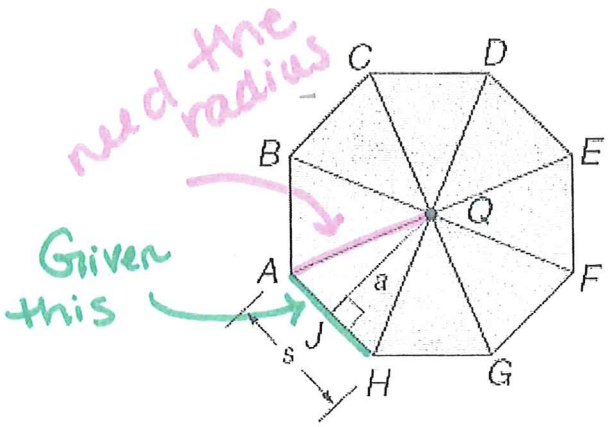
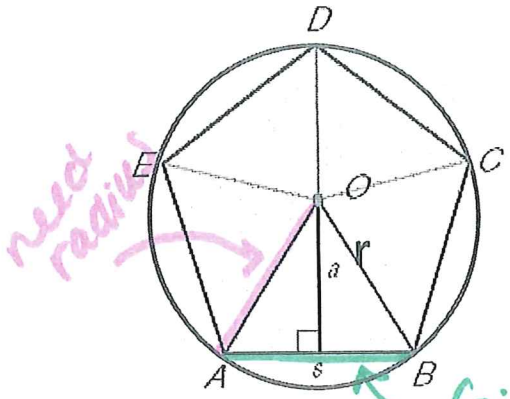
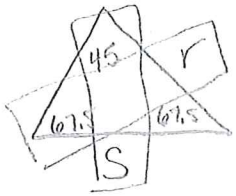
Area of Regular Polygons- Given a Side Length NOTES

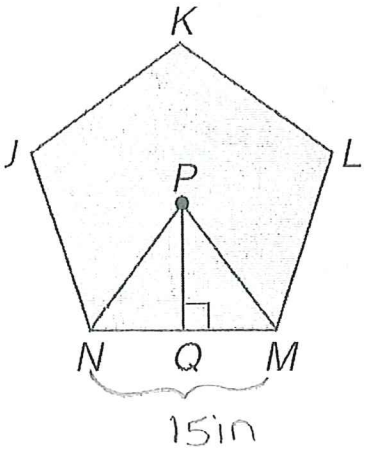




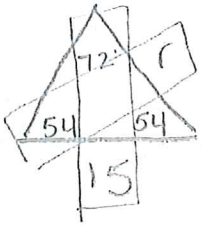


Examples:

1. If NM=15in



Law of Sines Step 1. Find Radius



$$\frac{\sin 72}{15} = \frac{\sin 54}{r}$$

$$r = \frac{15 \sin 54}{\sin 72}$$

$$r = 12.8 \text{ in.}$$

Step 2: A= n(1/2absinθ)

$$A = 5\left(\tfrac{1}{2}\right)(12.8)(12.8)\sin 72$$

$$\boxed{A \approx 389.6 \text{ in}^2}$$

✱ Add Round to nearest tenth

Examples:

Directions: Find the area of the regular polygon. Show all work.

1.Find the area of a regular pentagon with perimeter of 90cm.

$n = 5$

$\frac{90}{5} = 18 = s$

$\frac{\sin 72}{18} = \frac{\sin 54}{r}$

$\frac{18 \cdot \sin 54}{\sin 72} = r$

$r = 15.3$

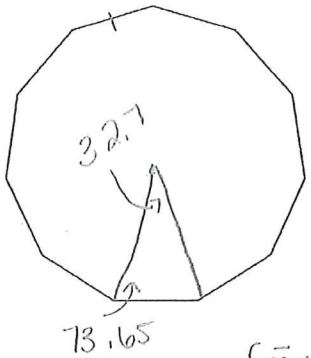
$A = 5\left(\frac{1}{2}\right)(15.3)(15.3)\sin 72$

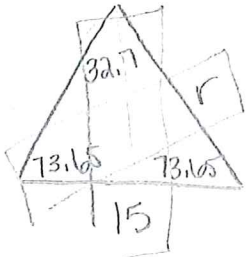
$A \approx 556.6 cm^2$

2. s= 15 cm

$n = 11$

$\frac{360}{11} = 32.7$





$\frac{\sin 32.7}{15} = \frac{\sin 73.65}{r}$

$r = \frac{15 \cdot \sin 73.65}{\sin 32.7}$

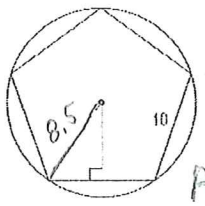
$r = 26.6$

$A = 11\left(\frac{1}{2}\right)(26.6)^2 \sin 32.7$

$A \approx 2102.4 cm^2$

Directions: Find the area of the shaded region. Show all work.

3.



O - pentagon

$A = \pi 8.5^2 - 5\left(\frac{1}{2}\right)(8.5)^2 \sin 72$

$A = 72.25\pi - 171.8$

$A \approx 55.2 units^2$

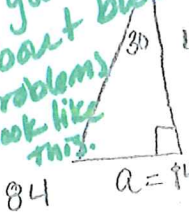
$\frac{\sin 72}{10} = \frac{\sin 54}{r}$

$r = \frac{10 \sin 54}{\sin 72}$

$r = 8.5$

4.

#4 is a good problem to "talk" about but no other problems look like this.



$42 = \text{short} \cdot \sqrt{3}$

$42 = a\sqrt{3}$

$a = 14\sqrt{3}$

$A = 3\left(\frac{1}{2}\right)(84)(14\sqrt{3}) - \pi(14\sqrt{3})^2$

$A = 1764\sqrt{3} - 196 \cdot 3\pi$

$A = 1764\sqrt{3} - 588\pi$

$A \approx 1208.1 units^2$