LESSON 9

Objective

Find the area of a shape using a Geoboard.

Common Core State Standards

- **3.MD.5a** Understand that a square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.
- **3.MD.5b** Understand that a plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.
- **3.MD.6** Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).

Measurement and Data

Finding Area

Students have already had some experience with the ideas of shape, perimeter, and area in their geometry lessons, although they may not have learned the terminology or formally addressed the concepts. Area is an aspect of measurement that is connected to other areas of math, such as geometry and algebra. Here students explore finding a shape's area by simply counting the square units that make it up, but this lays the groundwork for using formulas and calculations such as multiplication to measure and find area and perimeter.

Try It! *Perform the Try It! activity on the next page.*

Talk About It

Discuss the Try It! activity.

- **Ask:** *How did you check to make sure the shape you made had an area of 6 units?*
- Have pairs of students form groups to compare the shapes they made on their Geoboards. **Ask:** *Can shapes that look different have the same area?*
- **Ask:** *Do you think a shape could have an area that includes half units?* Guide students to model a shape with an area of $5\frac{1}{2}$ units on their Geoboards.

Solve It

With students, reread the problem. **Ask:** *What if Ms. Liu wanted the nametags to be a different size?* Display a Geoboard with a rubber band stretched in a rectangle with an area of 8 square units. Have students replicate the shape on their Geoboards and then calculate its area in square units.

More Ideas

For other ways to teach about finding the area of a shape—

- Have students take turns with partners using their Geoboards to explore making figures that have half-square units. Challenge students to each make a shape that includes at least two half square units. **Say:** *When you count the square units, don't forget to add the two halves to make one.*
- Tell students that Color Tiles are also square units. Have students build shapes from tiles and count tiles to find the shapes' areas. Remind students to describe a shape's area by saying how many "square units" it has.

Formative Assessment

Have students try the following problem.

What is the area of this shape?

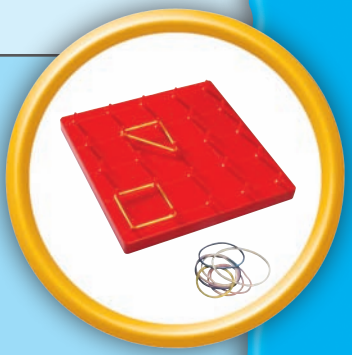
A. 16 square units

B. 18 square units

C. 20 square units

D. 22 square units

Try It! 25 Minutes | Pairs



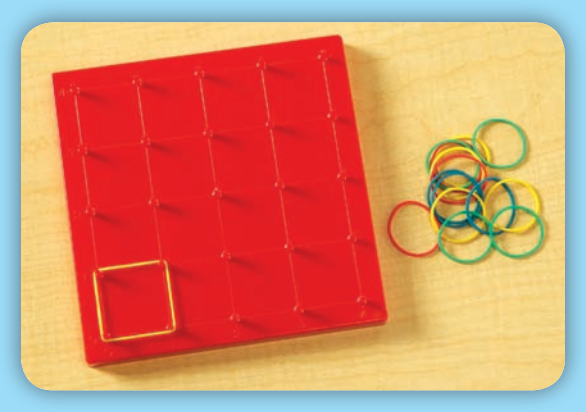
Here is a problem about finding the area of a shape.

A new student is joining Ms. Liu's class tomorrow, so she asks every student to make a nametag to wear. To show the size the nametags should be, Ms. Liu makes a rectangle on a Geoboard by stretching a rubber band around 2 rows made of 3 units each. How many square units will make up the area of each nametag?

