Author:_____ **Area of a Circle**

Group Members:

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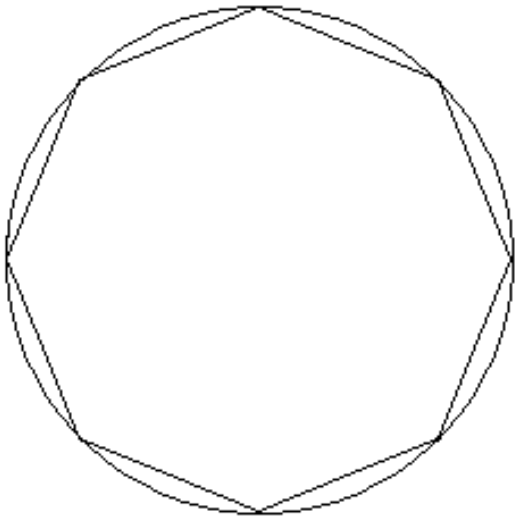
1. At the right is a regular octagon inscribed in a circle. On the picture at right, draw a regular 16-gon inscribed in the circle.



2. Consider the area of the octagon and the area of the 16-gon. Which is a better estimate for the area of the circle? Why?

3. Consider the perimeter of the octagon and the perimeter of the 16-gon. Which is a better estimate for the circumference of the circle? Why?

4. If we were to inscribe a 100-gon in the circle, would it give a better estimate of the area and circumference of the circle than the octagon and 16-gon?

5. As we inscribe polygons with more and more sides, the apothem gets closer and closer to what measurement in the circle?

6. As we inscribe polygons with more and more sides, the perimeter gets closer and closer to what measurement in the circle?

7. Looking back at problem number **??**, what is the area of a regular n-gon with apothem a and side s.

8. Can you rewrite the formula for the area of a regular n-gon in terms of the perimeter and the apothem?

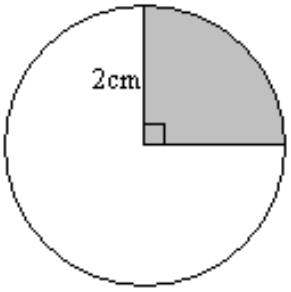
9. We can now understand the formula for the area of a circle. The $\rightarrow$ indicates what the measurement is getting closer and closer to as we include more and more sides in the inscribed polygon.

$$\begin{array}{rcccc} \text{Area of a regular } n\text{-gon} & = & \frac{1}{2} & a & P \\ \downarrow & & & \downarrow & \downarrow \\ \text{Area of a circle} & = & & & \end{array}$$

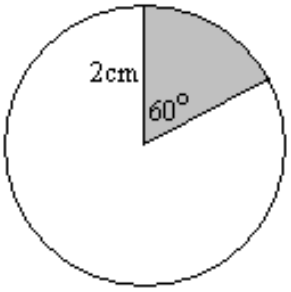
10. Simplify the above formula for the area of a circle.

11. Find the area of the shaded regions below. (Give the exact answer and an approximate answer rounded to the nearest tenth.)

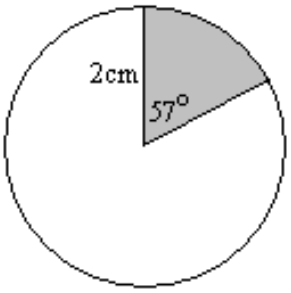
(a)



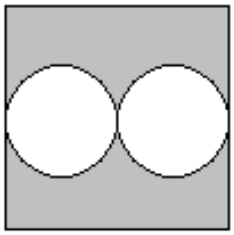
(b)



(c)



12. The square below has sides of length 5cm and the two circles are identical. Find the area of the shaded region below. (Give the exact answer and an approximate answer rounded to the nearest tenth.)



13. The larger circle below has radius 5cm and the smaller circle below has radius 4cm. Find the area of the shaded region below. (Give the exact answer and an approximate answer rounded to the nearest tenth.)