Using GEOBOARDS to Explore Areas of Squares

I^2 T^2 Project

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➢ Grade: 8th
➢ Time: One day lesson
➢ Tools: Geoboards
Goals:

- Develop strategies for finding areas of irregular figures on a grid
- Draw squares on 5 dot-by-5 dot grids, and use geoboards to find their areas.
- Relate the area of a square to its side length.

Standards:

- Select and apply techniques and tools to accurately find length, and area to appropriate levels of precision.
Resources and Materials
✓ Connected Mathematics Book: Looking For Pythagoras
✓ Labsheet 1.3 and 2.1
✓ Geoboards with rubberbands

Overview of the lesson
The first part of the lesson is a review and continuation of strategies on finding areas of irregular figures on a grid. It’s almost like a minilesson/bellwork to get them set up for the lesson. labsheet 1.3 that is used is attached. We spent some time talking and reviewing area of polygons and laid the ground work for irregular objects the previous day. This lesson was done in a double period and takes between 60-70 minutes.

Objective:
Develop strategies for finding areas of irregular figures on a grid.

Launch: (5 minutes)
Draw a simple figure on a dot grid. Ask students how they could find the area of the figure. Let students share their ideas. There are two main strategies students tend to use: subdividing the figure and finding the areas of the pieces; and enclosing the figure in a rectangle and subtracting the areas of the pieces outside the figure. It is not necessary to discuss both strategies now, but you will want to address both in the summary.
Have students explore the problem in pairs. Students may work on Labsheet 1.3, redraw the figures on dot paper.

**Explore:** (10 minutes)

In their work, students will review how to find areas of rectangles and triangles. Look for students who are actively applying this knowledge; they can share their strategies in the summary. Some students may need help applying the rule for the area of a triangle \( A = \frac{1}{2}bh \). Help them to see that a triangle is half of a rectangle.

**Summarize:** (5-10 minutes)

As students share answers and strategies, help them generalize their methods for finding area. Some students may use the strategy of rearranging parts of a figure to form a rectangle or a triangle with an easy-to-find area. Students will need to be able to apply these methods for their future work in this unit, so make sure everyone can use at least one of them and explain why it works.

**Objective**

Draw squares on 5dot-by-5dot gids and use geoboards to find areas.

**Launch:** (10 minutes)

Display Transparency 2.1 or draw a 5-dot-by-5-dot grid on the board. Draw a unit square on the grid and label it with the numeral 1.
I have drawn a square with an area of 1 square unit on this 5-dot-by-5-dot grid. Can someone come up and draw a square with a different area? Explain that students are to search for all the different sizes (areas) of squares that will fit on a 5-dot-by-5-dot grid. Distribute Labsheet 2.1 and have students work on the problem in groups of two or three. Labsheet 2.1 is attached.

Explore: (20 Minutes)
If students have difficulty identifying tilted squares, display one on the board or overhead. Start with a square of area 2. Remind students to check the area of each square they draw to verify that the areas are all different.

Summarize: (15 minutes)
Ask students to share the various squares they found as you draw them on Transparency 2.1. Continue until all eight squares are displayed. (If students do not offer all eight, suggest the missing ones yourself.) Discuss the strategies students used to find the squares.

Which squares were easy to find? Why?
Which squares were not easy to find? Why?
How did you determine that your figure was a square?
Looking for Pythagoras

5 Dot-by-5 Dot Grids

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Labsheet 1.3

Figures for Problem 1.3

Looking for Pythagoras