Name: _____

# In Class Practice- Regular Polygons

Radius/Apothem/Side Length

Areas of Regular Polygons In a regular polygon, the segment drawn from the center of the polygon perpendicular to the opposite side is called the **apothem**. In the figure at the right, $\overline{AP}$ is the apothem and $\overline{AR}$ is the radius of the circumscribed circle.
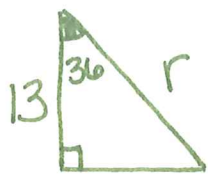
Find the area of the pentagon if

1. AR = 41 ft (given radius)

$$A = 5\left(\tfrac{1}{2}(41)(41)\sin 72\right)$$

$$A \approx 3996.8 \text{ ft}^2$$
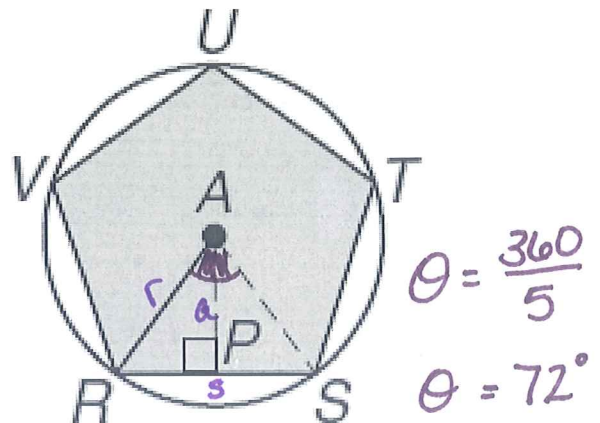
2. AP= 13 in (given apothem)

$$\frac{72}{2} = 36$$

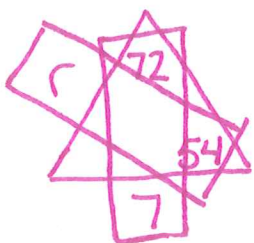$$\cos 36 = \frac{13}{r}$$

$$r = 16.1 \text{ in}$$

13 | 36 | r

$$A = 5\left(\tfrac{1}{2}(16.1)^2 \sin 72\right)$$

$$A \approx 616.3 \text{ in}^2$$

$$\theta = \frac{360}{5}$$

$$\theta = 72°$$

3. UT= 7cm (given side)

$$180 - 72 = \frac{108}{2} = 54$$
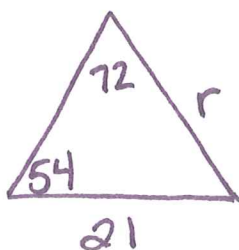
72 54 7

$$\frac{\sin 72}{7} = \frac{\sin 54}{r}$$

$$r = 6 \text{ cm}$$

$$A = 5\left(\tfrac{1}{2}(6)^2 \sin 72\right)$$

$$A \approx 85.6 \text{ cm}^2$$

4. Perimeter = 105 km

$$\frac{105}{5} = \text{side} = 21$$

72 r 54 21

$$\frac{\sin 72}{21} = \frac{\sin 54}{r}$$

$$r = 17.9 \text{ km}$$

$$A = 5\left(\tfrac{1}{2}(17.9)^2 \sin 72\right)$$

$$A \approx 761.8 \text{ km}^2$$