

**Math: Grade 3, Lesson 19, Multiplication Facts and Strategies**

**Lesson Focus:** Use strategies to multiply with the factor 8.

**Practice Focus:** Students will focus on practicing using doubles or a number line to multiply with 8.

**Objective:** Students will use strategies to multiply with 8.

**Key Vocabulary:** factor, product, doubles, number line

**TN Standards:** 3.OA.B.5

**Teacher Materials:**

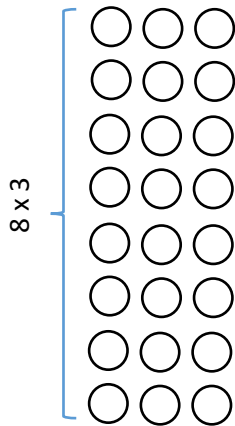
- Paper, pencil, and dry erase board/marker
- Student Practice Packet

**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 3<sup>rd</sup> graders out there, though all children are welcome to tune in. This lesson is the nineteenth 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 using strategies to multiply by 8 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 a pencil, and a surface to write on</li> <li>• The student packet for Math, Grade 3 Lesson 19 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>Let's review using the distributive property to help us find products. Let's find the product of <math>8 \times 3</math>. Since we are reviewing using the distributive property, we need to draw an array for <math>8 \times 3</math> so that we can break it into smaller parts.</b></p>	<p>Students draw an array of <math>8 \times 3</math> on their paper.</p>

On your paper, draw an array to represent  $8 \times 3$ . Our array will have 8 rows of 3. [Pause.]

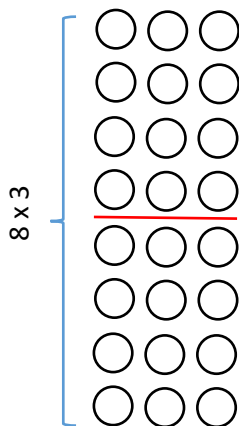


[Teacher displays an array like above image.]

**Label your array with the expression  $8 \times 3$ .**

Now let's break our array into smaller arrays. I'm really good with my fours facts, so I'm going to draw a horizontal line to break apart the 8 rows into two sets of 4 rows. Draw a line on your array to break it apart the same way as mine.

[Teacher shows image below with the partition.]



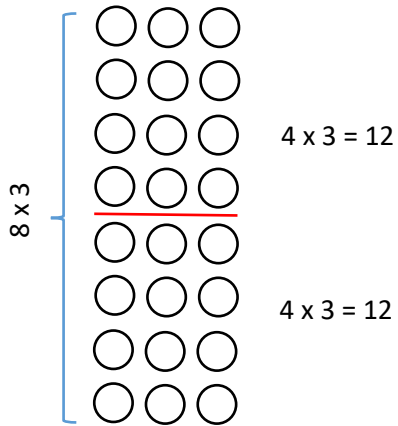
Now let's label the two smaller arrays. Show me with your fingers how many rows are in each of the smaller arrays. [Pause.] That's right! They each have 4 rows. I notice that there are still 3 counters in each row. Four rows of three or  $4 \times 3$  is 12. Let's label these smaller arrays with the multiplication equation  $4 \times 3 = 12$ . Do this with your array also. [Pause.]

Students check their array drawing and label the whole as  $8 \times 3$ .

Students break apart their  $8 \times 3$  array into two  $4 \times 3$  arrays.

Students use four fingers to show each smaller array has 4 rows each.

Students label the parts with the equation  $4 \times 3 = 12$ .



The distributive property states the product of the whole is equal to the sum of the products of the parts. That means that the total number of counters in the  $8 \times 3$  array is equal to the sum of the counters in the smaller arrays. Complete this equation on your paper below the array.

$$8 \times 3 = \underline{\quad} + \underline{\quad} = \underline{\quad}.$$

Give me a thumbs up if your completed equation says  $8 \times 3 = 12 + 12 = 24$ . [Pause.] Awesome! The expression  $12 + 12$  in the equation represents the sum of the two products from the  $4 \times 3$  arrays.

