

**Math: Grade 5, Lesson 15, Multiplying Multi-Digit Numbers**

**Lesson Focus:** Multiplying Multi-Digit Numbers

**Practice Focus:** Students will focus on practicing using the standard algorithm and place value in order to multiply multi-digit numbers.

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

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

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

**Teacher Materials:**

- Board/marker
- Student Activity 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 fifteenth 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 seen 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 using the standard algorithm and place value in order to multiply multi-digit 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 15 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> <p><b>Today we are going to think about multiplying multi-digit numbers.</b></p>	<p>This warm-up will support students' understanding of multiplying multi-digit numbers.</p> <p>Students will listen to the teacher think aloud modeling the thought</p>

**This week we have practiced multiplying two-digit and even some three-digit numbers. Let's take a minute to review how to find the product of a 2-digit by 2-digit multiplication problem.**

[Write and say.]

$$\begin{array}{r} 12 \\ \times 15 \\ \hline \end{array}$$

**Let's use place value and the standard algorithm to solve our problem.**

**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.**

**So, let's begin in the ones place. First, we will multiply 5 times the digit in the ones place. What digit is in the ones place? [Pause.]**

**Yes, the 2. What is 5 times 2? [Pause.]**

**Yes, 10. [Write and say.]**

**We will write the 0 in the ones column. We will need to regroup and write the 1 over the digit 1.**

[Add the numbers to your problem as you go. You might want to use different colored markers if possible.]

$$\begin{array}{r} 1 \\ 12 \\ \times 15 \\ \hline 0 \end{array}$$

**Now we need to multiply the tens.**

**5x1 tens = 5 tens.**

**Plus, we had regrouped 1 ten. So, we need to add 5 tens + 1 tens = 6 tens.**

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

$$\begin{array}{r} 1 \\ 12 \\ \times 15 \\ \hline 60 \end{array}$$

process for a problem from the start of the problem through finding the solution. Students will follow along.

**What do we need to do now?** [Pause.]

**Yes, we need to multiply by the number in the tens place.**

**What number is in the tens place?** [Pause.]

**Yes, a one.**

**So, what is 1 ten x 2?** [Pause.]

**Yes, 2 tens or 20.**

$$\begin{array}{r} 1 \\ 12 \\ \times 15 \\ \hline 60 \\ 20 \end{array}$$

**What is 1 tens x 1 tens?** [Pause.]

**Yes, 1 tens x 1 tens = 1 hundred**

**Let's include that in our problem.**

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

$$\begin{array}{r} 1 \\ 12 \\ \times 15 \\ \hline 60 \\ + 120 \end{array}$$

**Now, we need to add our partial products together. 60 + 120 = 180**

**Fantastic! Today, we are going to look at 3-digit by 2-digit multiplication.**

Teacher Model (10 min.)

Objective 1: Teacher will explicitly instruct how to use the standard algorithm to multiply three-digit numbers by 2-digit numbers.

**Listen to the problem and follow along. What? Oh...You're right! This is very similar to what we worked on yesterday. What's different?** [Pause.] **Exactly! There are no zeroes in our factors. Do you think this will change our process? Let's find out!**

[Read the problem aloud.]

Objective #1:  
Students will be applying the standard algorithm strategy to multiply multi-digit numbers by 2-digit numbers.

537

X 24

Starting with the ones place in 24 we can multiply each digit's place value by the digits in the number 537. Just like yesterday we can't forget to regroup when we need to!

$$\begin{array}{r}
 1 \\
 12 \\
 537 \\
 \times 24 \\
 \hline
 2148 \\
 +10740 \\
 \hline
 12888
 \end{array}$$

4 x 7 ones = 28 ones; we regroup 2 tens and write 8 ones  
 4 x 3 tens = 12 tens; plus the 2 regrouped tens = 14 tens or 1 regrouped hundred and 4 tens  
 4 x 5 hundreds = 20 hundreds plus the 1 regrouped hundred is 21 hundreds

So, we have now multiplied 537 times 4. What do we need to do next? You remembered! We need to multiply 537 by 20. [Point to the 2 in 24.]

2 tens x 7 ones = 14 tens; or 1 regrouped hundred, 4 tens and 0 ones  
 2 tens x 3 tens = 6 hundreds plus the regrouped hundred gives 7 hundreds.  
 2 tens x 5 hundreds = 10 thousands

Adding the two partial products, gives us a final product of 12,888.

That was amazing work. Do you see the connections to the work we have done all week? Fantastic! One of the benefits to using the standard algorithm is that the process does not change much when you add more digits to numbers...it just becomes longer. Did this match the process we did yesterday? [Pause.] It sure did! What was different? [Pause.] That's it. Today we did not get to multiply by 0. Which sometimes makes it easier to keep track of our numbers.

Let's try one more together to make sure that we have it!

[Read the problem aloud.]

