LESSON 17

Objective

Build a shape with a given perimeter.

Common Core State Standards

- **3.MD.8** Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

Measurement and Data

Building Perimeter

Having a student measure the perimeter of a shape is the first step in understanding the concept of perimeter. The next step is requiring students to apply their knowledge in order to create a shape with a given perimeter. This shows a higher level of understanding. In this lesson students will use Pattern Blocks to create a shape with a given perimeter.

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

Talk About It

Discuss the Try It! activity.

- **Say:** *Everyone made a shape with a perimeter of 8, but groups made different shapes.* **Ask:** *How is it possible for different shapes to have the same perimeter?*
- **Ask:** *As the size of the perimeter increased, did the number of Pattern Blocks in the shape increase? Why or why not?*
- **Ask:** *What if you kept the same blocks in your design but moved them around to make a different design? Would you still have the same perimeter?*
- **Ask:** *What if you measured the last shape you made using a different tool, such as a ruler? Would it still have a perimeter of 30? Why or why not?* Stress that when measuring anything, it is important that units are established.

Solve It

With students, reread the problem. Distribute a Centimeter Grid (BLM 5) to each student, and have them use it to draw a possible shape for the garden. Explain that in this case 1 cm—or one edge of one square in the grid—equals 1 unit (foot), so the perimeter should be 30 cm.

More Ideas

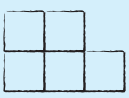
For other ways to teach about building a shape with a given perimeter—

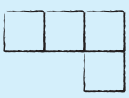
- Direct students to use Geoboards to create irregular shapes and find the perimeter. The space between two pegs equals 1 unit.
- Have students make shapes using Centimeter Cubes and find the perimeter. Then have students measure the shapes using Color Tiles, where one edge of one tile equals 1 unit. Have students compare the measurement in cubes to the measurement in tiles.

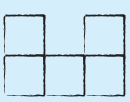
Formative Assessment

Have students try the following problem.

Which arrangement of blocks has a perimeter of 12 units?

A. 

B. 

C. 

D. 

Try It! 30 Minutes | Groups of 4

Here is a problem about building a shape with a given perimeter.

Washington School decided to plant a garden. The students want to put a fence around the garden to keep out rabbits. They have 30 feet of fence. How can the students make a garden that measures 30 feet around?

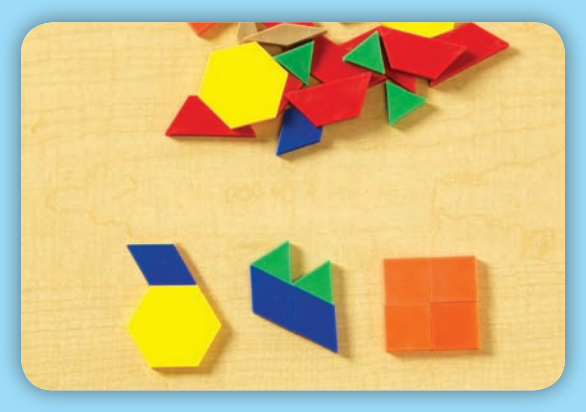
Introduce the problem. Then have students do the activity to solve the problem. Pass out an assortment of Pattern Blocks with at least one square and one triangle to each group.

Materials

- Pattern Blocks (150 assorted per group)

1. Say: *For this activity, one side of the green triangle equals 1 unit.* **Ask:** *What is the perimeter of the triangle? What is the perimeter of a square?* Have students establish that the triangle has a perimeter of 3, and the square has a perimeter of 4.

3. Say: *Now, create a shape that has a perimeter of 30 units.* Have groups create a shape. Encourage students to use many different blocks to make their shape. **Say:** *Take a green triangle. Find a group that made a different design. Use the green triangle to check the perimeter of the other group's design.*



2. Say: *With your group, make a shape that has a perimeter of 8 units.* Students should work with their groups to make shapes. Remind students that only the outside edges count in the perimeter. **Say:** *Let's see the different shapes you made.* Draw some of the different shapes students made on the board, and count to establish each shape's perimeter. Repeat the process, having students create shapes with perimeters of 20 units.

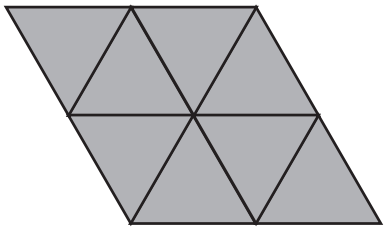
⚠ Look Out!

Some students think that a triangle included in the shape they make automatically adds three sides to the perimeter, or that a square adds four sides to the perimeter. Point out that not all of the sides are on the outside of the shape, so they are not all part of the perimeter. Remind students that perimeter is the distance around the outside edges of the shape only. Also, look out for students who think you can only measure perimeter on squares or triangles. Model how an irregular shape can have the same perimeter as a regular square or rectangle.

