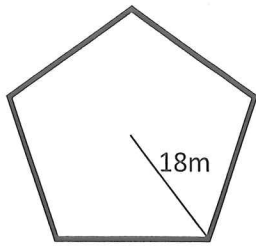


Name: _____

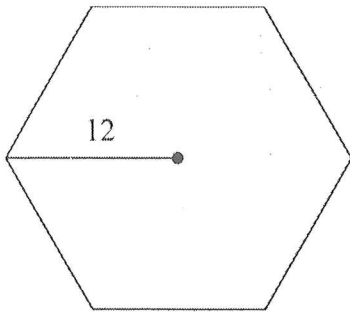
ACC Geometry: Area of Regular Polygons Examples

Directions: Identify if the radius, apothem, and/or side length is given, identify the number of sides, then find the area of each REGULAR polygon, rounding to the nearest tenth.

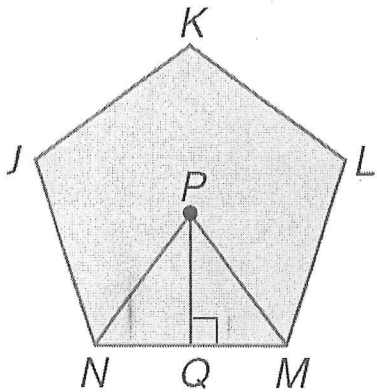
1.



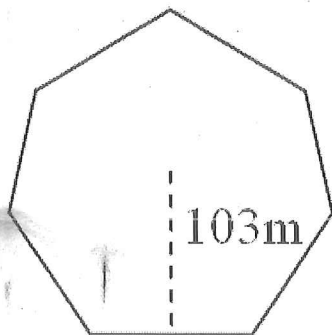
2.



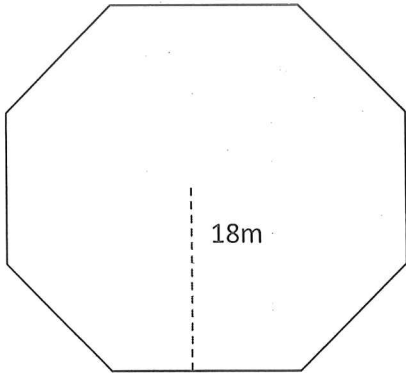
3. $PQ = 15$ m



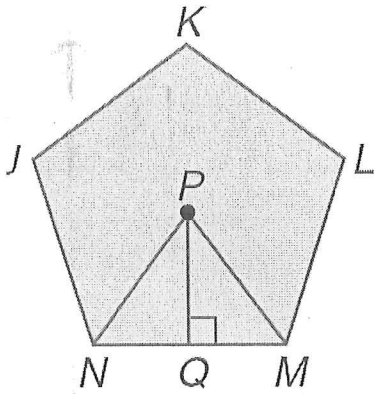
4.



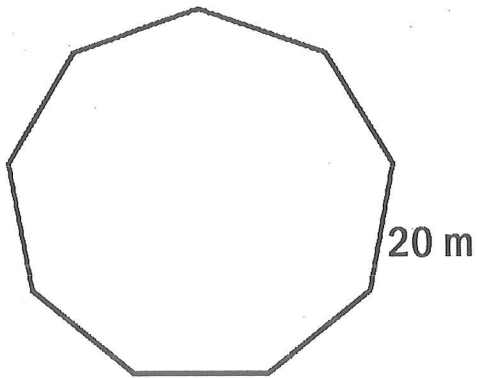
e 5.



6. If $NM=15\text{in}$



• 7.

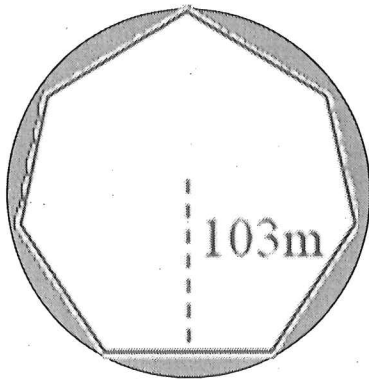


8. Find the area of a regular undecagon with a perimeter of 165 cm

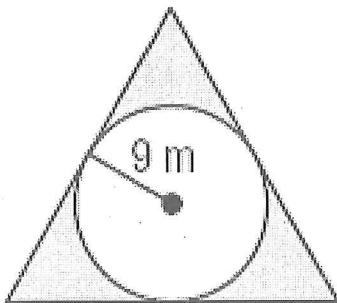
9. Find the area of a regular pentagon with **perimeter** of 90cm.

