

Math: Grade 3, Lesson 12, Area

Lesson Focus: Use standard units to measure the area of a shape.

Practice Focus: Students will focus on practicing using standard units to measure area and to record the area measurement with a focus on square inches, square feet, square centimeters, and square meters.

Objective: Students will measure the area of a shape using standard units.

Key Vocabulary: standard units, square inch, square foot, square centimeter, square meter

TN Standards: 3.MD.C.6

Teacher Materials:

- Unit square cutouts or manipulatives that have areas of 1 square cm
- Unit square cutouts or manipulatives that have areas of 1 square foot
- Paper, pencil, and dry erase board/marker
- Student practice packet

Student Materials:

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

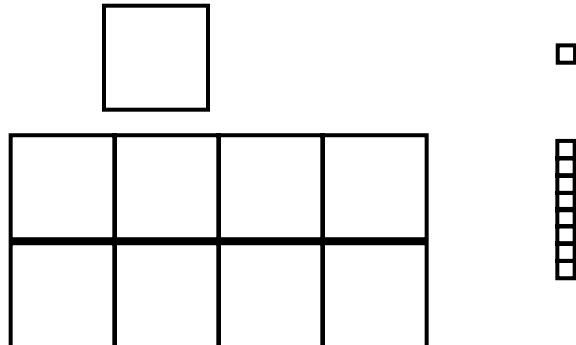
Note: Please use pre-made cutouts of unit squares that have an area of 1 square inch so that students see accurate representations of square inches throughout the lesson.

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 twelfth 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 using standard units to measure the area of a shape! 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 12 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> First, let's review how to measure area. We measure area by counting the number of unit squares that covers a shape with no gaps or overlaps. A unit square is a square with sides that are each one unit long. A unit square has an area of one square unit. [Teacher shows or creates image and text below.]</p> <div data-bbox="389 546 618 684" data-label="Image"> <p>A square with side lengths labeled as 1 unit on all four sides.</p> </div> <p>Let's do a warm-up problem together. On your paper, draw a square to represent 1 unit square. [Pause.] Now use your unit square to draw a rectangle that has an area of 8 square units. After you draw your unit square and rectangle with an area of 8 square units, we'll compare our drawings. [Pause.]</p> <p>Here is my drawing of a unit square and a rectangle with an area of 8 square units. [Teacher shows or creates drawing like the one below.]</p> <div data-bbox="380 1104 688 1285" data-label="Image"> <p>A unit square labeled "= 1 square unit" and a rectangle composed of 8 unit squares arranged in a single row, labeled "Area = 8 square units".</p> </div> <p>How is your unit square alike or different from my unit square? [Pause.] Both of our unit squares are alike because they are both squares and they both have an area of 1 square unit. Our unit squares are different because we probably drew different sizes of unit squares.</p> <p>How is your rectangle alike or different from my rectangle? [Pause.] Our rectangles are alike because they both have an area of 8 square units and because they are both rectangles. The amount of space our rectangles cover might be different and the way we drew our rectangles might be different.</p> <p>In a previous lesson, we learned that the size of the unit square affects the size of the rectangle we draw. Now I have some wonderings about the unit square and rectangle I just drew. What if my unit square was larger? Would my rectangle also be larger? What if my unit square was smaller?</p>	<p>Students actively listen to teacher.</p> <p>Students use prior learning to draw a unit square and then draw a rectangle that has an area of 8 square units.</p> <p>Students compare their drawings with the teacher's drawings.</p> <p>Students listen to teacher's wonderings and connections to a previous lesson.</p>

How would that affect the size of my rectangle? Let's see.

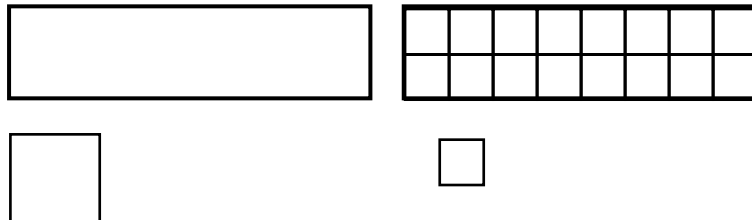
[While still displaying teacher's original square unit and rectangle, teacher draws or shows unit squares and rectangles like below.]



