

# Challenge Problems

## 9.5

NAME \_\_\_\_\_

Module 9      Characteristics of Geometric Shapes  
Lesson 5      Inductive and Deductive Reasoning

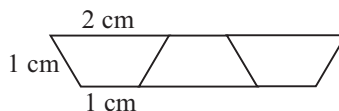
### Set 1

1

Sketch a triangle, quadrilateral, pentagon, and hexagon. Then, draw as many diagonals as possible from a single vertex of each polygon. Develop a conjecture for the number of diagonals that can be drawn from a single vertex of a polygon with  $n$  sides.

2

Find the perimeter or distance around the shape when 100 trapezoids are put together in the pattern shown. Assume that all trapezoids have the dimensions shown.



### Set 2

1

Use deductive reasoning to show why all equilateral triangles are also isosceles triangles.

## Possible Answers

### Set 1

1. One diagonal is possible in a quadrilateral; two are possible in a pentagon; and three are possible in a hexagon.



The number of diagonals that can be drawn from a single vertex in a polygon is  $n - 3$ , where  $n$  represents the number of sides of the polygon.

2. Every trapezoid's bases are included in the perimeter. There are 100 trapezoids, and the sum of the bases is three, so that is 300 cm. Including the two sides on the ends, the total of the perimeter is 302 cm.

### Set 2

1. Equilateral triangles have three equal sides. A triangle is isosceles if it has at least two equal sides. Since all equilateral triangles have three equal sides, they are all isosceles.