Finding the Area of Regular Polygons

Teacher Note

You may wish to demonstrate the construction of a regular pentagon by following the steps described in Part **a** of the exploration. Students should recall how to find the central angle of a polygon from the module "Reflect on This." The measure of each central angle should be 72°.

Exploration

a. Students should recognize how constructing a circle helps them draw the regular polygon.

b–e. Sample table:

Polygon	No. of Triangles	Apothem (a)	Length of Side (s)	Area of Polygon
pentagon	5	5.0 cm	7.2 cm	90.0 cm^2
heptagon	7	4.0 cm	3.8 cm	53.2 cm^2
decagon	10	6.0 cm	3.9 cm	117 cm^2
n-gon	n	a	s	$\frac{1}{2}a \cdot s \cdot n$

f. Sample response: The area determined by the geometry utility is about the same as the area calculated using triangles.

g. Students repeat Parts **a–f**, using 7 points to create a regular heptagon and 10 points to create a regular decagon.

h. Sample response: The formula for the area of a regular n-gon is Area = $0.5 \cdot a \cdot s \cdot n$, where a represents the length of the apothem, s represents the length of a side, and n represents the number of triangles.

Discussion

a. Sample response: As a polygon's number of sides increases, it begins to look more like a circle.

b. Sample response: As the measure of the central angle decreases, the polygon begins to look more like a circle.

c. The two areas should be approximately equal.

d. Sample response: Yes, this equation is equivalent to the formula because the number of sides is equal to the number of triangles.