On the left, I have a larger unit square. My rectangle is still 8 square units, but it is also larger because it covers more space. On the right, I have a smaller unit square. My rectangle is also smaller because it covers less space, but its area is still 8 square units!

The unit squares that we have drawn for this activity are called non-standard units. They can be different sizes. The size of the unit square can change the area measurement of a shape.


Look at these rectangles. [Teacher shows images below.] The rectangles are the same size, but when we use the different-sized unit squares, we get different area measurements. Show me with your fingers how many of the larger unit squares will cover the area of the rectangle on the left. [Pause.] Pat yourself on the back if you showed me four fingers. The rectangle on the left has an area of 4 square units when we use the unit square on the left. [Teacher points to unit square and rectangle on the left.] The rectangle on the right, even though it is the same-sized rectangle, has an area of 16 square units because we used this smaller unit square on the right.



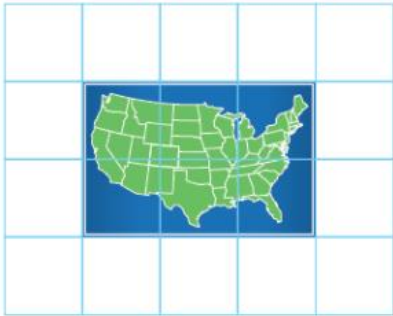
I have another wondering! Let's imagine these same-sized rectangles represent a rectangular area of flooring in our

Students find the area using the larger unit square.

Students pat themselves on the back for holding up 4 fingers to show how many unit squares cover the area of the rectangle on the left.

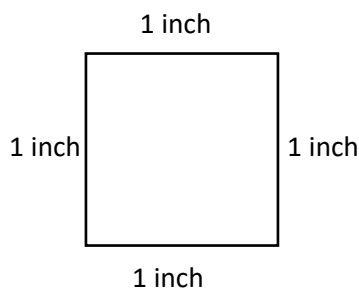
<p>classroom at school. We want to cover this flooring with carpet squares. Do we buy 4 square units or do we buy 16 square units? [Pause.] I think we'll be able to answer this question at the end of today's lesson.</p>	
<p><u>Teacher Model (10 min)</u></p> <p>Objective 1: Teacher modeling using standard units of measure to find area of shapes.</p> <p>In today's lesson, we'll continue to find area but we'll use standard units of measure. When have you learned about standard units before? [Pause.] In second grade, you learned how to measure lengths using standard units of length such as inches, feet, centimeters, and meters. Standard measurement units are used for consistency in finding and communicating our measurements. Today we will practice using standard units of measurement related to finding area. The standard units of area we will use are the square inch, square foot, square centimeter, and square meter.</p> <p>Let's do an area problem that uses standard units of measure. Listen as I read the problem. [Teacher reads problem aloud and displays the sticker below.]</p> <p>Meg bought this sticker. What is the area of the sticker in square centimeters?</p>  <p>What are we asked to find? [Pause.] We are asked to find the area of the sticker in square centimeters. I know that square centimeter is a standard unit of area, but what does it mean? A square centimeter is a unit square that has side lengths of 1 centimeter. [Teacher shows a cutout or manipulative that has an area of one square centimeter.]</p> <div style="text-align: center;"> <p>1 cm</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 5px;">1 cm</div> <div style="border: 1px solid black; width: 40px; height: 40px; position: relative;"> <div style="position: absolute; top: -10px; left: 50%; transform: translateX(-50%);">1 cm</div> <div style="position: absolute; bottom: -10px; left: 50%; transform: translateX(-50%);">1 cm</div> </div> <div style="margin-left: 5px;">1 cm</div> </div> <p>1 cm</p> <p>Area = 1 square centimeter</p> </div>	<p>Objective #1: Students will be connecting their prior knowledge of using standard units of length to using standard units of area. This will allow students to understand standard measurement units are used for consistency in finding and communicating our measurements.</p> <p>Students actively listen to teacher reading the problem.</p> <p>Students listen to teacher's think-aloud.</p>

To help us measure the area of the sticker, I'll put it onto centimeter grid paper. The grid paper will help us see how many square centimeters cover the sticker. [Teacher shows image below.]