Directions: Find the area of the shaded region. Show all work. Round to the nearest tenth.

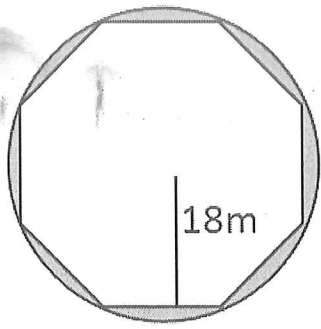
10.



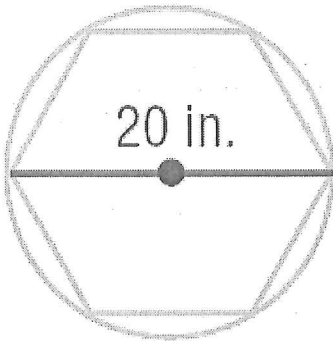
11.



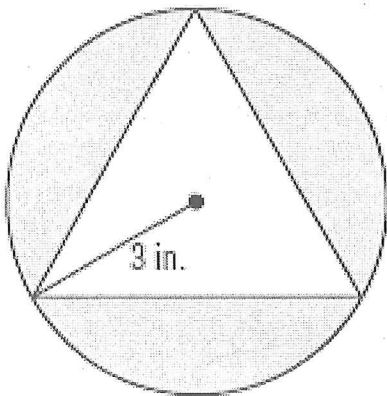
12.



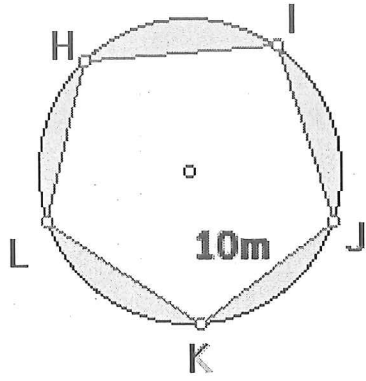
13.



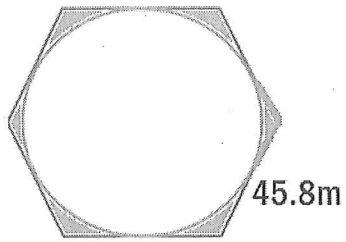
14.



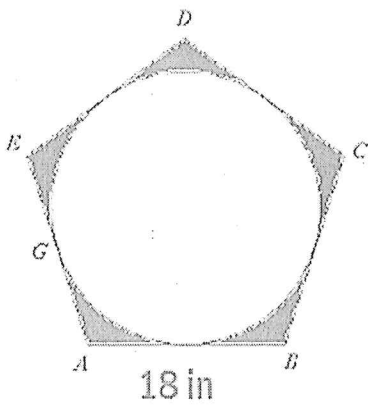
15.



16.



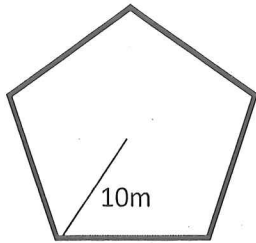
17.



Area of Regular Polygons: Independent Practice

Directions: Identify if the radius, apothem, and/or side length is given, identify the number of sides, then find the area of each REGULAR polygon, rounding to the nearest tenth. Circle your final answers.

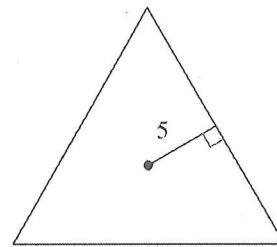
1.