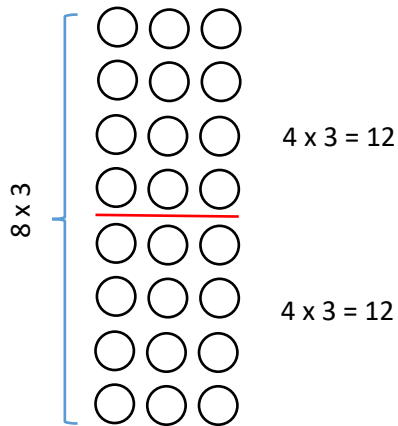
The way we broke apart the  $8 \times 3$  array into two  $4 \times 3$  arrays illustrates another strategy we've used before to find products. It's called using doubles or doubling. We've used the doubles strategy with our twos facts to help us find our fours facts, and with our threes facts to help us find our sixes facts. We can also use this strategy with our fours facts to find our eights facts!

This means that I can double the product of a fours fact to find the product of the related eights fact. For instance, if I know that  $4 \times 3 = 12$ , then I can double its product to find the product of the related fact  $8 \times 3 = \underline{\quad}$ . Doubling the 12 is the same as finding  $12 + 12$ . So  $8 \times 3 = 12 + 12 = 24$ .

Students complete the equation  $8 \times 3 = 12 + 12 = 24$ .

Students give a thumbs up to affirm they correctly completed the equation.

Let's revisit the drawing of our array for  $8 \times 3$ .



This image does show us that the  $8 \times 3$  array is double the  $4 \times 3$  array! There are 24 counters in the whole array and there is a double set of 12 counters in the smaller arrays.  $24 = 12 + 12$ .

Doubling is one of the strategies that we'll practice today to multiply by the factor 8.

Students revisit their drawings of the array to consider how it shows the doubles strategy.

#### Teacher Model (10 min)

Objective 1: Teacher modeling using the doubles strategy to multiply with the factor 8.

Listen as I read the following problem.

A scorpion has 8 legs. How many legs do 5 scorpions have? Write a multiplication equation to solve the problem.

Let's make sense of the problem. How many legs does one scorpion have? Show me using your fingers. [Pause.] That's right, one scorpion has 8 legs. [Pause.] We are asked to find out the number of legs that 5 scorpions have. On your paper, write the multiplication equation that describes the problem. Use a blank line for the product. [Pause.] Give me a thumbs up if you wrote  $5 \times 8 = \underline{\quad}$ . [Pause.] Great! The factor 5 represents the number of groups, in this case the number of scorpions. The factor 8 represents the number of legs that each scorpion has.

Objective 1: Students will be reviewing using the doubles strategy with their fours facts in order to find their eights facts. This will support students developing multiplication fact fluency.

Students show eight fingers to indicate one scorpion has 8 legs.

Students record  $5 \times 8 = \underline{\quad}$ .

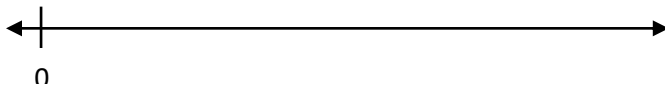
Let's use the doubles strategy to help us find the product of  $5 \times 8$ . Since the factor 8 is double the factor 4, we can use the related fours fact. Say out loud what the related fours fact is for  $5 \times 8$ . [Pause.] Yes, the related fours fact is the fact  $5 \times 4 = 20$ . The doubles strategy says we can double the product of  $5 \times 4$  to find the product of  $5 \times 8$ . Do this now and show your work by completing the equation  $5 \times 8 = \underline{\quad} + \underline{\quad} = \underline{\quad}$ . [Pause.]

Give me a thumbs up if your completed equation is  $5 \times 8 = 20 + 20 = 40$ . Awesome! The expression  $20 + 20$  describes doubling the product of  $5 \times 4$ . The product 40 answers the question we were asked to find. Eight scorpions have a total of 40 legs.