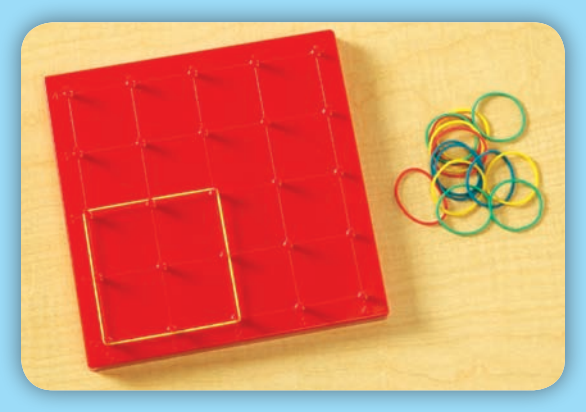
Introduce the problem. Then have students do the activity to solve the problem. Distribute Geoboards and rubber bands to students.

Materials

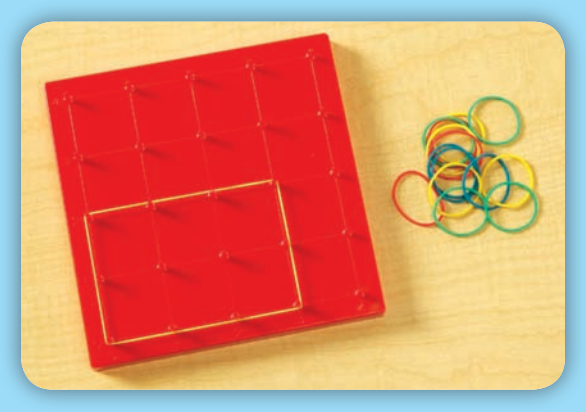
- Geoboard (1 per pair)
- rubber bands (1 per pair)



1. Model 1 square unit on a Geoboard by stretching a rubber band around 4 pegs, and guide students to do the same. **Say:** *The area of the square is the part inside the rubber band. The area of this square is 1 square unit.*



2. Move the rubber band to stretch around 2 rows of 2 units each. **Ask:** *How many square units is this shape?* Help students see there are now 4 square units in this shape. Have students replicate the shape on their Geoboards and trace over the 4 square units with their fingers.



3. Say: *With your partner, make a rectangle on the Geoboard that is 2 units high and 3 units wide.* Have students work with their partners to create the rectangles. **Ask:** *How many square units make up the area of your rectangle?* Students should count to find that the area of their rectangles is 6 square units.

⚠ Look Out!

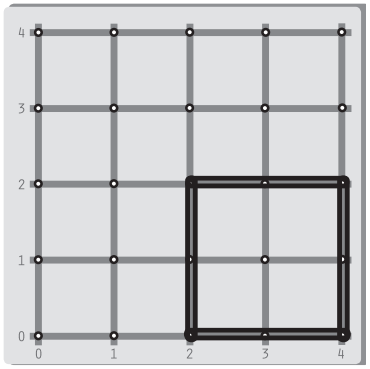
Watch for students who confuse area with perimeter. Make a square on a Geoboard and point out that the rubber band is the shape's perimeter, and that all the red space enclosed by the rubber band is the shape's area. Have students draw several shapes. Then have them use one color marker or crayon to trace each shape's perimeter and another color to shade in its area.

Answer Key

Use a Geoboard to model each shape. Find the area of the shape.

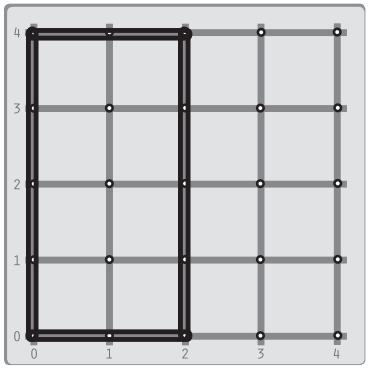
(Check students' work.)

1.



4 square units

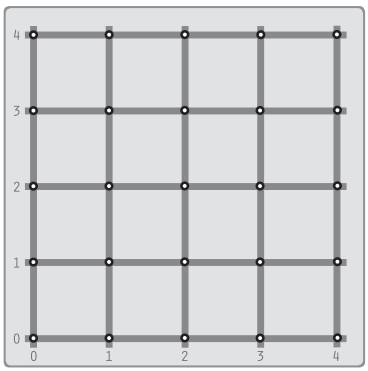
2.