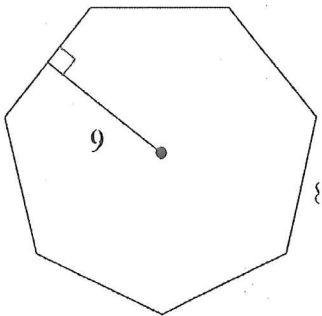
2. A regular pentagon with $r = 22\text{m}$

3. A regular dodecagon with perimeter of 120m.

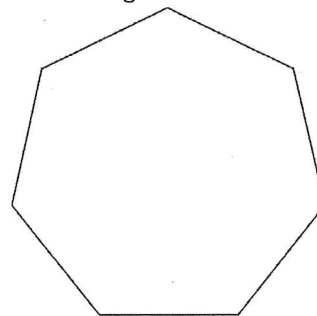
4.



5.

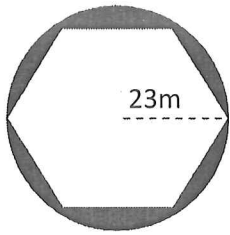


6. side length is 21 km.

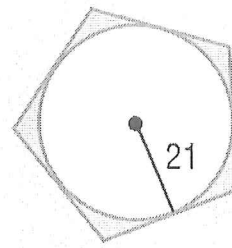


Find the area of each shaded region, rounding to the nearest tenth.

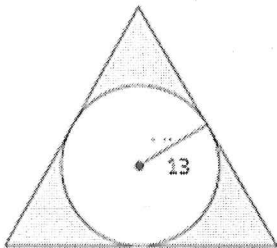
7.



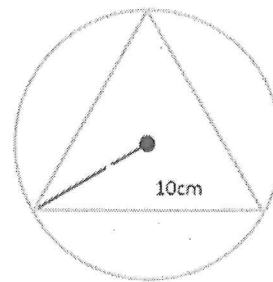
8.



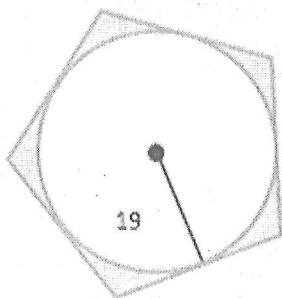
9.



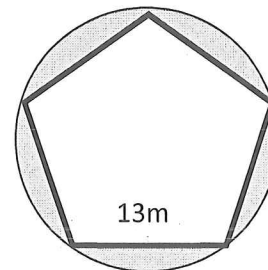
10.



11.



12.

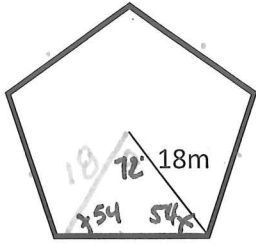


Name: Key

ACC Geometry: Area of Regular Polygons Examples

Directions: Identify if the radius, apothem, and/or side length is given, identify the number of sides, then find the area of each REGULAR polygon, rounding to the nearest tenth.

1.



Radius $n=5$

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

$$\theta = 72^\circ$$

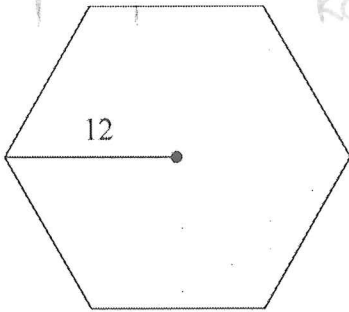
$$A = 5 \cdot \frac{1}{2} 18 \cdot 18 \sin 72$$

$$A \approx 770.4 \text{ m}^2$$

$$A = n \left(\frac{1}{2} r r \sin \theta \right)$$

↑
Central
∠

2.



