

Measuring Angles in Radians

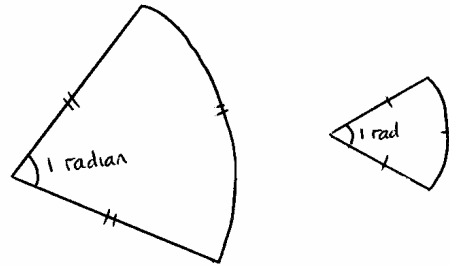
“A radian is the angle subtended at the centre of a circle by an arc length whose length is equal to that of the radius of the circle”. This means a radian is the angle formed when the arc length and the radius are the same.

$$\begin{aligned}\text{The number of radians in a circle} &= \frac{\text{length of circumference}}{\text{Length of radius}} \\ &= \frac{2\pi r}{r} \\ &= 2\pi\end{aligned}$$

$$\therefore 360^\circ = 2\pi \text{ rads}$$

$$180^\circ = \pi \text{ rads}$$

$$1 \text{ rad} = \frac{180}{\pi} \approx 57.3^\circ$$



Changing Degrees to Radians

Rule:- Multiply by $\frac{\pi}{180^\circ}$

Example 1. Convert 45° to radians

$$\begin{aligned}45 \times \frac{\pi}{180} &= \frac{45\pi}{180} \\ &= \frac{\pi}{4}\end{aligned}$$

← Leave your answer in terms of π unless asked for more accuracy

Example 2. Convert 75° to radians, give your answer to 2sf.

$$\begin{aligned}75 \times \frac{\pi}{180} &= \frac{75\pi}{180} \\ &= 1.308996 \\ &= 1.3 \text{ (2sf)}\end{aligned}$$

Changing Radians to Degrees

Rule: Multiply by $\frac{180^\circ}{\pi}$

Example 1. Convert $\frac{2\pi}{3}$ rads to degrees

$$\frac{2\pi}{3} \times \frac{180}{\pi} = 120^\circ$$

Example 2. Convert 20.1° to degrees

$$20.1 \times \frac{180}{\pi} = 120.3^\circ$$