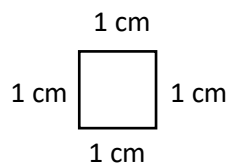


Now we can find the area by counting the unit squares. Show me with your fingers how many unit squares cover the sticker. [Pause.] That's right, there are 1, 2, 3, 4, 5, 6 unit squares covering the sticker. The unit squares on this grid are square centimeters. So, the area of the sticker is 6 square centimeters.

What if we were asked to find the area of the same sticker using square inches? Would we need more unit squares or fewer unit squares to cover the shape? Here's what a square inch looks like and here's what a square centimeter looks like. [Teacher shows cutouts or manipulatives of a square inch next to a square centimeter.] Let's draw a model of the square inch and of the square centimeter on our papers. Remember that your model for a square inch is larger in size than your model for a square centimeter. [Teacher draws the below images of the square inch next to the square centimeter.]



Area = 1 square inch



Area = 1 square centimeter

Students count to find the number of unit squares that cover the sticker and show their answer with their fingers.

Students consider whether it will take more or fewer square inches to cover the sticker.

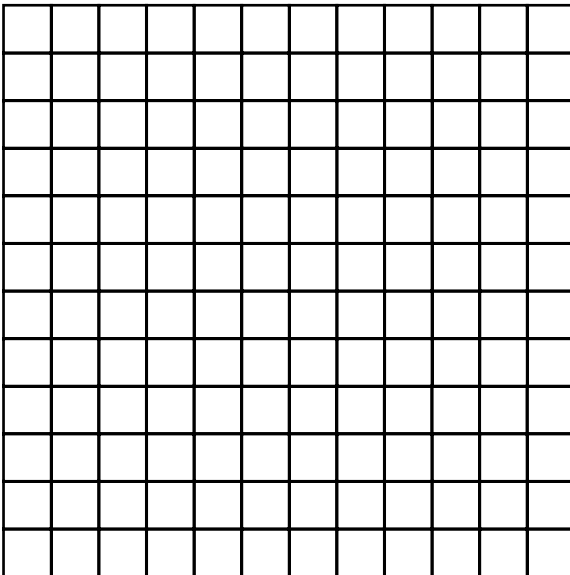
Students draw a model to represent a square inch and a model to represent a square centimeter.

How do your models look? Is the model of your square inch larger than the model of your square centimeter? [Pause.] [Teacher shows the drawings for her models.] It makes sense that a square inch is larger than a square centimeter because we already know that an inch is larger than a centimeter. Since the square inch is the larger unit square of the two, then it will take fewer square inches to cover the sticker.

So far today, we've used square centimeters and square inches. The two other standard units we'll use today are square feet and square meters. Can you picture in your head what these unit squares look like? [Pause.] I remember that there are 12 inches in one foot. So a square foot is a square whose sides are all 12 inches long. [Teacher shows images below. Or teacher can make cutouts to show.] So, if my square inch is this size, then my square foot will be this size.



Area = 1 square inch



Area = 1 square foot

Can you picture what a square meter looks like? [Pause.] I remember that 1 meter is equal to 100 centimeters. So a square meter is a unit square whose sides are all 100 centimeters long. If it's hard to picture this unit square, think about a meter stick. [Teacher shows meter stick if she has one.] If you arrange 4 meter sticks on the floor so that it

Students try to visualize the size of a square foot.

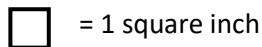
Students try to visualize what a square meter looks like.

looks like a square, the area of that square is equal to a square meter!

