

## FINDING A FORMULA FOR THE AREA OF A CIRCLE

Use the attached regular polygons to complete the following information.  
 First draw one representative triangle in each polygon using two consecutive vertices and the center of the circumscribed circle. Do not draw any triangles in the circle.

$n$  = number of sides

$r$  = length of the radius of circumscribed circle

$a$  = length of the apothem

$s$  = length of the one side of the polygon

$P$  = perimeter of the regular polygon

$A_{\Delta}$  = area of the representative triangle

$A_{POLY}$  = area of the polygon

$n$	$r$	$a$	$s$	$P$	$A_{\Delta}$	$A_{POLY}$

What observations can you make from the chart?

As  $n$  increases what happens with the length of the radius of the circumscribed circle?

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As  $n$  increases what happens with the length of the apothem?

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As  $n$  increases what happens with the length of side of the regular polygon?

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As  $n$  increases what happens with the length of the perimeter of the regular polygon?

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As  $n$  increases what happens to the area of the representative triangle?

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As  $n$  increases what happens to the area of the polygon?

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Think about what value each of the above statements approaches. Return to the above questions and write down the value they approach. What formula could be used to find the area of the regular polygon? \_\_\_\_\_

Use this formula to generate a formula for the area of a circle, thinking about how the value of  $a$  changes and the value of  $P$  changes and  $n$  increases to a very large number.

# Regular Polygons