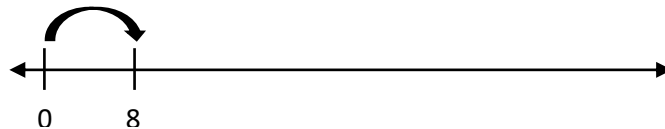
Objective 2: Teacher modeling using number lines to multiply with the factor 8.

Another way we could have found the product for  $5 \times 8$  is by using a number line.

Draw a blank number line on your paper and draw a tick mark labeled with zero. [Show or draw image below.]



Recall that when we use a number line to multiply, our factors describe the number of jumps to make and the length of the jumps. For  $5 \times 8$ , the factor 5 tells us how many jumps we'll make and the factor 8 tells us the distance or length of each jump. On your number line, draw a curvy arrow to indicate the first jump from 0 to 8. [Pause.]



[Teacher shows image of above number line.]

Make sure your number line looks similar to mine. Notice I've included a second tick mark labeled 8. This describes the length of the jump from zero to eight.

Students verbalize that the related fours fact for  $5 \times 8$  is  $5 \times 4 = 20$ .

Students complete the equation  $5 \times 8 = 20 + 20 = 40$ .

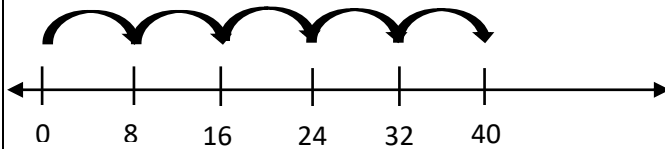
Students check their equations.

Objective #2:  
Students will be using number lines to multiply with the factor 8. This will support students developing multiplication fact fluency.

Students draw a blank number line with one tick mark labeled zero.

Students draw an arrow to illustrate a jump of length 8 from zero.

Complete your number line so that it shows the 5 equal jumps of 8. Use a tick mark and the number that describes another jump of length 8 to label each jump. We'll compare drawings in a moment. [Pause.]



[Teacher displays above image.] Give yourself a pat on the back if your number line looks similar to mine. Make corrections to your number line if needed. [Pause.] The 5 equal jumps of 8 represent the expression  $5 \times 8$ . The product is 40 because this is the total length of all five jumps.

Great job drawing a number line to illustrate multiplying by 8!

Tying the learning together: Teacher modeling using the doubles strategy when both factors are even.

So far today we have solved multiplication problems using the doubles strategy when one factor is 8 and the other factor is an odd number. What happens if both of our factors are even? Let's think about the expression  $6 \times 8$ .

I know one way I can use the doubles strategy to find the product of  $6 \times 8$  is to use the related fours fact because the factor 8 is the double of the factor 4.

I know that  $6 \times 4 = 24$ . To find  $6 \times 8$ , I double the product 24. Complete this equation on your paper to show the product of  $6 \times 8$ . [Teacher shows equation below.] [Pause.]

$$6 \times 8 = \underline{\quad} + \underline{\quad} = \underline{\quad}.$$

The completed equation is  $6 \times 8 = 24 + 24 = 48$ . Check your equation.

Earlier we said we had used the doubles strategy to find our sixes facts. The factor 6 is the double of the factor 3. On your paper, write the threes fact that we can use to help us solve  $6 \times 8$ . [Pause.]

Give me a thumbs up if you wrote  $3 \times 8 = 24$ . Excellent!

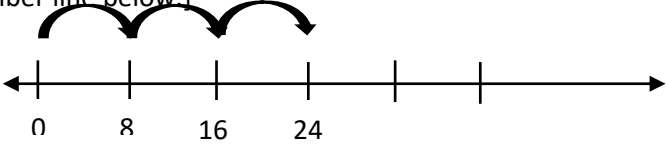
Students complete their number lines to illustrate  $5 \times 8 = 40$ .

Students compare their number lines with teacher's work.

Tying the learning together: Students notice that there's more than one way to use the doubles strategy when both factors are even.

