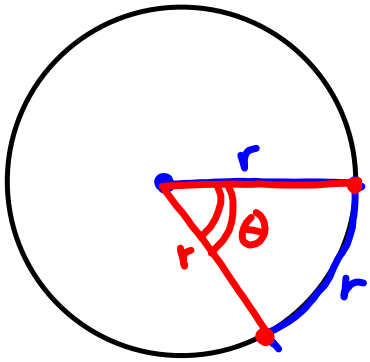
Radians

The radian (rad) is a unit of angle measure.

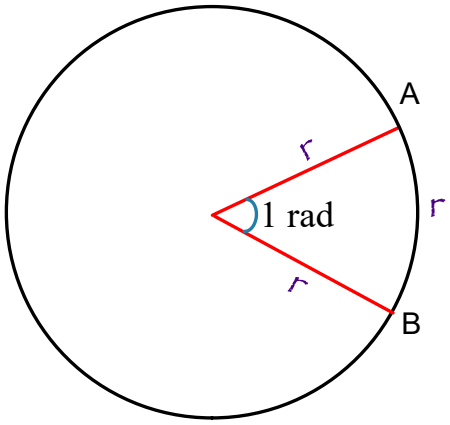


When a wheel completes a turn...

1) how many degrees has it moved? 360°

2) how far has the rim of the wheel travelled? $C = 2\pi r$

3) How many times is the radius contained in the circumference? 2π times



When the distance covered on the circumference is equal to the length of the radius (i.e., $\overset{\frown}{AB} = r$), the measure of the central angle is equal to 1 radian.

- There are 2π radians in a circle.
- $360° = 2\pi$ radians

$180° = \underline{\pi} \; rad$

$90° = \underline{\frac{\pi}{2}} \; rad$

$135° = \underline{\frac{3\pi}{4}} \; rad$

We can convert between radians and degrees using the proportion

$$\frac{n°}{360°} = \frac{\theta rad}{2\pi}$$ or $$\frac{n°}{180°} = \frac{\theta rad}{\pi}$$

Example: What is ....

a) $50°$ in radians? $\frac{50°}{180°} = \frac{x}{\pi} \Rightarrow 50\pi = 180x$

$\frac{50\pi}{180} = x$

b) 2.3 rad in degrees? $0.8727 = \frac{5\pi}{18} = x$

$\frac{y}{180°} = \frac{2.3}{\pi} = 131.78°$

c) 12π rad in degrees? $6 \times 360 = 2160°$

d) $120°$ in radians?