Objective 2: Teacher modeling/guided practice on using standard units of measure to find area.

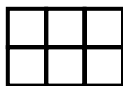
Let's think about the sticker problem again. If Meg's sticker measured 2 inches by 3 inches, what would its area be?

Let's build or draw this rectangle out of unit squares so we can find the area. You draw along with me. First let's draw a square and label it as 1 square inch. [Teacher draws square and labels like image below, and shows to students.]



Since the rectangle is 2 inches by 3 inches, that means we'll have 2 rows of unit squares. Show me with your fingers how many unit squares will be in each row. [Pause.] **Yes, there are 3 in each row because our other side length is 3 inches. Let's draw our 2 rows with 3 unit squares in each row now.** [Pause.]

Here is my rectangle. [Teacher shows her rectangle.] **Does your rectangle look like mine with 2 rows and 3 unit squares in each row?** [Pause.]



Now we can count the unit squares to find the area. Count with me! 1, 2, 3, 4, 5, 6. There are 6 unit squares. Since each unit square is 1 square inch, the area of this rectangle is 6 square inches.

Have you ever seen a sticker with an area of 6 square inches? [Pause.] **There's probably some stickers that size, but usually stickers are small. Most of the time, if you're finding the area of a sticker, you'll use small standard units of measure such as square centimeters.**

Now I'm going to read a problem asking us to decide what standard units we should use to measure an area. Listen as I read the problem.

Zoey paints a wall that measures 8 feet by 10 feet. What units should Zoey use for the area of the wall? [Pause.]

Objective 2: Students will continue to find area of shapes when standard units are being used. They will consider how the size of the standard units affect the number of units needed to cover an area.

Students draw a square to represent 1 square inch.

Students hold up 3 fingers to show how many unit squares will be in each row.
Students draw their rectangle.

Students compare their rectangle with the teacher's rectangle.

Students count out loud the unit squares with the teacher.

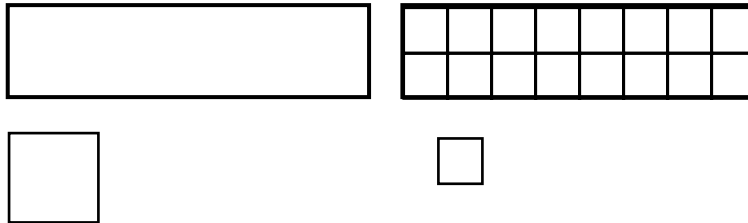
Students actively listen to teacher read the problem.

Give me a thumbs up if you said Zoey should use square feet for the area of the wall. Great! Zoey used feet to measure the dimensions of her wall so she'll use square feet for its area measurement.

It's important to remember that an area measurement consists of two parts: the number of square units and the name of the square units.

Tying the learning together: Explicit Instruction, Example(s), Guided Practice

Let's think back to the wonderings I had toward the beginning of today's lesson when we were reviewing finding area with non-standard unit squares. We had two same-sized rectangles and we had different-sized unit squares to find the areas. [Teachers shows images below.]



I asked us to imagine these same-sized rectangles represent a rectangular area of flooring in our classroom at school. We want to cover this flooring with carpet squares. But we have two different answers for the area of the rectangle. Do we buy 4 square units or do we buy 16 square units? What do you think? [Pause.]

Companies that make carpet squares only make them using standard units of measure. We have to know what our standard unit of measure is so we can purchase the correct number and size of carpet squares for our floor. We usually measure floor space in feet. If that's true about the floor we want to cover with carpet squares, then what units will we use for the area of the floor? [Pause.] Give me a thumbs up if you said square feet. That's right, so when I go to purchase carpet squares, I'll be able to ask for the number of square feet instead of the number of square units. If I just ask for square units when I really need square feet, I might end up with really small carpet squares that are measured by square inches or really large carpet squares that are measured by square meters!

Students give a thumbs up to indicate they said Zoey should use square feet.

Students reflect on prior learning to of using non-standard units of measure to make connections to the need for standard units of measure.

