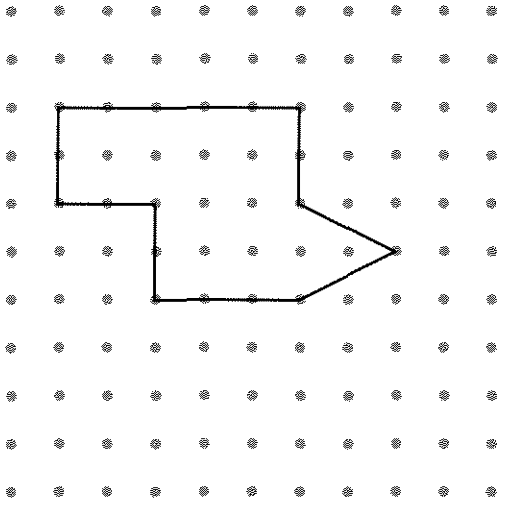
1.12 Area on the Geoboard

You will need:

- geoboard
- dot paper

This geoboard shape has area 18.



1. **Exploration** Find as many geoboard shapes having area 18 as you can. They do not need to be rectangles. You are allowed to stretch the rubber band in any direction whatsoever, including diagonals. Sketch each shape on dot paper.

TRIANGLES

2. On your geoboard make three triangles, each one satisfying one of the following conditions. Sketch each triangle on dot paper.

a. One side is horizontal, and one is vertical.

b. One side is horizontal, no side is vertical.

c. No side is horizontal or vertical.

3. Repeat problem 2 for these conditions.

a. Two sides are of equal length, one horizontal and the other vertical.

b. Two sides are of equal length, but neither is horizontal or vertical.

VERTICES

Definition: The corners of geometric figures such as triangles and rectangles are called *vertices.* (Singular: *vertex.*)

4. Make a figure on the geoboard having vertices in order at (4, 6), (7, 5), (8, 3), (8, 2), (6, 0), (2, 0), (0, 2), (0, 3), (1, 5).

5. Do not remove the rubber band from problem 4. Using another rubber band, make a figure having vertices in order at (2, 2), (6, 2), (5, 1), (3, 1).

6. Add eyes to the face. What are the coordinates of their vertices?

AREA TECHNIQUES

7. Make a triangle having vertices at (0, 0), (0, 10), and (10, 0). What is its area? Explain how you figured it out.

8. Make a triangle having vertices at (0, 10), (0, 6), and (3, 6).

a. With another rubber band, make a rectangle that shares three of its vertices with the triangle. What are the coordinates of the fourth vertex of the rectangle?

b. What is the area of the rectangle?

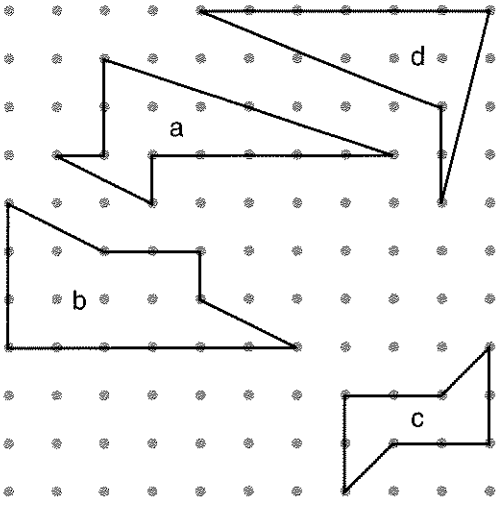
c. What is the area of the triangle?

9. Find the area of a triangle having vertices at (0, 10), (0, 5), and (7, 5).

10. On your geoboard, make two different-shaped triangles that satisfy these conditions: one horizontal and one vertical side, and area 10. Record your solutions on dot paper.

11. Repeat problem 10 for area 9.

12. Copy these figures on your geoboard (or on dot paper). Find the area of each one. Explain how you did it.



13. On your geoboard, make the triangle having vertices at (0, 10), (0, 4), and (3, 6).

a. With another rubber band, divide the triangle into two smaller triangles, such that they each have one horizontal and one vertical side. Find the area of all three triangles.

b. With another rubber band, make the smallest rectangle that covers the original triangle. What is the area of the rectangle?

14. Find the area of the triangle having vertices at (0, 0), (0, 7), and (3, 5).

15. Record your solutions on dot paper.

a. Make five triangles having a horizontal side of length 6 and area 15.

b. Make five triangles having a horizontal side of length other than 6 and area 15.

c. Make five triangles having a vertical side of length 7 and area 10.5.

16. Find the area of the triangle having vertices at (0, 0), (0, 5), and (3, 7).

17. **Summary** Explain how one finds the area of a geoboard triangle having one horizontal or vertical side.