To use the doubles strategy to complete the equation  $6 \times 8 = 24 + 24 = 48$ .

Students record the fact  $3 \times 8 = 24$  on their paper as the fact they can use to find  $6 \times 8$ .

<p>Now we double the product of this threes fact to find the product of the sixes fact <math>6 \times 8</math>.</p> <p>Record this equation on your paper. <math>6 \times 8 = 24 + 24 = 48</math>. Circle the expression that describes doubling the product of <math>3 \times 8</math>. [Pause.] Give yourself some applause for circling the expression <math>24 + 24</math>!</p> <p>Great job reviewing strategies to multiply with the factor 8. It's now time to work some practice problems.</p>	<p>Students record the equation <math>6 \times 8 = 24 + 24 = 48</math>.</p> <p>Students circle the expression <math>24 + 24</math> because it describes doubling the product of <math>3 \times 8</math>.</p>
<p><u>Guided Practice</u> (10 min)</p> <p>[I do, problem 1.]  <b>I'll do the first practice problem.</b>          [Teacher reads the problem out loud and does a think aloud as she solves it.]</p> <p><b>Use the doubles strategy to find the product of <math>9 \times 8</math>.</b></p> <p>Listen to my think aloud as I use the doubles strategy.          [Pause.] I need to find the product of <math>9 \times 8</math> using the doubles strategy. Since the factor 8 is the double of 4, I can use the related fours fact <math>9 \times 4</math> to help me find the product of <math>9 \times 8</math>. I know that <math>9 \times 4 = 36</math>. On your paper, write <math>9 \times 4 = 36</math>. [Pause.] I can double this product to find the product of <math>9 \times 8</math>. So <math>9 \times 8 = 36 + 36 = 72</math>. [Teacher records the equation.] Record this equation on your paper below the equation <math>9 \times 4 = 36</math>.</p> <p>So to find the product of <math>9 \times 8</math>, I doubled the product of <math>9 \times 4</math> which is expressed as <math>36 + 36</math>. The product of <math>9 \times 8 = 72</math>.</p> <p>[I do, problem 2.]  <b>Now, I'll use a number line to find the product of <math>3 \times 8</math>.</b></p> <p>If I think about <math>3 \times 8</math> as three groups of eight, then I know that the factor 3 tells me how many jumps to make on the number line and the factor 8 tells me the equal length of each jump. I'll draw tick marks to label the beginning or ending of the jumps. I'll skip count by 8s to label the tick marks appropriately. [Teacher shows or draws completed number line below.]</p> 	<p>Students listen to teacher's think aloud for using the doubles strategy to find <math>9 \times 8</math>.</p> <p>Students record the fours fact <math>9 \times 4 = 36</math> on their paper.</p> <p>Students record <math>9 \times 8 = 36 + 36 = 72</math>.</p> <p>Students listen to teacher's think aloud for drawing a number line to find <math>3 \times 8</math>.</p>

From my number line, I can see that the product of  $3 \times 8 = 24$ .

Take a minute to draw this number line that illustrates  $3 \times 8 = 24$ . [Pause.]

[We do, problem 1.]

Now let's do this next problem together.

Use the doubles strategy to find the product of  $8 \times 8$ .

On your paper, record the equation  $8 \times 8 = \underline{\hspace{1cm}}$ . Notice that both of our factors are 8. When we use the doubles strategy, we are only considering a single factor to be the double. So for the related fours fact, we can use either  $4 \times 8$  or its equivalent fact  $8 \times 4$ . On your paper, record and complete the equation  $4 \times 8 = \underline{\hspace{1cm}}$ . [Pause.]

Give me a thumbs up if you remembered that  $4 \times 8$  equals 32. Great! Our completed equation for the related fours fact is  $4 \times 8 = 32$ .

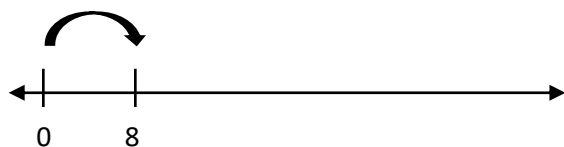
We can double the product 32 to find the product of  $8 \times 8$ . On your paper, complete the equation  $8 \times 8 = \underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$ .

