

Math: Grade 4, Lesson 15, Multiplication

Lesson Focus: Multiplication Word Problems

Practice Focus: Students will focus on practicing two-digit multiplication while solving multi-step word problems.

Objective: Students will make sense of word problems and use strategies to multiply two-digit numbers.

Key Vocabulary: area, area model, place value, partial products

TN Standards: 4.NBT.B.5

Teacher Materials:

- Whiteboard and markers
- Student Practice Packet

Student Materials:

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

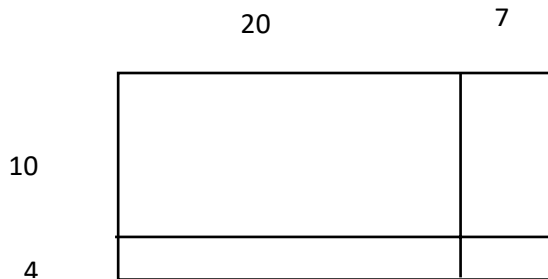
Teacher Do	Student Do
<p><u>Opening</u> (1 min)</p> <p>Hello! Welcome to Tennessee's At Home Learning Series for math! Today's lesson is for all our 4th graders out there, though all children are welcome to tune in. This lesson is the fifteenth in our series.</p> <p>My name is ____ and I'm a ____ grade teacher in Tennessee schools! I'm so excited to be your teacher for this lesson! Welcome to my virtual classroom!</p> <p>If you didn't see our previous lesson, you can find it on the TN Department of Education's website at www.tn.gov/education. 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.</p> <p>Today we will be learning about two-digit multiplication word problems in mathematics! Before we get started, to participate fully in our lesson today, you will need:</p> <ul style="list-style-type: none"> • Paper and a pencil, and a surface to write on • The student packet for Math, Grade 4, Lesson 15 which can be found at www.tn.gov/education. <p>Ok, let's begin!</p>	<p>Students get materials ready for the lesson.</p>
<p><u>Intro</u> (5 mins)</p> <p>Today we are going to solve word problems that involve two-digit multiplication. Before we do that, let's review how to multiply two 2-digit numbers using an area model with partial products.</p>	<p>This warm-up will support students' understanding of multiplying two 2-digit numbers, foreshadowing the</p>

Let's start by looking at this problem: 14×27

Do these steps with me on your own paper. Go ahead and draw a large rectangle so it's ready for our numbers. [Draw a large rectangle.]

To start, we need to use place value to break apart both numbers and put them into the area model. The number 14 is made up of 1 ten and 4 ones. That means we can write the number 14 as $10 + 4$. Write those numbers along the left side of the rectangle allowing more room for the 10 to show that it's bigger than 4 in my model. [Write the numbers and draw the line separating the sections – see example below.]

How would you use place value to break apart 27? [Pause.] That's great, break 27 is made up of 2 tens and 7 ones so it can be written as $20 + 7$. Write those numbers across the top allowing more room for the 20. [Write the number and draw the line separating the sections – see example below.] **Notice that the rectangle is wider than it is long, because 27 is bigger than 14. Of course, these lengths are just estimates and not exact. They just help show the size of the numbers being multiplied.**



Now we will multiply the length and width of each smaller rectangle to find their areas. This will give us the partial products. A partial product is found when you break apart a number using place value in a multiplication problem, then multiply each of those parts by the other number in the problem.

We can do these in any order, but I like to start on the top left rectangle. Record your multiplication problem and your partial product in each rectangle.

[Write each of these in each rectangle – see completed example below.] To find the area of the top left rectangle, I will multiply 10×20 . Using one of my strategies for

work in in the Teacher Model section.

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. Students will follow along and responding to teacher questioning.

multiplying by a multiple of ten, I know that 1 ten times 2 tens is 2 hundreds, or 200. Write 200 in the top left rectangle.

To find the area of the top right rectangle, we will multiply 10 x 7. What is 10 x 7? [Pause.]

That's right, 70! Write 70 in the top right rectangle.

To find the area of the bottom left rectangle, I will multiply 4 x 20. Using the same strategy for multiplying by a multiple of ten, I know that 4 times 2 tens, is 8 tens or 80. Write 80 in the bottom left rectangle.

To find the area of the bottom right rectangle, I will multiply 4 x 7, which is a basic fact and is 28. Write 28 in the bottom right rectangle.