Radius $n=6$

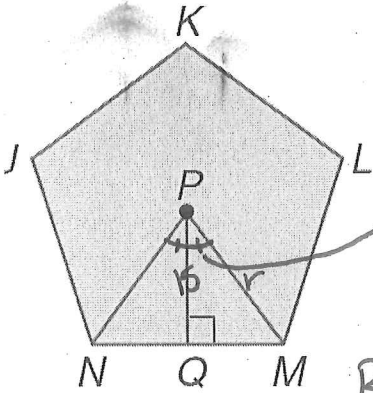
$$\theta = \frac{360}{6}$$

$$\theta = 60^\circ$$

$$A = 6 \cdot \frac{1}{2} 12 \cdot 12 \sin(60)$$

$$A \approx 374.1 \text{ units}^2$$

3. $PQ = 15 \text{ m}$



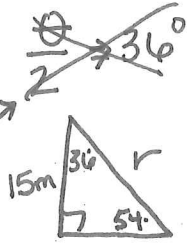
Apothem $n=5$

$$\frac{360}{5} \Rightarrow 72^\circ = \theta$$

Don't forget it is the central ∠

$$A = 5 \cdot \frac{1}{2} (18.5)^2 \sin 72$$

$$A \approx 813.7 \text{ m}^2$$



$$\cos(36) = \frac{15}{r}$$

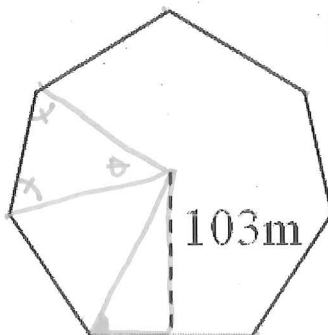
OR

$$\sin(54) = \frac{15}{r}$$

$$r \approx 18.5 \text{ m}$$

Right Δ

4.



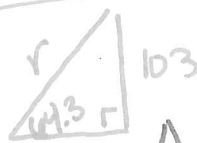
Apothem

$$n=7$$

$$\frac{360}{7} \Rightarrow 51.4^\circ = \theta$$

$$\begin{aligned} \text{Base } \angle &= 180 - 51.4 \\ &= 128.6 \div 2 \\ &= 64.3 \end{aligned}$$

Find r



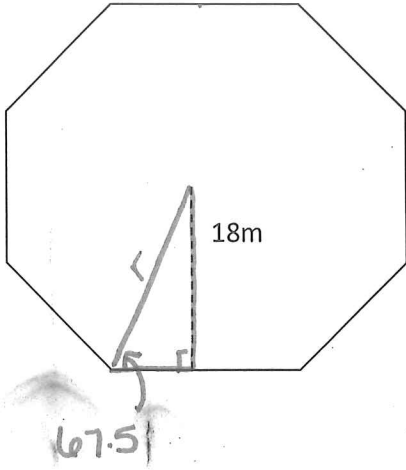
$$\sin(64.3) = \frac{103}{r}$$

$$r \approx 114.3 \text{ m}$$

$$A = 7 \cdot \frac{1}{2} 114.3^2 \sin(51.4)$$

$$A \approx 35,735.6 \text{ m}^2$$

5.

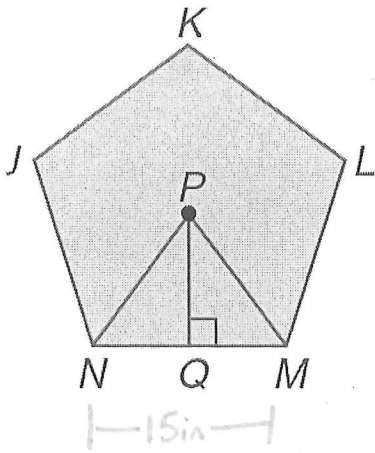


Apothem $n=8$
 $\frac{360}{8} = 45^\circ = \theta$

Base $\angle = 67.5^\circ$
 $\sin(67.5) = \frac{18}{r}$
 $r \approx 19.5m$

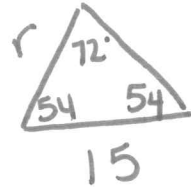
$A = 8 \cdot \frac{1}{2} (19.5)^2 \sin 45$
 $A \approx 1075.5m$

