

Math: Grade 3, Lesson 15, Area

Lesson Focus: Use areas of rectangles to find the areas of irregular shapes.

Practice Focus: Students will focus on practicing finding the area of irregular shapes that can be decomposed into rectangles.

Objective: Students will find the area of irregular shapes.

Key Vocabulary: area, irregular shape, regular shape, decompose

TN Standards: 3.MD.C.7

Teacher Materials:

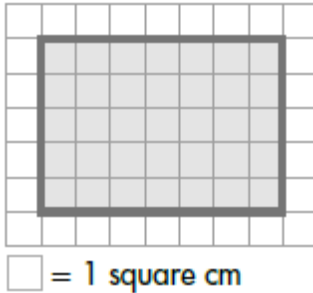
- Paper, pencil, and dry erase board/marker
- Student practice packet

Student Materials:

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

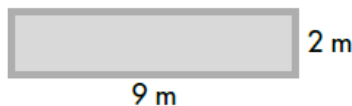
Teacher Do	Student Do
<p><u>Opening (1 min)</u></p> <p>Hello! Welcome to Tennessee's At Home Learning Series for math! Today's lesson is for all our 3rd graders out there, though all children are welcome to tune in. This lesson is the fifteenth in our series.</p> <p>My name is ____ and I'm a ____ grade 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 finding the area of irregular shapes! 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 • Student packet for Math, Grade 3, 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 (5 min)</u></p>	<p>Students actively listen to teacher.</p>

Let's review how to multiply side lengths to find the area of rectangles. [Teacher displays the rectangle below.]



Look at the rectangle that is on grid paper. When we first started learning how to find area, what did we do? [Pause. That's it! We counted the total number of unit squares covering the inside of the shape. Then we noticed that the unit squares were arranged in rows or groups and that each group had the same number. What did that let us do? [Pause.] You got it! That means we can multiply to find the area. In this rectangle, I can see that there are 5 rows of unit squares. Each row has 7 unit squares. We can write the expression 5×7 to describe the area of this rectangle. On your paper, write the area of this rectangle and be sure to include the appropriate square units. [Pause.] Give me a thumbs up if you wrote 35 square centimeters.

Now let's look at this rectangle. [Teacher displays or draws rectangle like image below.]



This rectangle is not on grid paper so we can't see all the unit squares that cover the inside space. However, the side lengths are labeled. We can see that one side length has a measure of 9 meters and the other side length has a measure of 2 meters. On your paper, write the multiplication expression that describes the area of this rectangle. [Pause.] Give yourself some applause if you wrote 2×9 or 9×2 . Now let's record the area of the rectangle. I know $2 \times 9 = 18$ so the area of this rectangle is 18 square meters. Record the area on your paper.

Teacher Model (10 min)

Students find and write the area of the rectangle on their paper.

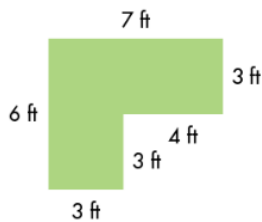
Students give a thumbs up to indicate they wrote 35 square cm.

Students write the expression 2×9 to describe the area of the shape.

Students record the area 18 square meters.

Objective 1: Teacher modeling finding area of irregular shapes by decomposing into rectangles and finding the sum of their areas.

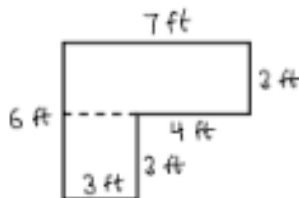
Today, we are going to use what we know about finding the area of rectangles to find the area of irregular shapes that we can break apart into rectangles. Let's look at a problem together. [Teacher displays image below and reads the problem aloud.]



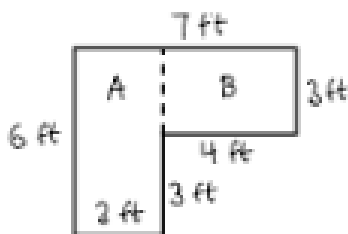
Mrs. Marcum's desk is shaped like this. The length of each side of the desk is labeled in feet. Find the area of Mrs. Marcum's desk.

Take a moment to draw this shape on your paper. [Pause.] **How can we decompose or break apart this irregular shape into smaller shapes to find the area?** [Pause.] **Draw a line on your shape to make two smaller shapes.** [Pause.]