236

X 32

Starting with the ones place in 32 we can multiply each digit's place value by the digits in the number 236. Just like yesterday we can't forget to regroup when we need to!

$$\begin{array}{r}
 11 \\
 1 \\
 236 \\
 \times 32 \\
 \hline
 472 \\
 + 7080 \\
 \hline
 7552
 \end{array}$$

2 x 6 ones = 12 ones; we regroup 1 ten and write 2 ones  
 2 x 3 tens = 6 tens; plus the 1 regrouped ten = 7 tens  
 2 x 2 hundreds = 4 hundreds

So, we have now multiplied 236 times 2. What do we need to do next? You remembered! We need to multiply 236 by 30. [Point to the 3 in 32.]

3 tens x 6 ones = 18 tens; or 1 regrouped hundred, 8 tens and 0 ones  
 3 tens x 3 tens = 9 hundreds plus the regrouped hundred gives 10 hundreds or 1 thousand to regroup and 0 hundreds.  
 3 tens x 2 hundreds = 6 thousands plus the 1 regrouped thousand equals 7 thousands.

Adding the two partial products, gives us a final product of 7,552.

Tying the learning together:

**Let's review! We have multiplied multi-digit numbers by 2-digit numbers using the standard algorithm.**

**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.**

Guided Practice (10 min.)

[I do.]

Tying the learning together:

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.

[I do.]

<p><b>Listen to the problem and follow along. Work the problem as I do!</b>  [Read the problem aloud.]</p> $\begin{array}{r} 537 \\ \times 21 \\ \hline \end{array}$ <p><b>Where do we start? Yes! With the 1 in 21! Here we go!</b></p> <p>1</p> $\begin{array}{r} 537 \\ \times 21 \\ \hline 537 \\ + 10740 \\ \hline 11277 \end{array}$ <p><b>1 x 7 ones = 7 ones;  1 x 3 tens = 3 tens;  1 x 5 hundreds = 5 hundreds</b></p> <p><b>So, we have now multiplied 537 times 1. What do we need to do next? You remembered! We need to multiply 537 by 20. [Point to the 2 in 21.]</b></p> <p><b>2 tens x 7 ones = 14 tens; or 1 regrouped hundred, 4 tens and 0 ones  2 tens x 3 tens = 6 hundreds plus the regrouped hundred gives 7 hundreds  2 tens x 5 hundreds = 10 thousands.</b></p> <p><b>Adding the two partial products, gives us a final product of 11,277.</b></p> <p>[We do.]  <b>Let's do this problem together. Follow along with me and writ on your paper.</b>  [Read the problem aloud and write it on you board.]</p> $\begin{array}{r} 437 \\ \times 34 \\ \hline \end{array}$ <p><b>What would we multiply first? You are amazing! We would multiply 4 by each digit in 437. Can you do all of that and then we will check our work! [Pause.]</b></p> <p><b>Did you get 1748? Check your work with mine.</b></p> <p>1 2</p>	<p>Students work alongside the teacher as the teacher thinks aloud.</p> <p>[We do.]  Students will respond to teacher questions with less scaffolding than the previous example. Students will have more time to think and respond on their own prior to the teacher providing solutions.</p>
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<p>437  <math>\begin{array}{r} \text{X } 34 \\ \hline 1748 \end{array}</math></p> <p>What would be next? That's it! We would multiply 30 times 537. [Point to the 3 in 34.] Can you work that one by yourself? I heard several of you ask that we do this part together. That's okay! Here we go!</p> <p>1 2  1 2  437  <math>\begin{array}{r} \text{X } 34 \\ \hline 1748 \\ +13110 \\ \hline 14858 \end{array}</math></p> <p>3 tens x 7 ones = 21 tens; or 2 regrouped hundred, 1 ten and 0 ones  3 tens x 3 tens = 9 hundreds plus the 2 regrouped hundred gives 11 hundreds or 1 regrouped thousand and 1 hundred  3 tens x 4 hundreds = 12 thousands plus one regrouped thousand gives 13 thousands.</p> <p>Now we add our partial products to get 14, 858.</p> <p>[You do.]  <b>Now you try one on your own. I now you can do it!</b>  [Write problem on board and read it aloud. Give students about 2 minutes to solve. Then check their work with them.]</p> <p>421  <math>\begin{array}{r} \text{X } 25 \\ \hline \end{array}</math></p> <p>All right let's check your work. How did you do? Did you get 10,525? Amazing! I am so proud of you!</p> <p>1  421  <math>\begin{array}{r} \text{X } 25 \\ \hline +8420 \\ \hline 10,525 \end{array}</math></p> <p><u>Additional Problems (if Needed):</u></p> <ol style="list-style-type: none"> <li>531 x 47</li> <li>759 x 68</li> <li>525 x 37</li> </ol>	<p>[You do.]  Students are working almost exclusively independently with the teacher providing answers at the end.</p>
<p><u>Independent Practice</u> (1 min.)</p>	

## PBS Lesson Series

<p><b>Great work, students! Today, we reviewed use the standard algorithm to multiply with a focus on multi-digit numbers. I hope you're seeing some connections to multiply with a focus on 2-digit numbers! You sure did a great job! After the video, you will have some problems to practice on your own. Good luck and do your best!</b></p> <p><b>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 a document camera or camera zooms in on student practice page.]</b></p>	
<p><u>Closing</u> (1 min.)</p> <ul style="list-style-type: none"><li>• <b>Students, I enjoyed reviewing using the standard algorithm to multiply with a focus on multi-digit numbers 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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