6. If $NM=15in$



side $n=5$

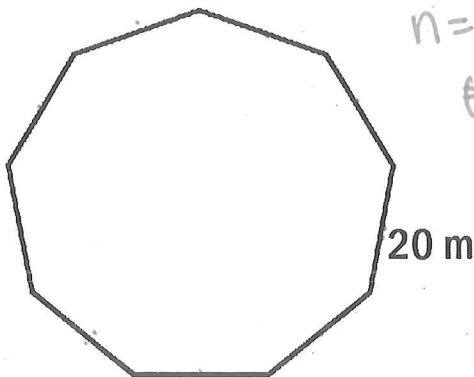
$\theta = 72^\circ$
 Base $\angle = 54^\circ$



$\frac{\sin(54)}{r} = \frac{\sin(72)}{15}$ $r \approx 12.8in$

$A = 5 \frac{1}{2} 12.8^2 \sin(72)$
 $A \approx 389.6in^2$

7.

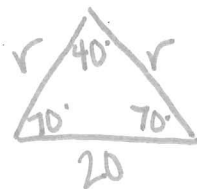


side $n=9$

$\theta = \frac{360}{9}$

$\theta = 40^\circ$

Base $\angle = 70^\circ$



$\frac{\sin 70}{r} = \frac{\sin 40}{20}$

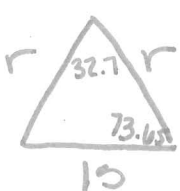
$r \approx 29.4m$

$A = 9 \cdot \frac{1}{2} \cdot (29.4)^2 \sin 40^\circ$
 $A \approx 2500.2m^2$

8. Find the area of a regular undecagon with a perimeter of 165 cm

$$\theta = \frac{360}{11} = 32.7 \quad n=11$$

$$\text{Base } \angle = 73.65^\circ$$

$$\text{Side length} = 15$$


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

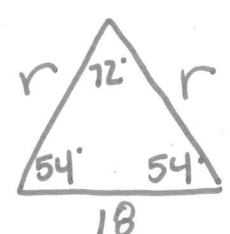
$$r \approx 26.4 \text{ cm}$$

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

$$A \approx 2102.4 \text{ cm}^2$$

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

$$\theta = \frac{360}{5} = 72 \quad n=5$$

$$\text{Base } \angle = 54^\circ$$


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

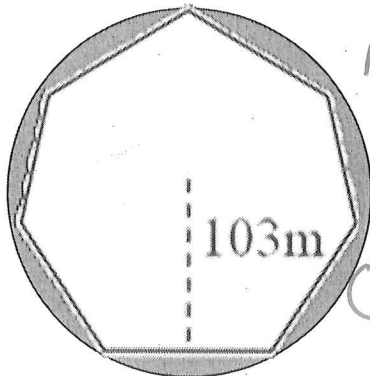
$$r \approx 15.3 \text{ m}$$

$$A = 5 \cdot \frac{1}{2} 15.3^2 \sin(72)$$

$$A \approx 556.6 \text{ cm}^2$$

Directions: Find the area of the shaded region. Show all work. Round to the nearest tenth.

10.



(From #4) $r = 114.3$

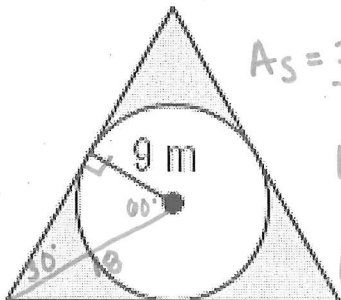
$$A_s = \text{Circle} - \text{poly}$$

$$A_s = \pi (114.3)^2 - 35,735.6$$

$$A_s = 13,064.49\pi - 35,735.6$$

$$A_s \approx 5307.7 \text{ m}^2$$

11.



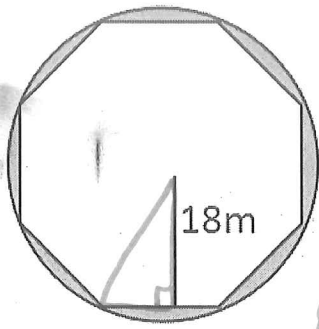
Triangle - circle ← circle radius \neq Triangle radius

$$A_s = 3 \cdot \frac{1}{2} 18^2 \sin 120 - \pi 9^2$$

$$A_s = 420.9 - 81\pi$$

$$A_s \approx 166.4 \text{ m}^2$$

12.



