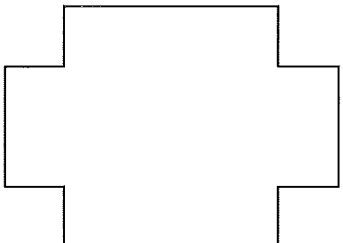


Name _____

KEY

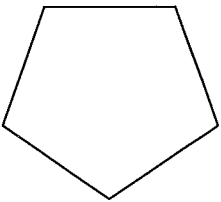
1. Name and classify the following polygon.

Concave
Dodecagon



2. Name and classify the following polygon.

Convex
Pentagon



3. Draw a regular octagon with a radius of 3 cm. Find its side length and apothem.

$$\text{Central } \angle = 45^\circ$$

$$\cos 22.5^\circ = \frac{a}{3\text{cm}}$$

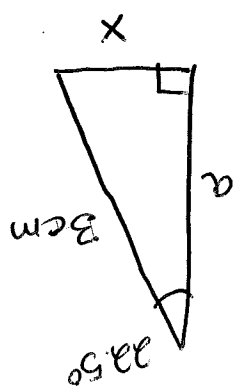
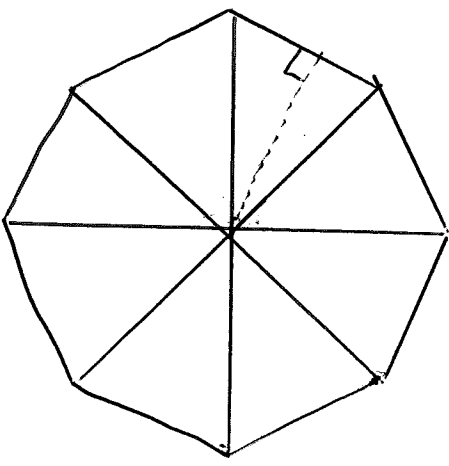
$$3(\cos 22.5^\circ) = a$$

$$a = 2.77\text{cm}$$

$$\text{Side} = a(x)$$

$$x = 1.15\text{cm}$$

$$\sin 22.5^\circ = \frac{3\text{cm}}{x}$$



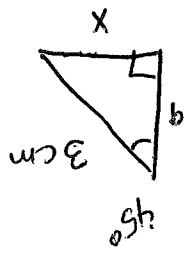
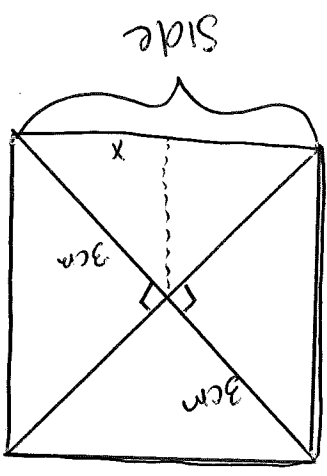
$$\text{Side} = 2.3\text{cm}$$

$$\text{Apothem} = 2.77\text{cm}$$

4. Draw a square with a radius of 3 cm. Find its side length.

$$\begin{aligned} \text{Side} &= 2x \\ \sin 45^\circ &= \frac{3}{x} \\ 3(\sin 45^\circ) &= x \\ 3(.707) &= x \end{aligned}$$

$$\begin{aligned} x &= 2.12\text{cm} \\ 2(x) &= 4.24 \end{aligned}$$



$$4.24\text{cm}$$

5. Given a regular pentagon with a radius of 10 cm, find its central angle, apothem, and side length.

$$\begin{aligned} \text{Central } \angle &= \frac{72^\circ}{1} \\ \text{Apothem} &= \frac{8.09 \text{ cm}}{1} \\ \text{Side} &= \frac{11.76 \text{ cm}}{1} \end{aligned}$$

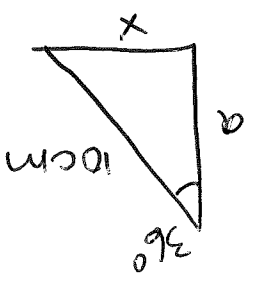
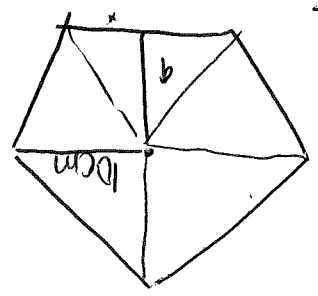
$$\begin{aligned} \cos 36^\circ &= \frac{a}{10 \text{ cm}} \\ 8.09 &= a \end{aligned}$$