Check to see that you recorded  $8 \times 8 = 32 + 32 = 64$ . So the product of  $8 \times 8 = 64$ .

[We do, problem 2.]

Now, we'll use a number line to find the product of  $4 \times 8$ . Before we draw the number line, we need to interpret the meaning of the factors in the expression  $4 \times 8$ . Show me with your fingers which factor describes the number of jumps we'll make. [Pause.] That's right! The first factor 4 tells us the number of jumps or groups. The second factor 8 tells us the length of each jump.

Go ahead and draw a number line that shows 1 jump of 8. After we check the first jump, then we'll complete our number lines. [Pause.]



Students draw the teacher's number line illustration of  $3 \times 8 = 24$ .

Students record the equation  $8 \times 8 = \underline{\hspace{1cm}}$ .

Students record the related fours fact  $4 \times 8 = 32$ .

Students use the doubles strategy to complete the equation  $8 \times 8 = 32 + 32 = 64$ .

Students show 4 fingers to indicate that's the factor that describes how many jumps on the number line.

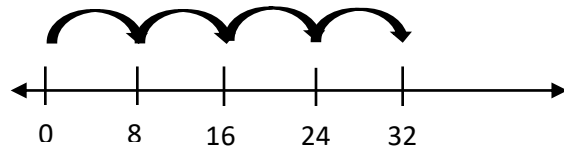
Students begin their number line drawing by showing the first jump of length 8.



[Teacher displays above image of number line.] **Check to see that your number line is looking like this one. So far it describes one jump of length 8.**

**Complete your number line to find the product for  $4 \times 8$ .**

[Pause.]



**Check to see that your number line looks similar to mine.**

[Teacher displays above image.] **The number line illustrates 4 equal jumps of 8 beginning at zero and ending at 32. The product for  $4 \times 8 = 32$ .**

[You do, problem 1.]

**Now you try one by yourself!**

**Use the doubles strategy to find the product of  $7 \times 8$ .**

**Show that you used the doubles strategy by completing the equation  $7 \times 8 = \underline{\quad} + \underline{\quad} = \underline{\quad}$ .**

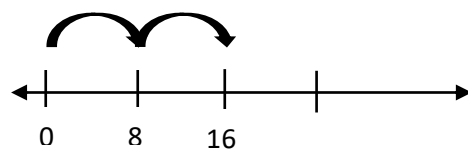
[Pause.]

**The completed equation is  $7 \times 8 = 28 + 28 = 56$ .**

[You do, problem 2.]

[Teacher reads problem out loud.]

**Use a number line to find the product of  $2 \times 8$ .** [Pause.]



**Does your number line look similar to this one?** [Teacher shows number line above.] **It shows that the product of  $2 \times 8 = 16$ .**

**Great job!**

Students complete their number lines to show  $4 \times 8 = 32$ .

Students compare their number lines with the teacher's.

Students work alone to use the doubles strategy to find  $7 \times 8 = 28 + 28 = 56$ .

Students work alone to draw a number line to find the product of  $2 \times 8$ .

## PBS Lesson Series

<p>Additional Problems (if needed):</p> <p><b>Lynn has 4 stacks of quarters. There are 8 quarters in each stack. How many quarters does Lynn have?</b></p> <p><b>What two facts can you double to find <math>8 \times 4</math>? Explain.</b></p>	
<p><u>Independent Practice</u> (10 min)</p> <p><b>Great work, students! Today, we reviewed using strategies to multiply with the factor 8. I hope you are feeling confident with your multiplication facts. You sure did a great job! 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>Good luck and do your best!</b></p>	<p>Students listen to teacher summarize today's learning and view the independent practice problems.</p>
<p><u>Closing</u> (1 min)</p> <p><b>Students, I enjoyed practicing strategies to multiply by the factor 8 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!</b></p>	

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