Answer Key

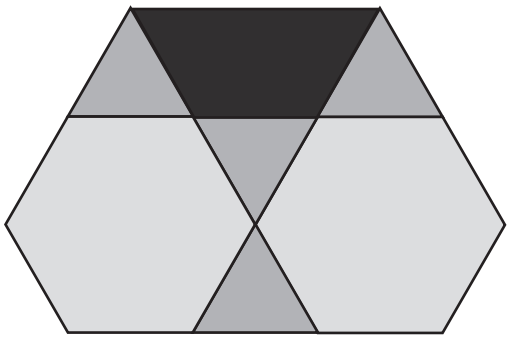
Use Pattern Blocks to build each model. One side of a green triangle equals 1 unit. Find the perimeter of each shape. (Check students' work.)

1.



8 units

2.

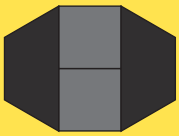


11 units

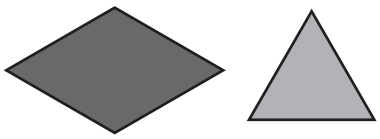
Using Pattern Blocks, model a shape with the given perimeter. Use as many of the two blocks given as you need. Sketch the shape below. (Check students' models.)

3. 8 units

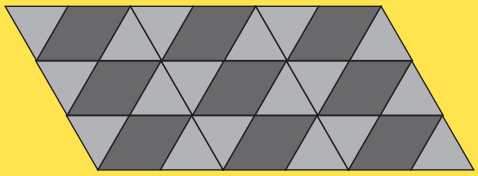
Sample shape:



4. 18 units

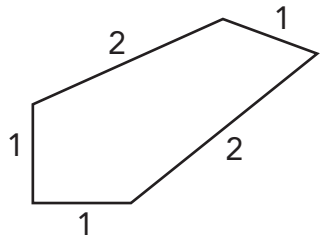


Sample shape:



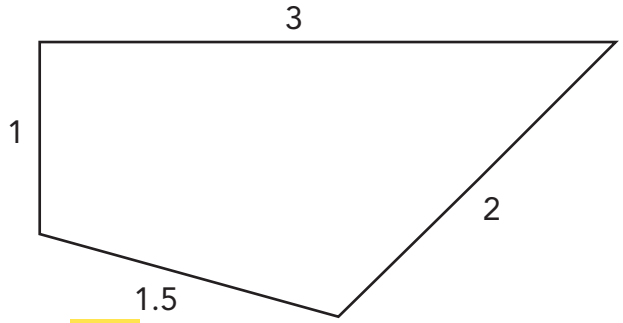
Find the perimeter of each shape.

5.



7 units

6.



7.5 units

Answer Key

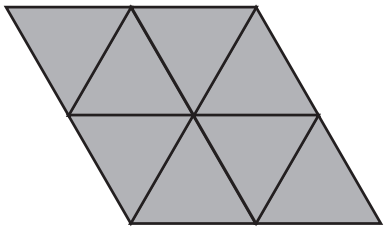
Challenge! Write directions for how to find the perimeter of a figure when you do not have a Geoboard.

Challenge: (Sample) Add the lengths of all the sides of the figure.

Name _____

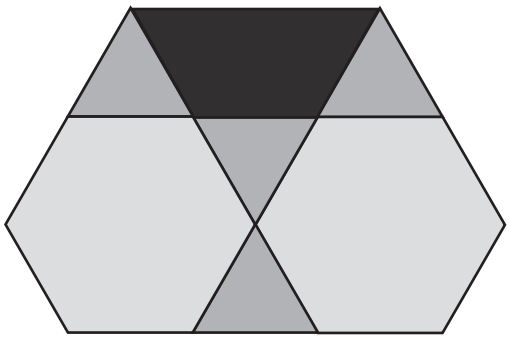
Use Pattern Blocks to build each model. One side of a green triangle equals 1 unit. Find the perimeter of each shape.

1.



_____ units

2.

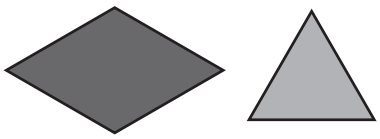


_____ units

Using Pattern Blocks, model a shape with the given perimeter. Use as many of the two blocks given as you need. Sketch the shape below.

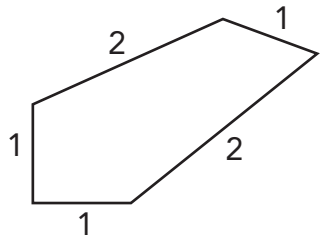
3. 8 units

4. 18 units



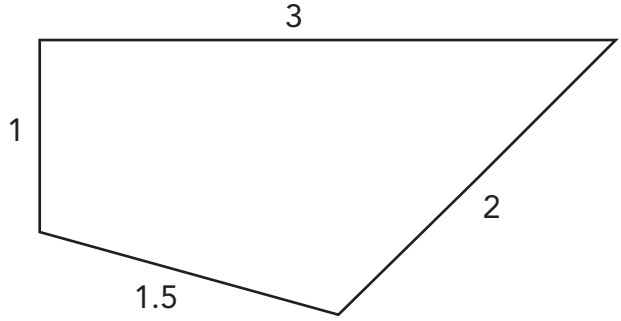
Find the perimeter of each shape.

5.



_____ units

6.



_____ units

Name _____

Challenge! Write directions for how to find the perimeter of a figure when you do not have a Geoboard.