	20	7
10	$10 \times 20 = 200$	$10 \times 7 = 70$
4	$4 \times 20 = 80$	$4 \times 7 = 28$

So to find the product of 14 x 27, I will add the four partial products I found. [Point to and say them as you write these to the side.] $200 + 70 + 80 + 28$. [Write out the following as you say it.] We can use the standard algorithm to add these 4 numbers. Add the ones, then the tens, then the hundreds. [Pause.] I got a solution of 378, did you?

Area models and partial products are helpful strategies for multiplication. Today we are going to solve word problems that involve multiplication with two-digit numbers.

Teacher Model (12 mins)

Now we are going to explore a real-world situation that will require more than one step to solve. We will need to make sense of the problem and decide on a strategy.

The park has a large garden with a walkway around it. The dimensions of the garden are 32 feet by 65 feet. The dimensions of the whole park with the garden and walkway around it are 52 feet by 85 feet. The park's ground crew are going to paint the walkway. What is the area of the walkway?

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.

Objective #1:

Teacher will guide students through how to make sense of a multi-step problem.

What is this problem about? [Pause.]

Great! The problem is about a park with a garden in the middle and a walkway around it.

What information do we know? [Pause.]

We know the dimensions of the garden are 32 feet by 65 feet and the dimensions of the whole park are 52 feet by 85 feet.

Is there anything else that we know? [Pause.]

We know that the ground crew is going to paint the walkway.

What are we trying to find? [Pause]

We are trying to find the area of walkway.

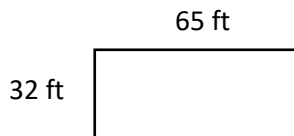
Drawing a picture can help us make sense of a problem. Let's draw what is happening in this situation. Draw with me.

First, I'm going to draw a rectangle to represent the garden.



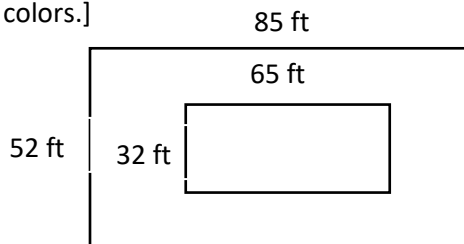
What are the dimensions of the garden? [Pause,]

That's right, 32 feet by 65 feet. We can label these dimensions on the drawing.



Now let's draw a picture of the whole park. The problem told us that a walkway goes around the garden. What are the dimensions of the whole park with the walkway around the garden? [Pause.]

Great, 52 feet by 85 feet. Notice that these dimensions are bigger than the dimensions of the garden. The walkway is going to look like a larger rectangle that surrounds the garden. Draw with me. [Draw the walkway to create the final drawing, it may help to shade the two areas in different colors.]



Objective #1:

Through following along with the think aloud, students will learn how to make sense of a multi-step word problem.

Remember, we are trying to find the area of just the walkway. What is a strategy that we could try? [Pause.] I'm hearing some excellent ideas. One strategy is to find the area of each rectangle that we just drew. Then, we will subtract the area of the smaller rectangle, which is the garden, from the larger rectangle, which is the whole park including the walkway. That will give us the area of just the walkway portion of the park. Let's give it try!

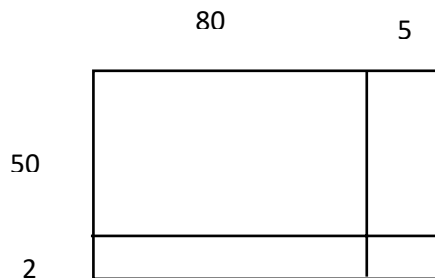
Objective #2:

Teacher will guide students through how to solve the problem using two-digit multiplication and subtraction to find the area of the walkway.

First, we will find the area of the garden and the walkway together, which is the whole park. The dimensions on the whole park are 52 feet by 85 feet. How do we find the area of a rectangle? [Pause.]

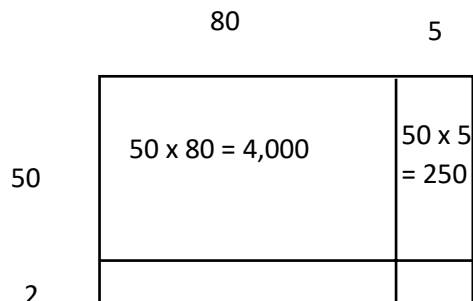
You got it! Multiply length times width. The dimensions of the park are the length and width. We need to multiply 52 times 85. These are big numbers so we might want to use an area model like we did earlier in the lesson to help.

Let's draw an area model to multiply 52 times 85. Draw with me. Remember, the first step is to break apart each number by place value by writing the number as the sum of tens and ones. [Draw and label the area model below.]



