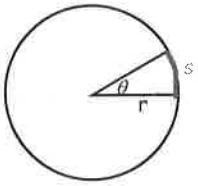
Arc Length of a Circle:

s denotes the length of the arc of a circle of radius r subtended by the central angle θ



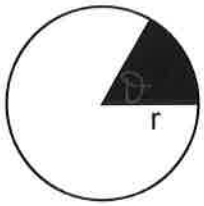
$C = 2\pi r$

In degrees: $s = \left(\frac{\theta}{360} \bullet 2\pi r\right) = \frac{\pi r \theta}{180}$

In radians: $s = \left(\frac{\theta}{2\pi} \bullet 2\pi r\right) = r\theta$

So, if the angle is in radians, the length of the arc, s, is found with the formula: $s = r\theta$

Area of a sector:



$A = \pi r^2$

In degrees: $A = \frac{\theta}{360^\circ} \bullet \pi r^2$

In radians: $A = \frac{\theta}{2\pi} \bullet \pi r^2 = \frac{1}{2} r^2 \theta$

So, if the angle is in radians, the area of the sector is given by the formula: $A = \frac{1}{2} r^2 \theta$

s denotes the length of the arc of a circle of radius r subtended by the central angle θ. Find the missing quantity. Round answers to three decimal places.

1. $r = 20\,meters,\ \theta = \frac{1}{3}\,radian,\ s = ?$

part of ↓ C of circle ↓

$S = \frac{\frac{1}{3}}{2\pi} \cdot 2\cdot\pi(20) = 20\left(\frac{1}{3}\right) = \frac{20}{3}\,m. = 6.667\,m$

2. $r = 4\,inches,\ \theta = 120^\circ,\ s = ?$

$S = \frac{\frac{1}{120^\circ}}{\frac{360^\circ}{3}} \cdot 2\pi(4) = \frac{8}{3}\pi\,'' = 8.378\,''$

3. $r = 5\,miles,\ s = 2\,miles,\ \theta = ?$

$S = \frac{\theta}{360} \cdot 2\pi r$

$2 = \frac{\theta}{360} \cdot 2\pi(5)$

$2 = \frac{\theta\pi}{36}$

$72 = \theta\pi$

$\theta = \frac{72}{\pi}^\circ \approx 22.918^\circ$

OR

DO this one

$S = \frac{\theta}{2\pi} \cdot 2\pi r$

$2 = \frac{\theta}{2\pi} \cdot 2\pi(5)$

$2 = 5\theta$

$\theta = \frac{2}{5} = .4$

$\theta = .4$ radians

A denotes the area of the sector of a circle of radius r formed by the central angle θ. Find the missing quantity. Round answers to three decimal places.

1. $r = 20\,meters,\ \theta = \frac{1}{3}\,radian,\ A = ?$

part of θ / Area of θ

$A = \frac{\frac{1}{3}}{2\pi} \cdot \pi(20)^2 = \frac{1}{6}(400) = \frac{1}{3}(200)$

$A = \frac{200}{3}\ m^2$

$A = 66.667 m^2$

2. $r = 4\,inches,\ \theta = 120^\circ,\ A = ?$

$A = \frac{120^\circ}{360^\circ} \cdot \pi(4)^2 = \frac{1}{3} \cdot \pi \cdot 16$

$= \frac{16}{3}\pi = 16.755\ in^2$

3. $r = 5\,miles,\ A = 7\,square\,miles,\ \theta = ?$

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

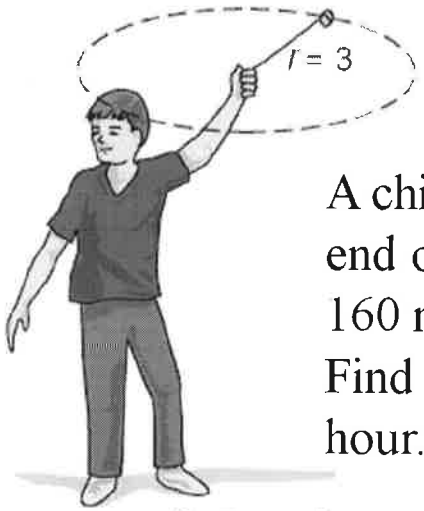
$7 = \frac{\theta}{2\pi} \cdot \pi(5)^2$

$7 = \frac{25\theta}{2}$

$\frac{14}{25} = \theta$

$\theta = 0.56$ radians

Unit Analysis Problem:



1 revolution $= 2\pi(3) = 6\pi$ ft.

A child is spinning a rock at the end of a 3-foot rope at the rate of 160 revolutions per minute (rpm). Find how fast is that in miles per hour.

$\frac{160\ rev}{1\ min} \cdot \frac{6\pi\ ft.}{1\ rev} \cdot \frac{1\ mi.}{5280\ ft} \cdot \frac{60\ min}{1\ hr} = \frac{57600\pi\ miles}{5280\ hrs}$

≈ 34.27 mph