$$360 \div 5 =$$

$$\sin 36^\circ = \frac{10}{x}$$

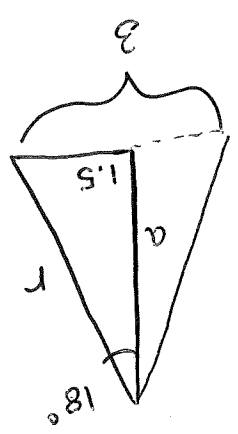
$$x = 5.88 \text{ cm}$$

$$a(x) = 11.76 \text{ cm}$$



6. Given a regular decagon with a side of 3 cm, find its central angle, apothem, and radius.

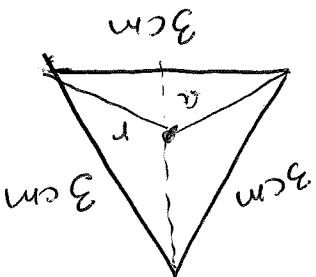
$$\begin{aligned} \text{Central } \angle &= \frac{36^\circ}{1} \\ \text{Apothem} &= \frac{4.62 \text{ cm}}{1} \\ \text{Radius} &= \frac{4.85 \text{ cm}}{1} \end{aligned}$$



$$\begin{aligned} \tan 18^\circ &= \frac{1.5}{a} \\ a &= \frac{1.5}{\tan 18^\circ} \\ a &= 4.62 \text{ cm} \\ \sin 18^\circ &= \frac{1.5}{r} \\ r &= \frac{1.5 \text{ cm}}{\sin 18^\circ} \\ r &= 4.85 \end{aligned}$$

7. Given an equilateral triangle with a side of 3 cm, find its central angle, apothem, and radius.

$$\begin{aligned} \text{Central } \angle &= \frac{120^\circ}{3} \\ \text{Apothem} &= \frac{0.87 \text{ cm}}{3} \\ \text{Radius} &= \frac{1.73 \text{ cm}}{3} \end{aligned}$$

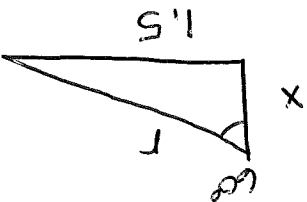


$$\tan 60^\circ = \frac{1.5}{a}$$

$$a = 0.87 \text{ cm}$$

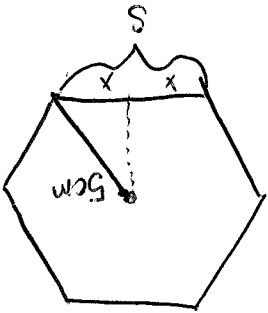
$$\sin 60^\circ = \frac{1.5}{r}$$

$$r = 1.73$$



8. Given a regular hexagon with a radius of 5 cm, find its central angle, apothem, and side.

$$\begin{aligned} \text{Central } \angle &= \frac{60^\circ}{6} \\ \text{Apothem} &= \frac{4.33 \text{ cm}}{6} \\ \text{Side} &= \frac{5 \text{ cm}}{6} \end{aligned}$$



$$\cos 30^\circ = \frac{a}{5 \text{ cm}}$$

$$5(\cos 30^\circ) = a$$

$$4.33 \text{ cm} = a$$

$$\sin 30^\circ = \frac{x}{5}$$

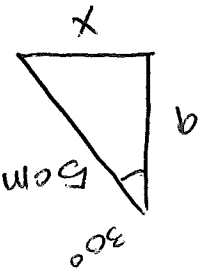
$$5(\sin 30^\circ) = x$$

$$x = 2.5 \text{ cm}$$

$$\text{side} = 2x$$

$$\text{side} = 2(2.5 \text{ cm})$$

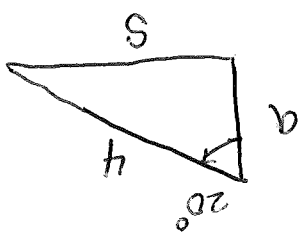
$$5 \text{ cm}$$



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9. Given a regular nonagon with a radius of 4 cm, find its central angle, apothem, and side.

$$\begin{aligned} \text{Central } \angle &= \frac{40^\circ}{1} \\ \text{Apothem} &= \frac{3.76 \text{ cm}}{1} \\ \text{Side} &= \frac{2.74 \text{ cm}}{1} \end{aligned}$$



$$\cos 20^\circ = \frac{a}{4} \quad 4(\cos 20^\circ) = a$$

$$4(\sin 20^\circ) = S$$

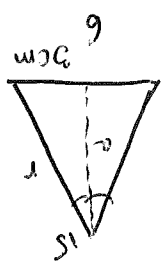
$$S = 1.37 \text{ cm}$$

$$\begin{aligned} 2(S) &= \text{side} \\ 2(1.37) & \\ 2.74 & \end{aligned}$$

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10. Given a regular dodecagon with a side of 6 cm, find its central angle, apothem, and radius.

$$\begin{aligned} \text{Central } \angle &= \frac{30}{1} \\ \text{Apothem} &= \frac{11.2 \text{ cm}}{1} \\ \text{Radius} &= \frac{11.59 \text{ cm}}{1} \end{aligned}$$



$$\begin{aligned} \tan 15^\circ &= \frac{a}{3} \\ a(\tan 15^\circ) &= 3 \\ a &= \frac{3}{\tan 15^\circ} \end{aligned}$$

$$\begin{aligned} \sin 15^\circ &= \frac{3 \text{ cm}}{r} \\ r \sin 15^\circ &= 3 \text{ cm} \\ r &= \frac{3 \text{ cm}}{\sin 15^\circ} \end{aligned}$$