From #5

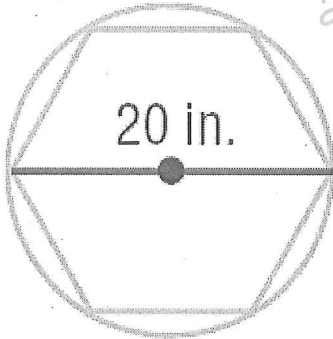
$$r = 19.5$$

$$A_{\text{poly}} = 1075.5$$

$$A_s = \pi 19.5^2 - 1075.5$$

$$A_s \approx 119.1 \text{ m}^2$$

13.



$$20 = d$$

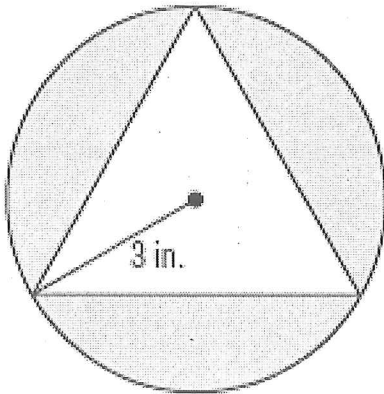
$$r = 10!!!$$

$$A_s = \pi 10^2 - 6 \cdot \frac{1}{2} 10^2 \sin 60$$

$$A_s \approx 100\pi - 259.8$$

$$A_s \approx 54.4 \text{ in}^2$$

14.



$$A_s = 0 - \Delta$$

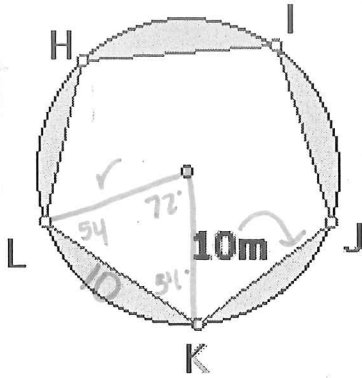
$$A_s = \pi 3^2 - 3 \cdot \frac{1}{2} 3^2 \sin 120^\circ$$

$$A_s \approx 16.6 \text{ in}^2$$

$$\Delta \quad \theta = 120^\circ$$

$$r = 3$$

15.



$$n=5$$

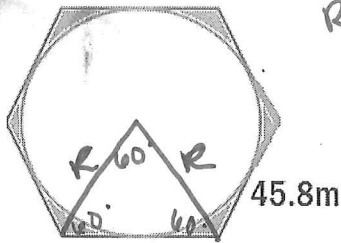
$$\frac{\sin(54)}{r} = \frac{\sin(72)}{10}$$

$$\boxed{r \approx 8.5m}$$

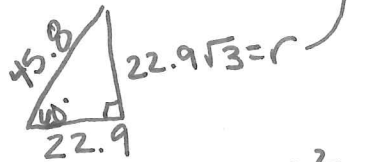
$$A_s = \pi 8.5^2 - 5 \frac{1}{2} 8.5^2 \sin(72)$$

$$\boxed{A_s \approx 55.2m^2}$$

16.



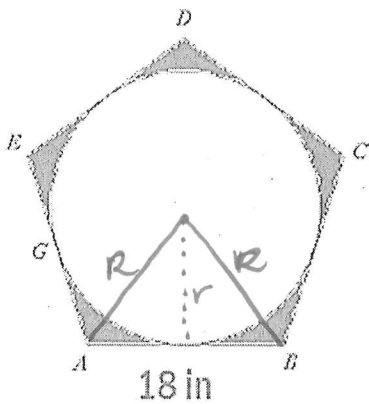
Radius of poly = 45.8m

Radius of circle is the Apothem of poly
Find apothem.

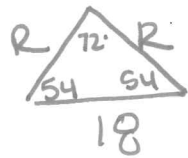
$$A_s = 6 \frac{1}{2} (45.8)^2 \sin(60) - \pi (22.9\sqrt{3})^2$$

$$\boxed{A_s \approx 507.4m^2}$$

17.