I'm going to show you two pieces of student work so we can see how they decomposed their shapes. [Teacher shows student work images below.]



Rodrigo's Work



Janet's Work

Objective #1:

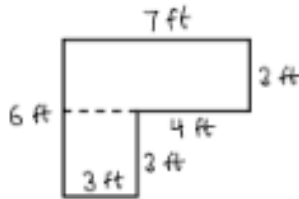
Students will be using their prior knowledge of finding the area of rectangles to finding the area of irregular shapes. They'll learn that they can decompose an irregular shape into smaller shapes so that the sum of the areas of the smaller shapes equals the area of the whole shape.

Students draw the irregular shape on their paper.

Students draw a line on their shape to decompose into smaller shapes.

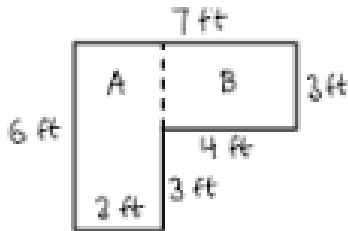
Does your shape look like either Rodrigo's or Janet's shape? They drew dotted lines to show how they are breaking apart the irregular shape into two smaller shapes. [Pause.]

Now we can find the areas of the two smaller shapes and add them together to get the area of the whole shape. Let's find the area using Rodrigo's shape first. [Teacher displays Rodrigo's drawing and records the math during her think aloud.]



I see that there is a rectangle and a square. Write on your paper what multiplication expressions describe the area of these shapes. [Pause.] Give me a thumbs up if you wrote the expressions 3×7 and 3×3 . Great! I know that $3 \times 7 = 21$ so the rectangle has an area of 21 square feet. I know that $3 \times 3 = 9$ so the square has an area of 9 square feet. On your paper, find the sum of these two areas. [Pause.] The sum of 21 and 9 is 30. So the area of the whole desk is 30 square feet.

Now let's use Janet's shape. [Teacher displays Janet's shape.] Should we get the same total area using Janet's shape that we got using Rodrigo's shape? [Pause.] Yes! She cut her irregular shape into two different shapes than Rodrigo, but the area of the whole desk should be the same.



I see that Janet cut her shape apart into two rectangles. On your paper, write the multiplication expressions that describe the area of each rectangle. [Pause.] Pat yourself on the back if you wrote 6×3 and 3×4 . Great! I know that $6 \times 3 = 18$ and $3 \times 4 = 12$. On your paper, find the sum of the areas. [Pause.] The sum of 18 and 12 is 30. So the area of the whole desk is 30 square feet. Just like Rodrigo found!

Students compare their drawings with the displayed student work.

Students write the multiplication expressions 3×7 and 3×3 to represent the two shapes.

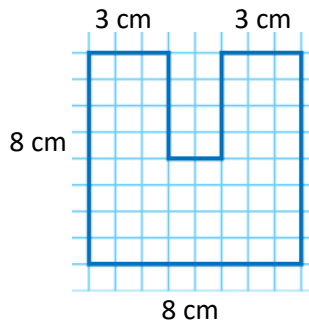
Students find the sum of the areas.

Students write the multiplication expressions 6×3 and 3×4 to represent the two shapes.

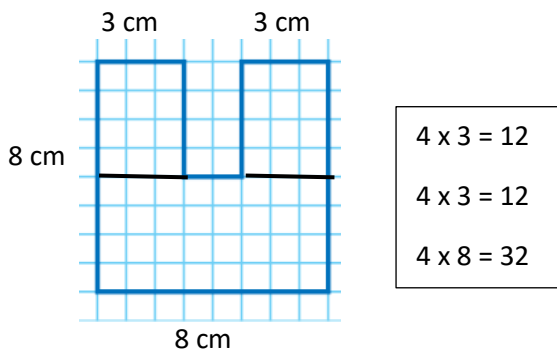
Students find and record the sum of the two areas.

Tying the learning together:

Both students found the area of an irregular shape by breaking the shape apart into simpler shapes. It's important that you understand that irregular shapes can be divided into many different sets of rectangles without changing the area of the whole shape. Let's do another example. Look at this irregular shape that's on grid paper. [Teacher displays image below.]



There are many ways we can decompose this shape into smaller shapes. Draw the outline of this shape on your paper. Then draw lines to make smaller shapes. [Pause.]