8 square units

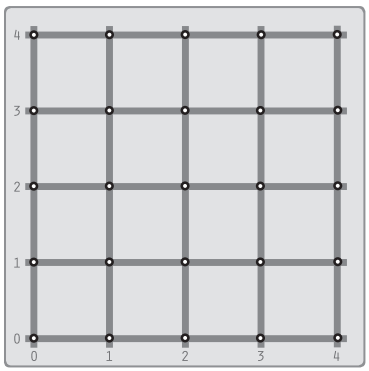
Using a Geoboard, model a shape with the given dimensions. Sketch the shape below. Find the area of the shape. (Check students' models.)

3. 4 units by 4 units



16 square units

4. 1 unit by 3 units



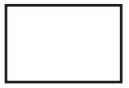
3 square units

Find the area of each rectangle, given the dimensions.

5.

14 units

6.



6 units

7.

27 units

8.

24 units

Answer Key

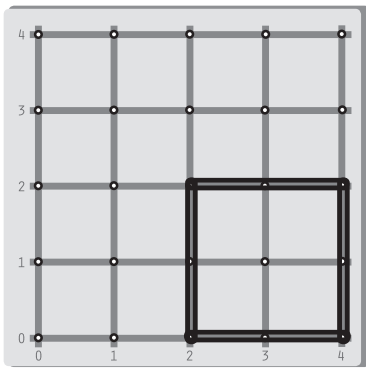
Challenge! If you rotate the shape in Problem 2, would the area change? Draw a picture to help. Explain your answer.

Challenge: (Sample) The area of the shape would not change. The shape would still have two sides that are 4 units long and two sides that are 2 units long.

Name _____

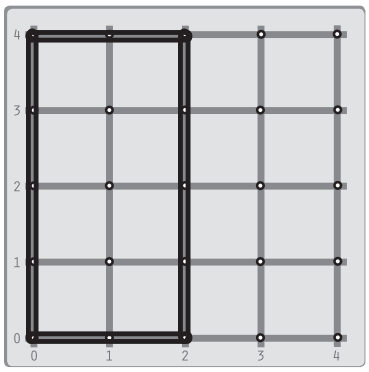
Use a Geoboard to model each shape. Find the area of the shape.

1.



_____ square units

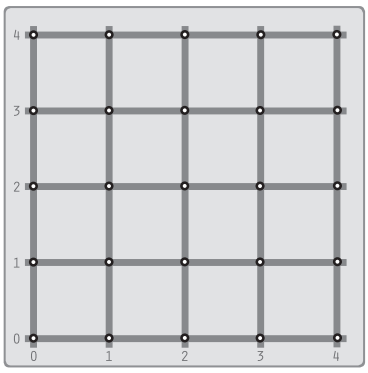
2.



_____ square units

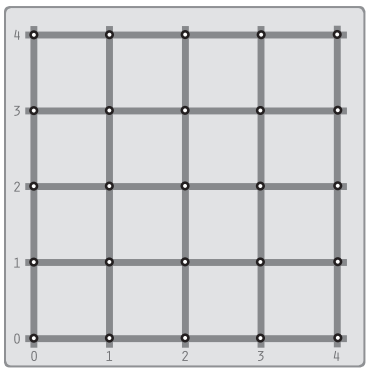
Using a Geoboard, model a shape with the given dimensions. Sketch the shape below. Find the area of the shape.

3. 4 units by 4 units



_____ square units

4. 1 unit by 3 units



_____ square units

Find the area of each rectangle, given the dimensions.

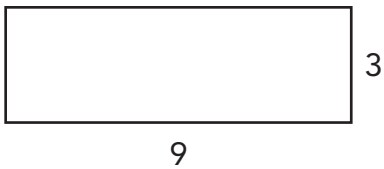
5.

_____units

6.

_____units

7.



_____ units

8.

_____units

Name _____

Challenge! If you rotate the shape in Problem 2, would the area change? Draw a picture to help. Explain your answer.