Radius of pentagon



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

$$\boxed{r \approx 15.3in}$$

Find r



$$\tan(54) = \frac{r}{9}$$

$$\boxed{r \approx 12.4in}$$

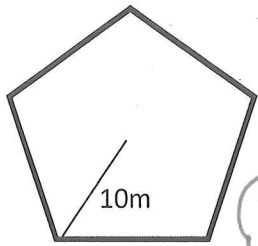
$$A_s = 5 \frac{1}{2} (15.3)^2 \sin(72) - \pi (12.4)^2$$

$$\boxed{A_s \approx 73.5in^2}$$

Area of Regular Polygons: Independent Practice

Directions: Identify if the radius, apothem, and/or side length is given, identify the number of sides, then find the area of each REGULAR polygon, rounding to the nearest tenth. Circle your final answers.

1.



$$n = 5 \quad r = 10m$$

$$\theta = 72^\circ$$

$$A = 5 \cdot \frac{1}{2} \cdot 10^2 \sin 72^\circ$$

$$A \approx 237.8m^2$$

2. A regular pentagon with $r = 22m$

$$n = 5 \quad \theta = 72^\circ$$

$$A = 5 \cdot \frac{1}{2} \cdot 22^2 \sin(72^\circ)$$

$$A \approx 1150.8m^2$$

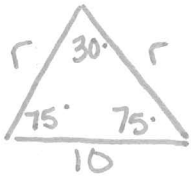
3. A regular dodecagon with perimeter of 120m.

$$n = 12 \quad s = 10m \quad \theta = \frac{360}{12} = 30^\circ$$

$$\text{Base } \angle = 75^\circ$$

$$\frac{\sin(75^\circ)}{r} = \frac{\sin(30^\circ)}{10}$$

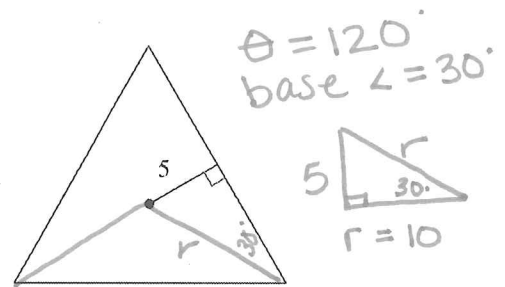
$$r \approx 19.3m$$



$$A = 12 \cdot \frac{1}{2} \cdot 19.3^2 \sin(30^\circ)$$

$$A \approx 1117.5m^2$$

4.



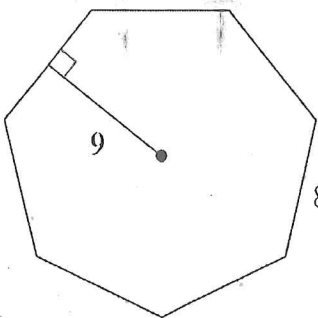
$$\theta = 120^\circ$$

$$\text{base } \angle = 30^\circ$$

$$A = 3 \cdot \frac{1}{2} \cdot 10^2 \sin 120^\circ$$

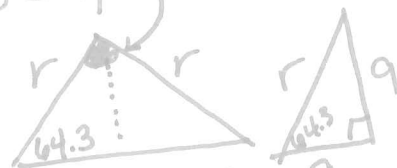
$$A \approx 129.9 \text{ units}^2$$

5.



$$n = 7$$

$$\theta = \frac{360}{7} = 51.4^\circ$$



$$\sin(64.3^\circ) = \frac{9}{r}$$

$$r \approx 9.98$$

$$r \approx 10.0 \text{ } \leftarrow \text{Round}$$

$$A = 7 \cdot \frac{1}{2} \cdot 10.0^2 \sin(51.4^\circ)$$

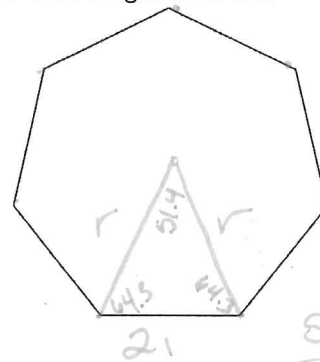
$$A \approx 273.5 \text{ units}^2$$

6. side length is 21 km.