[Teacher shows image above and the equations.] **Here's one way you may have drawn lines. This decomposes the irregular shape into 3 smaller shapes. The two rectangles at the top of the shape both have areas of 12 square centimeters. The third rectangle has an area of 32 square cm. On your paper, find the sum of the 3 areas.** [Pause.] **The sum of the three areas is 56. So the whole shape has an area of 56 square cm.**

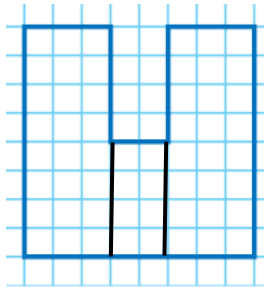
[Teacher displays image below.]

Students work through another example to make the connection that irregular shapes can be divided into many different sets of rectangles without changing the area of the whole shape.

Students draw the outline of the shape on their paper. Students draw a line or lines to decompose the shape.

Students find the sum of the three areas on their paper.

Here's another way we can decompose the irregular shape.

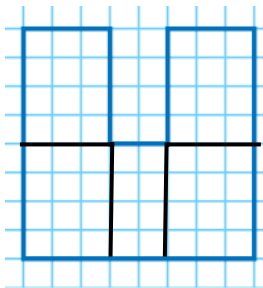


$$8 \times 3 = 24$$

$$8 \times 3 = 24$$

$$4 \times 2 = 8$$

Again, I've made 3 rectangles with the lines I drew. Two of my rectangles have an area of 24 square cm. One of the rectangles has an area of 8 square cm. On your paper, find the sum of the three areas. [Pause.] 24 plus 24 is 48. 48 plus 8 is 56. The area of the whole irregular shape is 56 square cm.



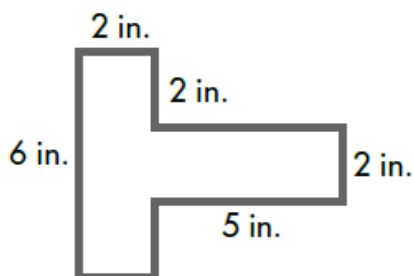
[Teacher shows image above.] We also could have decomposed the irregular shape into 5 smaller rectangles. Because the space inside the whole shape doesn't change, the sum of the areas of the 5 smaller shapes will still equal the area of the whole shape.

Now let's practice some problems where we'll decompose a shape to find its total area.

Guided Practice (10 min)

[I do.]

I'll do the first practice problem. Find the area of the irregular shape. [Teacher displays or draws image below.]



Students find and record the sum of the three areas.

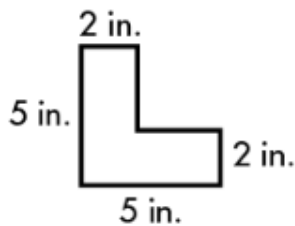
Students actively listen to teacher think aloud.

I just learned that I can decompose a shape into smaller shapes. I'm going to break this shape apart into 2 rectangles. One rectangle is 6 inches by 2 inches. [Teacher points to the 6 by 2 rectangle in image.] The other rectangle is 2 inches by 5 inches. [Teacher points to the 2 by 5 rectangle in image.] On your paper, write the multiplication equations that describe the areas of my two rectangles. [Pause.] Give me a thumbs up if you wrote $6 \times 2 = 12$ and $2 \times 5 = 10$. Great! Now find the sum to get the area of the whole shape. Record the area measurement on your paper. [Pause.] Let's see, 12 plus 10 is 22. So the area of the whole shape is 22 square inches. Is that what you found?

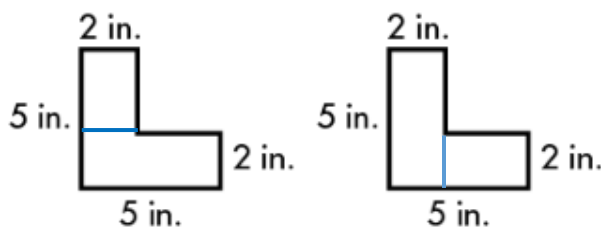
Remember, I could have decomposed the irregular shape a different way. The sum of the areas of the smaller shapes would still be 22 because the space inside the whole shape doesn't change.

[We do.]

Now let's do this next problem together. Find the area of the irregular shape. [Teacher displays image below.]



Draw this shape on your paper and label the side lengths. [Pause.] Draw a line or lines to make smaller shapes. [Pause.]



