shirts did Ms. Arnold order?

What should we do to solve this problem? [Pause.]

Yes, we need to multiply. What do we need to multiply?

[Pause.]

Yes, 156 times 4.

$$\begin{array}{r} 156 \\ \times 4 \\ \hline \end{array}$$

So, Step 1 is to multiply the ones. Write this problem with me. [Write the problem and say aloud.]

We need to start with 4 times 6. What is 4 x 6? [Pause.]

Yes, 24. But, we will need to regroup. So, we need to write 24 on our problem like this.

Objective #2:

Students will listen to the teacher think aloud modeling the thought process for a problem from the start of the problem through finding the solution.

The purpose of this problem is to have students use the algorithm to solve problems.

$$\begin{array}{r} 2 \\ 156 \\ \times 4 \\ \hline 4 \end{array}$$

So,  $4 \times 6$  ones = 24; 24 is 2 tens 4 ones.

Now we need to multiply the tens.

$4 \times 5$  tens = 20 tens.

Plus, we had regrouped earlier. So, we need to add 20 tens + 2 tens = 22 tens.

Now, add the numbers to our problem like mine. [Continue writing the numbers on the problem. Use different colors if available.]

$$\begin{array}{r} 22 \\ 156 \\ \times 4 \\ \hline 24 \end{array}$$

Step 3 we need to multiply by the number in the hundreds place. What number is in the hundreds place? [Pause.]  
Yes, a one.

So, what is  $4 \times 1$ ? [Pause.]

Yes, 4.

$4 \times 1$  hundred = 4 hundreds.

We need to add the 2 hundreds that we regrouped.

4 hundreds + 2 hundreds = 6 hundreds.

[Continue writing the numbers on the problem. Use different colors if available.]

$$\begin{array}{r} 22 \\ 156 \\ \times 4 \\ \hline 624 \end{array}$$

Now we know that Ms. Arnold ordered 624 T-shirts. We have solved the problem using the standard algorithm.

<p>Tying the learning together:</p> <p><b>Let's review! We have multiplied multi-digit numbers by 1-digit numbers using place value and the standard algorithm. Using the standard algorithm is another strategy to multiply numbers.</b></p> <p><b>Remember when multiplying we work from right to left so that we multiply our smallest numbers first. In our problems that has been what place value? [Pause.] You got it ones! Then we can move to the left to work with 10s, 100s, and even thousands! What did we have to do sometimes as we were multiplying? [Pause.] Yes! We might have to regroup tens, hundreds, or even thousands. Let's continue practicing our multiplication.</b></p>	<p>Tying the learning together:</p> <p>Students will compare and connect the different representations and identify how they are related.</p> <p>Students will respond to questions to display an understanding of how to multiply multi-digit numbers by 1-digit numbers using the standard algorithm.</p>
<p><u>Guided Practice</u> (10 min.) [I do]</p> <p><b>Let's try another problem that uses place value to find the product. [pause]</b></p> <p><b>In this problem [Write <math>3 \times 746</math>.], we're multiplying 746 by 3. Remember, I'm thinking about place value, so I'm going to multiply each of the numbers in 746 in place value order by 3. If I need to regroup, I'll add the regrouped values to each place value. [As you think aloud, you will model the following on your white board.]</b></p> <p><b>11</b></p> <p>746</p> <p><u>X 3</u>      <math>3 \times 6 = 18</math> 2238      <math>3 \times 40 = 120 + 10 = 130</math>             <math>3 \times 700 = 2100 + 100 = 2200</math></p> <p><b>3 times 6 is 18; [Add this to the model as exemplified above.]</b></p> <p><b>Do you see where I regrouped? [pause]</b> <b>Yes, I regrouped the 18 as a ten [Point to the 1.] and 8 ones [Point to the 8.]</b></p> <p><b>Now, I am multiplying 40 times 3. Why am I multiplying 40 and not 4? [pause]</b> <b>Right, because the 4 in this factor is in the tens place, so it has a value of 40.</b> <b>3 times 4 tens is 120 tens; plus the ten I regrouped is 130. [Add this to the model as exemplified.]</b></p>	<p>Follow the same directions as in the Intro section. Describe how the students will move through the gradual release process. Be explicit as to what the gradual release looks like from the student perspective.</p>

**Do you see where I regrouped?** [pause]  
**I regrouped the 130 tens into 1 hundred and 3 tens.**

**3 times 7 hundreds is 21 hundreds; plus the regrouped hundred is 2200.** [Add this step to the model as exemplified.]  
**How did I record the regrouped hundreds?** [pause]  
**You're right, I regrouped the 22 hundreds into 2 thousands and 2 hundreds here** [Point to the regrouped hundreds.]

**Now, I can see that the sum of all of my partial products is 2,238.** [Point to the product.]

**You did a great job thinking through that problem with me! Let's try another problem together.**

[We do]

**Here is a problem that multiplies a 3-digit number by a 1-digit number. This time, as you work through the problem on your paper, I want you to think about how you're using place value to regroup products.**

[Display and read the problem aloud: 519

$$\begin{array}{r} \times 4 \\ 519 \end{array}$$

**We can start by multiplying the ones place.** [pause]

**Did you multiply 9 times 4?** [pause]

**Great, That should have given you 36. Did you regroup the 36 ones as 3 tens and 6 ones?** [pause]

**Great!** [Add this step to the model.]

**Now, go ahead and multiply the tens place.** [pause]

**Did you multiply 4 times 10?** [pause]

**Good! And did you remember to add the regrouped tens (3)?** [pause]

**Excellent!** [Add this step to the model.]

**That should've gotten you 70. Why didn't we have to regroup here?** [pause]

**You're right, because we only had 7 tens, we didn't have any tens to regroup into hundreds.**

**Now, multiply the hundreds place.** [pause]

**Did you multiply 4 times 500? Great! 4 times 5 is 20. And there were no regrouped hundreds to add.** [Add this step to the model.]