$$n = 7$$

$$\theta = 51.4^\circ$$

$$\text{Base } \angle = 64.3^\circ$$



$$\frac{\sin(64.3^\circ)}{r} = \frac{\sin(51.4^\circ)}{21}$$

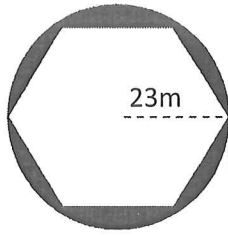
$$r \approx 24.2 \text{ km}$$

$$A = 7 \cdot \frac{1}{2} \cdot 24.2^2 \sin(51.4^\circ)$$

$$A \approx 1601.9 \text{ km}^2$$

Find the area of each shaded region, rounding to the nearest tenth.

7.

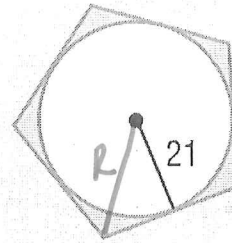


Some radius!

$$A_s = \pi 23^2 - 6 \cdot \frac{1}{2} 23^2 \sin(60)$$

$$A_s \approx 287.5 \text{ m}^2$$

8.

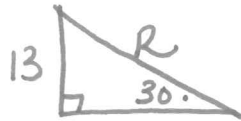


$$A_s = 5 \cdot \frac{1}{2} 26^2 \sin(72) - \pi 21^2$$

$$A_s \approx 221.8 \text{ units}^2$$

$21 = r$
Find R
 $\sin(54) = \frac{21}{R}$
 $R \approx 26.0$

little r = 13
Find R

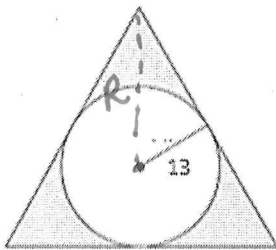


$R = 26$

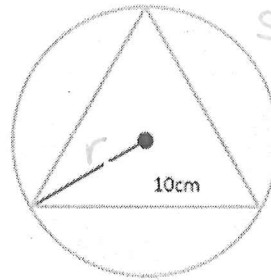
$$A_s = 3 \cdot \frac{1}{2} 26^2 \sin(120) - \pi 13^2$$

$$A_s \approx 347.2 \text{ units}^2$$

9.



10.



Some radius
Find r



$$A_s = \pi 5.8^2 - 3 \cdot \frac{1}{2} 5.8^2 \sin(120)$$

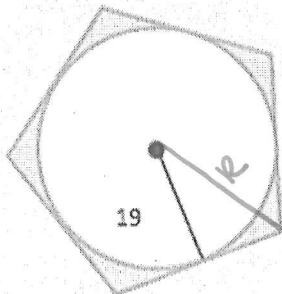
$$\frac{\sin(120)}{10} = \frac{\sin(30)}{r}$$

$$r \approx 5.8$$

$A_s \approx 61.98$

$$A_s \approx 62.0 \text{ cm}^2$$

11.



Given Apothem
 $r = 19$

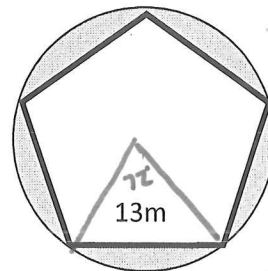


Find R
 $\sin(54) = \frac{19}{R}$
 $R \approx 23.5$

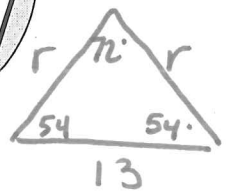
$$A_s = 5 \cdot \frac{1}{2} (23.5)^2 \sin(72) - \pi 19^2$$

$$A_s \approx 178.9 \text{ units}^2$$

12.



Some radius
Find r



$$A_s = \pi 11.1^2 - 5 \cdot \frac{1}{2} 11.1^2 \sin(72)$$

$$A_s \approx 94.1 \text{ m}^2$$

$$\frac{\sin(54)}{r} = \frac{\sin(72)}{13}$$

$$r \approx 11.1 \text{ m}$$