If you made two rectangles, your shape will look like one of these. [Teacher shows above images with the lines drawn.]

Now write multiplication equations to find the area of each of your shapes. [Pause.]

Did you get an area of 10 square inches for one of your rectangles and 6 square inches for your other rectangle?

[Teacher does a think aloud and points to the images above to show how these are the areas of the two smaller rectangles.]

Now find the sum of your areas and record the area of the whole shape on your paper. [Pause.]

Students write the multiplication equations that describe the areas of the two rectangles.

Students find the sum of the areas and record the area measurement 22 square inches.

Students work a problem with the teacher.

Students draw the shape on their paper and include the side lengths. Students draw a line to decompose the shape.

Students write multiplication equations to describe the areas of the rectangles.

Students find the sum of the areas and record the total area measurement.

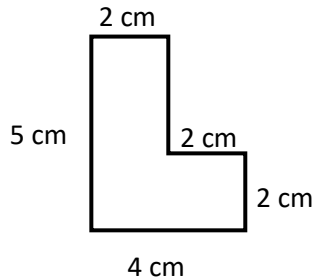
Did you find an area of 16 square inches for the whole shape? Pat yourself on the back!

[You do.]

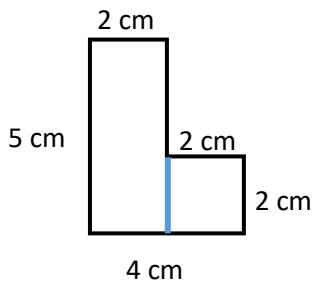
Now you try one by yourself!

[Teacher displays or draws image below.]

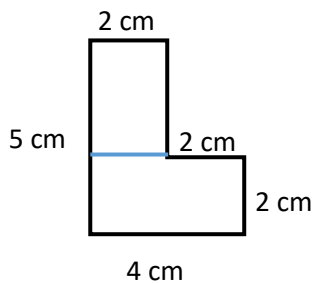
Draw this irregular shape on your paper and label the side lengths. Then find the area of the irregular shape. [Pause.]



The area of the irregular shape is 14 square centimeters. Give yourself some applause if that's what you found. Great job! I'll explain two of the ways you could have found the area. Check your work and make corrections if needed.



If you drew your line here, you created a rectangle and a square. $5 \times 2 = 10$ gives us the area of the rectangle and $2 \times 2 = 4$ gives us the area of the square. The sum of the 2 areas is 14. So the total area is 14 square cm.



If you drew your line here, you created two rectangles. $3 \times 2 = 6$ gives us the area of one rectangle and $2 \times 4 = 8$ gives us

Students check their answers.

Students solve the problem alone.

Students draw the image on their paper and label the side lengths. Students find the area of the irregular shape.

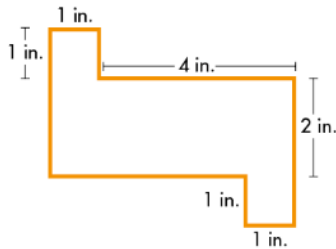
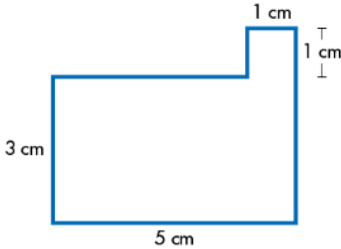
Students check to see if they found an area of 12 square centimeters.

Students listen to solutions.

the area of the second rectangle. The sum of the 2 areas is 14. So again, we get the total area is 14 square cm.

[Additional problems if needed.]

Find the area of the irregular shape.



Independent Practice (10 min)

Great work, students! Today, we reviewed finding the area of rectangles and squares by using multiplication. We applied this learning to finding the area of irregular shapes by decomposing the irregular shape into smaller shapes whose areas we added together to get the total area. 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, www.tn.gov/education.

[Teacher shows student practice page under document camera or camera zooms in on student practice page.]

Good luck and do your best!

Students listen to teacher summarize today's learning and view the independent practice problems.

Closing (1 min)

- **Students, I enjoyed reviewing using what we know about finding the area of rectangles and squares to finding the area of irregular shapes! Thank you for inviting me into your home. I look forward to seeing**

PBS Lesson Series

<p>you in our next lesson in Tennessee's At Home Learning Series!</p> <ul style="list-style-type: none">• Bye!	
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