## Teacher Notes

Objective
· Investigate the limit of the area of regular polygons with constant perimeter as the number of sides increase.

Ryan's Puppy Problem Part 2

This activity is an extension of activity 3, where Ryan found a square to have the maximum area given a fixed perimeter for rectangular shapes. In this activity, students explore regular polygons to find the figure that will give the maximum area given a fixed perimeter. The construction is extensive, and the best strategy might be to lead students initially, then let them make the discovery. Recall the calculate feature will need constants placed on the screen to perform operations on the collected measurements. Below is a screen shot with all the constants and measurements for a pentagon.
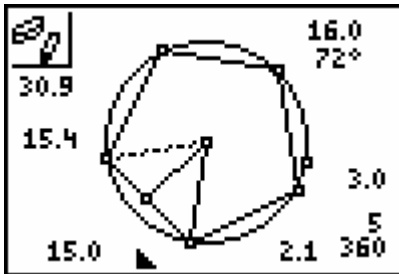
If student have problems adjusting the polygon to obtain a perimeter of 15, try translating the point on the circle that defines the circle. Translating this point may also help in arriving at the desired central angle measurement.

The table below shows a possible collection of area for each corresponding number of sides in the polygon. With the corresponding scatterplot.

Number of sides	Area
3	10.8
4	14.1
5	15.5
6	16.3
8	16.8
9	17.2
10	17.3
12	17.4
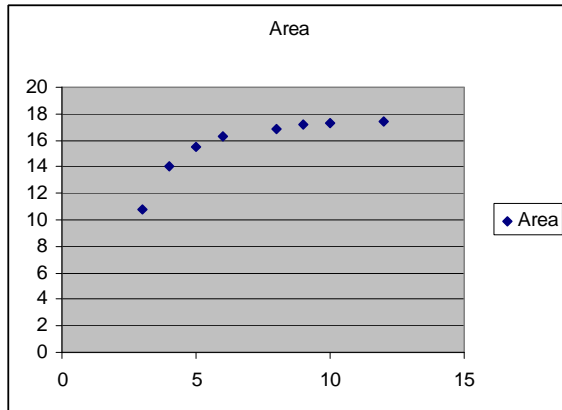
Students should see the graph of the area levels off at about 17.8. The area of the circle is 17.9.

A proof exists that shows the largest area given a fixed perimeter is a circle. The following web site might be of help for more information:
http://mathforum.org/library/drmath/view/51881.html