Students think about the number of units of carpet squares they should purchase.

Students give a thumbs up to indicate they said square feet.

Guided Practice (10 min)

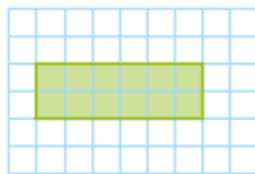
Today we've learned how to measure the area of a shape using standard units. We've also thought about the most appropriate standard unit for a shape. The standard units for area are related to the standard units for length that we used in second grade. If we're solving area problems with shapes that have centimeter side lengths, then the area of the shape will be measured in square centimeters. For meter side lengths, the area is measured in square meters. Let's practice finding and writing the area measure of a shape using standard units.

[I do.]

I'll do the first practice problem.

[Teacher reads the problem out loud and does a think aloud as she solves it.]

Each unit square represents a standard unit. Count the shaded unit squares. Then write the area.

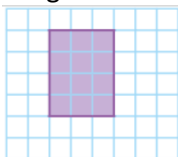


□ = 1 square m

The unit square on this grid is 1 square meter. When I count the unit squares to find the area, I find a total of 12 unit squares. Since the area of the rectangle is measured in square meters, the area is 12 square meters. [Teacher records 12 square meters.]

[We do.]

Now let's do this next problem together. Our directions are the same. Each unit square represents a standard unit. Count the shaded unit squares. Then write the area. [Teacher shows image below as she reads directions.]



□ = 1 square ft

Go ahead and find the area of this rectangle. [Pause.] **Give me a thumbs up if you counted 12 unit squares. Great! Are we finished?** [Pause.] **No. We haven't stated the standard units. Complete this sentence out loud. The rectangle has an area of 12 blank.** [Pause.] **Did you notice in the picture that the rectangle is measured in square feet?** [Pause.] **Give**

Students actively listen to the teacher's summary of today's learning.

Students actively listen to teacher reading the problem.

Students actively listen to teacher think aloud.

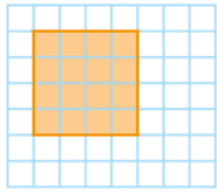
Students solve the problem with the teacher.


Students give a thumbs up to indicate they counted 12 unit squares.
Students verbalize the rectangle has an area of 12 square feet.

yourself some applause if you said the rectangle has an area of 12 square feet. [Teacher records 12 square feet.] **Great job!**

[You do.]

Now you try one by yourself! [Teacher reads directions while displaying the problem below.] **Each unit square represents a standard unit. Count the shaded unit squares. Then write the area.** [Pause while students work.]

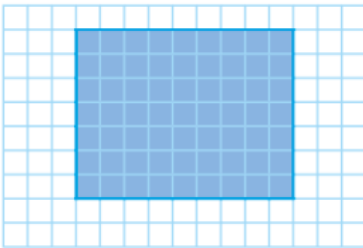



 = 1 square in.

The area of this rectangle is 16 square inches. [Teacher writes 16 square inches or 16 square in.] **Give yourself a pat on the back if you recorded both the number of unit squares and the standard unit of square inches. Well done!**

[Additional problems if needed.]

Each unit square represents a standard unit. Count the shaded unit squares. Then write the area.



 = 1 square m

Brad says that a square that has a length of 9 feet has an area of 18 square feet. Is Brad correct? Why or why not?

Students give themselves applause for saying the rectangle has an area of 12 square feet.

Students solve the problem alone.

Students give themselves a pat on the back to indicate they recorded both the number and standard unit. That is, 16 square inches.

Independent Practice (10 min)

Great work, students! Today, we reviewed measuring the area of a shape using standard units. When people use a standard unit, the measurement of a given area will be consistent. You sure did a great job! I will show you the

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

PBS Lesson Series

<p>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 (1 min)</u></p> <ul style="list-style-type: none">• Students, I enjoyed reviewing finding the area of a shape using the standard units of square centimeters, square inches, square feet, and square meters. 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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