Do you remember what to do next? [Pause.]

That's right, find the area of each section. These are our partial products. [Pause, then speak aloud while writing each partial product in the area model.]



Objective #2:

Through following along with the think aloud, students will solve a multi-step word problem by using multiplication and subtraction.

$$2 \times 80 = 160$$

$$2 \times 5 \\ = 10$$

What do we do with each of these products? [Pause.] You got it! Add the partial products together. [Write and say.]

4,000

250

160

+ 10

4,420

The area of the whole park is 4,420 square feet. We say square feet because there are two dimensions, length and width.

Next, we are going to find the area of just the garden. The dimensions of the garden are 32 feet by 65 feet. Again, we will multiply. Let's try using only partial products this time. Write the multiplication problem. [Write the products below while speaking aloud.]

$$\begin{array}{r} 32 \\ \times 65 \\ \hline \end{array}$$

5 times 2 is 10

5 times 30 is 150

60 times 2 is 120

60 times 30 is 1,800

Add the partial products. [Pause.]

The sum is 2,080, is the area of the garden.

Our last step is to subtract the area of the garden from the area of the entire park to find the area of just the walkway.

[Write and solve the subtract problem below.]

4,420

- 2,080

2,340

The area of the walkway is 2,340 square feet. Think back to the original picture that we drew. We subtracted the area of the garden from the area of the entire park to find the area of the walkway that surrounds the garden.

Tying the learning together:

Thank you for sharing your thinking. We can see that making sense of the problem is an important part of solving a multi-step word problem. We also noticed that area models and partial products can help us multiply two-digit numbers.

Tying the learning together:

Students will review the strategies used in this lesson and consider how they are related.

[illegible]

<p>consisted of 4 Sundays and 26 other days. How many newspapers did Jarrod deliver last month?</p> <p>What information do we know? [Pause.] We know Jarrod delivered 63 newspapers on 26 days. We also know Jarrod delivered 78 newspapers on 4 days. What are we trying to find? [Pause.] We are trying to find how many total newspapers Jarrod delivered.</p> <p>What is your plan for solving this problem? [Pause.] Good thinking! Multiply 63×26 and 78×4. Then add those results together to find the total number of newspapers delivered. Give it a try! Remember you can use an area model or partial products to help with the multiplication. [Pause to allow students time to think and work.]</p> <p>Let's check your work. I found that $63 \times 26 = 1,638$. I found that $78 \times 4 = 312$. Then I added $1,638 + 312$ to get 1,950. What does this solution mean? [Pause.] Right! Jarrod delivered 1,950 newspapers. Great job!</p> <p>[You do] Now you are going to try a problem on your own. Remember to use an area model or partial products to help you multiply! [Write and say aloud.] On her vacation, Julia filled 3 memory cards with pictures. Each memory card holds 28 pictures. Julia printed 2 copies of each picture. How many pictures did Julia print? [Pause to allow students time to think and work.] Let's check your work. A possibly strategy is to multiply 3 by 28 to get 84 pictures taken. Then multiply 84 times 2 to get 168 total pictures taken.</p> <p>Great job, students!</p> <p><u>Additional Problems (if needed):</u></p> <p>A camera normally costs \$126. Mike can buy it making 6 payments of \$23. How much more would Mike have to pay for the camera with payments than if he paid for it all at once? Answer: \$12</p> <p>On weekdays, Rosalie bikes 5 miles. On Saturdays, she bikes 15 miles. Last month, there were 21 weekdays and 4 Saturdays. How many miles did Rosalie bike last month?</p>	<p>respond on their own prior to the teacher providing solutions.</p> <p>Students are working almost exclusively independently with the teacher providing answers at the end.</p>
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<p>Answer: 165 miles</p> <p>A truck used 6 cartons of boxes for the dinners they sold yesterday. There are 24 boxes in a carton. Each dinner uses one box and costs \$11. What was the total amount of money they made from selling dinners?</p> <p>Answer: \$1,584</p>	
<p><u>Independent Practice</u> (1 min)</p> <p>Great work, everyone! Today, we practiced two-digit multiplication word problems in mathematics. I hope you're seeing that you can use area models and partial products to multiply! You sure did a great job! After the video, you will have some problems to practice on your own. 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, www.tn.gov/education. [Teacher shows student practice page under document camera or camera zooms in on student practice page.]</p> <p>Good luck and do your best!</p>	
<p><u>Closing</u> (1 min)</p> <ul style="list-style-type: none">• Boys and Girls, I enjoyed learning about two-digit multiplication word problems 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!• Bye!	

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