

4.1 Angles and Their Measures

Degrees

36.5°

Degree Minute Seconds

$5^\circ 16' 52''$

Ex 1 Working with DMS measure

a) Convert 37.425° into DMS

$37^\circ \quad .425 \left(\frac{60'}{1^\circ} \right)$

$0.5 \left(\frac{60''}{1'} \right)$

$37^\circ \quad \begin{matrix} 25.5 \\ 25' \end{matrix}$

$30'' \Rightarrow \boxed{37^\circ 25' 30''}$

b) Convert $42^\circ 24' 36''$ to degrees

$42 + 24 \left(\frac{1}{60} \right) + 36 \left(\frac{1}{3600} \right)$

$\boxed{42.41^\circ}$

Radian - another measure of angles, often used with trig

Converting

Rad \Rightarrow Deg

$$\cdot \frac{180^\circ}{\pi \text{ rad}}$$

Deg \Rightarrow Rad

$$\cdot \frac{\pi \text{ rad}}{180^\circ}$$

Ex 2 Working with Radian Measure

a) how many radians in 90 degrees?

$$90 \cdot \frac{\pi}{180} \Rightarrow \frac{\pi}{2}$$

b) how many degrees in $\frac{\pi}{3}$ radians

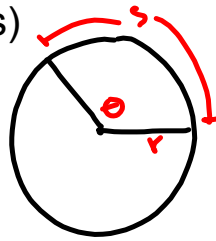
$$\frac{\pi}{3} \cdot \frac{180}{\pi} = 60^\circ$$

Circular Arc Length

Arc Length Formula-(Radians)

$$S = r\theta$$

θ theta is central angle in radians
 r = radius S = arc length



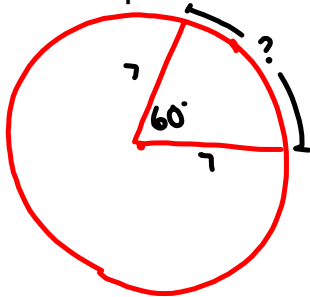
(Degrees)

$$S = \frac{\pi r \theta}{180}$$

θ = central angle in degrees
 r = radius S = arc length

Ex 3 Perimeter of a Pizza

Find the perimeter of a pizza of a 60° slice of a large (7 in radius pizza)

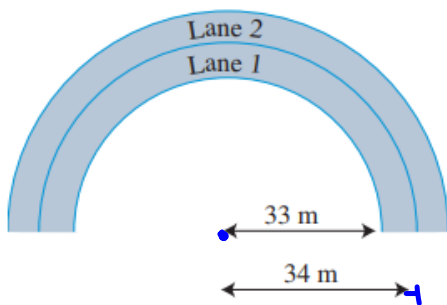


$$S = \frac{\pi r \theta}{180} = \frac{\pi (7)(60)}{180} = \frac{7\pi}{3} = 7.33$$

$$P = 7 + 7 + 7.33 = 21.33 \text{ in}$$

Ex 4 Designing a Track

The running lanes of the new EPHS track are 1 m wide. The inside radius of lane 1 is 33 meters and the inside radius of lane 2 is 34 meters. How much longer is lane 2 than lane 1 around the turn?



Find arc length for each
 Lane 1 lane 2

$$S = \frac{\pi r \theta}{180}$$

$$S = \frac{\pi r \theta}{180}$$

$$S = \frac{\pi (33)(180)}{180}$$

$$S = \frac{\pi (34)(180)}{180}$$

$$S = 103.6 \text{ m}$$

$$S = 106.81 \text{ m}$$

$$106.81 - 103.6$$

lane 2 is 3.14 m longer.

p 356
 #2-28 E
 35, 37, 38