**Our product is 2,076! I think you've got this!**

With guidance, students follow the process of solving a multiplication problem with grouping using what they know about place value concepts.

[We do - contextual problem]

**I have a new problem I'd like you to help me think through.**

[Post the following problem for students to read as you read it aloud.]

**Derek rode in 3 motorcycle races. Each race was 150 miles.**

**How many miles did Derek ride?** [pause]

**What is the problem asking us?** [pause]

**Yes, it's asking to find out the total of miles that Derek rode his motorcycle in the 3 races. Take a minute to think about how you can use multiplication to solve this problem?**  
[pause]

**Did you think about multiplying 150 miles times 3?** [pause]

**Me too! Let's solve the multiplication problem together.**

[As you write: 150 say the following.]

X 3

**150 miles times 3 races, is how many total miles?**

**Go ahead and try solving this multiplication problem; remember to start with the ones place, and don't forget to add any regrouped numbers after you multiply. We'll come back together in less than 2 minutes to check your work**  
[Pause < 2 minutes].

**How did you do?** [pause]

**Great!**

[Talk through the following as you model the process.]

**Did you multiply 3 times 0?** [pause]

**Good! That should've given you zero.**

**Did you multiply 3 times 5 tens?** [pause]

**Great! Did you remember to regroup?** [pause]

**Excellent! That should've given you 150 tens which can be regrouped as 1 hundred and 5 tens.**

**Now, did you multiply 3 times 100? And did you remember to add the regrouped hundred?** [pause]

**Impressive! That should've given you 400.**

The completed model:

**1**

150

x 3

450

With teacher guidance, students draw on their understanding of place value concepts to make sense of and solve a contextual problem involving multiplication with regrouping.



[You do]

**You're ready to try one on your own now!**

**Find the product of** [Write and say.]

378

X 2

**I'll give you a minute to work this problem on your own.**

[pause]

[After 1 minute.]

**Let's see how you did.** [Display the following as you talk through the solution path.]

11

378

X 2

756

**For this problem, I see you had to regroup twice. You regrouped the 16 ones (from 2 times 8) into 1 ten and 6 ones; the 15 tens (from 2 times 7 tens plus ten) into 1 hundred and 5 tens; and then 2 times 3 hundred plus 1 hundred is 7 hundred. And your answer is 756.**

**Great work, fifth-graders!**

Additional Problems (if needed):

**Now try this problem** [Display and read the following problem.]

157

X 5

**I'll give you a minute to work this problem on your own.**

[pause]

[After 1 minute.]

**Let's see how you did.** [Display the following as you talk through the solution path.]

23

157

X 5

785

**For this problem, you had to regroup twice. You should have regrouped the 35 into 3 tens and 5 ones; multiplied the 5 and 5 tens, then added the 3 regrouped tens to get 28 tens; regrouped the 28 tens into 2 hundreds and 8 tens; then multiplied the 5 times 1 hundred, and added the regrouped 2**

**hundred to get 7 hundreds. I hope you remembered to multiply before adding the regrouped amounts.**

Additional contextual problem if needed:

**Try solving this problem on your own** [Display the following problem and read it aloud.]

**A farmer has 4 crates of plums. Each crate contains 118 plums. How many plums does the farmer have?**

**I'll give you a couple of minutes to solve this problem on your own. After 2 minutes, we will check your work together. Go ahead and start your work.**

[Pause for approximately 2 minutes.]

**Thank you for focusing on solving the problem! Are you ready to check your work?** [pause]

**Great!**

**For this problem, we were asked to figure out how many total plums the farmer has.**

[Model the following as you talk through the solution.]

**3**

**118**

**X 4**

**472**

**Did you multiply 118 plums times 4 crates?** [pause]  
**Great!**

**Did you multiply 4 times 8 ones?** [pause]

**Good job! That should've gotten you 32. I hope you remembered to regroup the 32 ones into 3 tens and 2 ones.**

**Did you multiply 4 times 1 ten then add the 3 regrouped tens?** [pause]

**Excellent! That should've given you 7 tens.**

**And finally, did you multiply 4 times 1 hundred?** [pause]  
**Great!**

**So, the farmer has 472 plums.**

Independent Practice (1 min.)

<p><b>Great work, students! Today, we reviewed how to multiply multi-digit numbers by 1-digit numbers. I hope you're seeing some connections to multiplication and the algorithms in multiplication! You sure did a great job! Do you think we could use this same process to multiply by 2-digit numbers?</b></p> <p>[pause]</p> <p><b>Think about that for the next time we meet!</b></p> <p><b>After the video, you will have some problems to practice on your own. Good luck and do your best! I will show you the independent practice problems now, or you can find them in the student practice for this lesson posted on our website, <a href="http://www.tn.gov/education">www.tn.gov/education</a>. [Teacher shows student practice page under document camera or camera zooms in on student practice page.]</b></p>	
<p><b><u>Closing</u> (1 min)</b></p> <ul style="list-style-type: none"><li>• <b>Students, I enjoyed reviewing multiplication with you! Thank you for inviting me into your home. I look forward to seeing you in our next lesson in Tennessee's At Home Learning Series!</b></li><li>• <b>Bye!</b></li></ul>	

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