

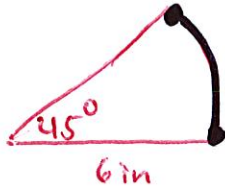
5.2 Central Angles and Arcs Notes

Central Angles: is an angle whose vertex lies at the center of the circle

Length of an Arc: the length of any circular arc, s , is equal to the product of the measure of the radius of the circle, r , and the radian measure of the central angle, θ , that it subtends. $s = r\theta$

↑
radians subtends

1. A circle has a radius of 6 inches. Find the length of the arc intercepted by a central angle of 45° .



$$45 \cdot \frac{\pi}{180} \cdot 6 = \frac{6\pi}{4} \text{ or } 1.5\pi \text{ in.}$$

$$6 \cdot \frac{\pi}{4} \approx 4.7 \text{ in.}$$

2. A circle has a radius of 5cm. Find the length of the arc intercepted by a central angle of 38°

$$s = 5 \cdot \frac{38}{180} \cdot \pi = \frac{19\pi}{18} \text{ cm.}$$

3. A circle has a radius of 10 ft. Find the length of the arc intercepted by a central angle of $\frac{5\pi}{12}$.

$$\frac{5\pi}{12} \cdot 10 = \frac{50\pi}{12} = \frac{25\pi}{6} \text{ ft.}$$

4. A circle has a radius of 8 in. Find the length of the arc intercepted by a central angle of $\frac{4\pi}{7}$.

$$\frac{4\pi}{7} \cdot 8 = \frac{32\pi}{7} \text{ in.}$$

5. Find the degree measure to the nearest tenth of the central angle that has an arc length of 87 and a radius of 16 cm.

$$87 = 16\theta$$

$$\frac{87}{16} = \theta$$

$$\frac{87}{16} \cdot \frac{180}{\pi} = \frac{3915}{4\pi}$$

$$\theta = 311.5$$

6. Find the degree measure to the nearest tenth of the central angle that has an arc length of 5.6 and a radius of 12 cm.

~~$$5.6 = 12\theta$$~~

$$5.6 = 12\theta$$

$$\frac{5.6}{12} = \theta$$

$$\left(\frac{5.6}{12}\right) \cdot \frac{180}{\pi} = 26.7^\circ$$

$$-2.6 \text{ radians} \qquad -2.6 \cdot \frac{180}{\pi}$$

Sector of a circle: A region bounded by a central angle and the intercepted arc. (A piece of PIE)

Area of a Circular Sector: If θ is the measure of the central angle expressed in radians and r is the measure of the radius of the circle, then the area of the sector, A , is as follows.

$$A = \frac{1}{2} r^2 \theta$$

↑ radians $A = \pi r^2 \cdot \frac{\theta}{360}$

7. Find the area of the sector of the circle that has a central angle measure of $\frac{\pi}{6}$ and a radius of 14 cm.

$$A = \frac{1}{2} (14)^2 \cdot \frac{\pi}{6} = \frac{98\pi}{6} \text{ cm}^2$$

8. A sector has arc length 12 cm and a central angle measuring 1.25 radians. Find the radius and the area of the sector.

$$12 = 1.25 r \quad A = \frac{1}{2} (9.6)^2 (1.25)$$

$$9.6 = r \quad = 57.6 \text{ cm}^2$$

Nearest Degrees, Minutes, and Seconds: A degree of an angle can be broken down into minutes and seconds. There are 60 minutes in a degree, and 60 seconds in a minute.

Finding values using a calculator:

- a. 133.47° *2.33 rads* b. -321.81 c. 3.85 rads d. 1.06 rads

Trig Ratios:

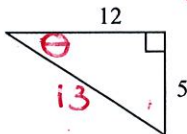
$\sin\theta =$

$\cos\theta =$

$\tan\theta =$

Reciprocals:

Hint: Every function pair has a "co" in it.



$$\sin\theta = 5/13$$

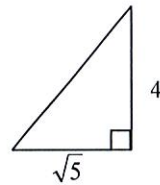
$$\cos\theta = 12/13$$

$$\tan\theta = 5/12$$

$$\csc\theta = 13/5$$

$$\sec\theta = 13/12$$

$$\cot\theta = 12/5$$



$$\sin\theta =$$

$$\cos\theta =$$

$$\tan\theta =$$

$$\csc\theta =$$

$$\sec\theta =$$

$$\cot\theta =$$

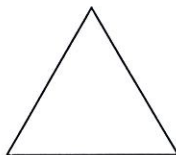


$\sin 45^\circ =$

$\cos 45^\circ =$

$\tan 45^\circ =$

Equilateral Triangle:



$$\sin 30^\circ =$$

$$\cos 30^\circ =$$

$$\tan 30^\circ =$$

$$\sin 60^\circ =$$

$$\cos 60^\circ =$$

$$\tan 60^\circ =$$