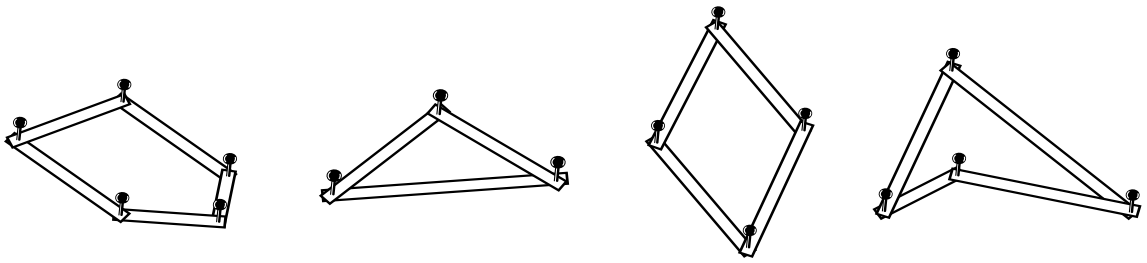
Polygons Sample Lesson

- **Lesson on Polygons**

Use thin strips of heavy paper, push-pins, and a cork board to demonstrate how to construct models of polygons.

A. 

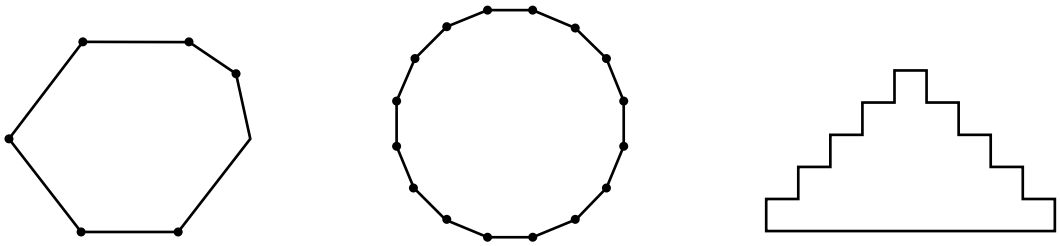
The models constructed by your teacher, and the pictures shown above, are all alike in some very important ways.

i. They are made from a set of straight strips (segments).

ii. Each segment intersects exactly two other segments, at their endpoints. (In the models, a push-pin represents the point where the two segments intersect.

iii. The models and pictures are all on a flat surface (the cork board or page of your book).

These figures are called polygons. You are already very familiar with 3-sided polygons (triangles) and 4-sided polygons (quadrilaterals). You may also recognize pentagons (5 sides), hexagons (6 sides), and octagons (8 sides). For any number bigger than 2, there are polygons with that number of sides. Examples:



7 sides 16 sides 20 sides

Assign students to work in pairs. Give each pair a cork board, 8 push pins, and 3 thin strips of heavy paper that are all 20 cm long.

B. Measure the length (in centimeters) of the strips of paper that your teacher gave you. Now figure out how to cut the strips so that you end up with segments that are 4 cm, 5 cm, 6 cm, 7 cm, 8 cm, 9 cm, 10 cm, and 11 cm long. Write the length on each strip. Then on your cork board, connect the 4 cm, 8 cm, and 9 cm strips to form a triangle.

a. Does it appear to have a right angle?

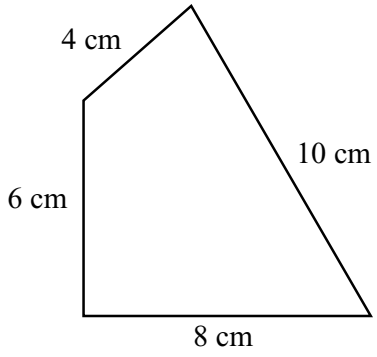
b. Compare your triangle with those of your classmates. Do they all seem to be congruent?

C. Construct a polygon using the 4 cm, 6 cm, 8 cm, and 10 cm strips.

a. Compare your polygon with those of your classmates. Do they all seem to be congruent?

b. Did anyone construct a rectangle?
Could anyone have constructed a rectangle?
Explain.

c. Do any of the polygons appear to have a right angle?
On your cork board, construct a polygon that models the picture at right.
Measure the angle formed by the 6 cm and 8 cm strips.



D. Now construct a triangle using the 4 cm, 5 cm, and 11 cm strips.

When students discover that this is impossible, lead a discussion of why it can't be done. Emphasize that the problem with the set of segments is that the figure can't be closed. Use the word "closed" in a natural way, and let students judge whether or not a figure is closed by their intuitive sense of what that means.

Relate all of this to the nature of a segment—it is the shortest path between its endpoints. Label the ends of the 11 centimeter segment A and B. Now we know that the shortest path from A to B is 11 centimeters. So if the sum of the lengths of the other two segments is less than 11 centimeters, then they can't be connected to form a path from A to B. In other words, they can't be joined to segment AB to form a triangle.

After everyone "sees" that segments of 4 centimeters, 5 centimeters, and 11 centimeters can't form a triangle, revisit the issue for quadrilaterals.