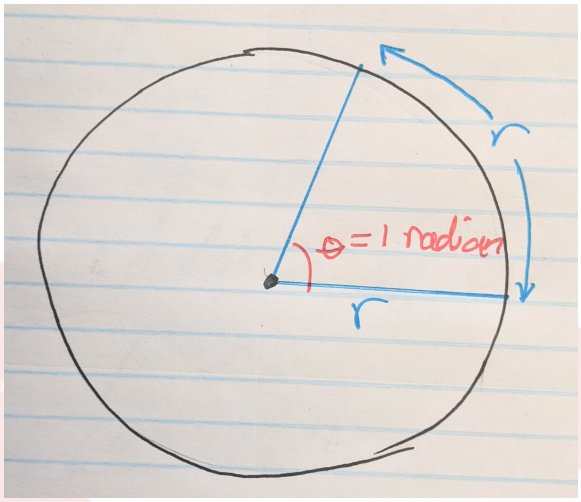
Radian Measure

RaiseMyMarks.com

2021

Radians

One radian is the measure of an angle subtended at the centre of a circle by an arc equal in legnth to the radius of the circle.



From here we have the ratio:

$$\begin{aligned} \frac{1 \text{ radian}}{360^\circ} &= \frac{\text{arc length}}{\text{circumference}} \\ \frac{1 \text{ radian}}{360^\circ} &= \frac{r}{2\pi r} \\ \pi \text{ radian} &= \frac{360^\circ}{2} \end{aligned}$$

Therefore, $\boxed{2\pi \text{radians} = 180^\circ}$. Fron here we have,

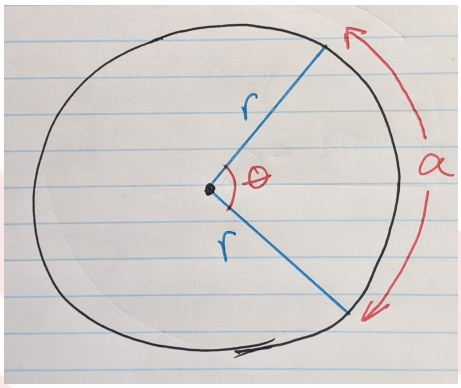
$$\frac{\pi}{2}\text{radians} = 90^\circ \qquad \frac{\pi}{4}\text{radians} = 45^\circ$$
$$\frac{\pi}{3}\text{radians} = 60^\circ \qquad \frac{\pi}{6}\text{radians} = 30^\circ$$

Arc length of a circle

The *arc length* a is subtended by an angle θ radians in a circle with radius r is given by,

$$\boxed{a = r\theta}$$

.



The *related acute angle* is the angle between the terminal arm and the x-axis. A *coterminal angle*, in radians, is, given an angle θ, by $(\theta + 2n\pi)$ radians where n is an integer.

Exercises

1. Determine the arc length of a circle with radius 4cm that subtends each angle at the centre.
   (a) $\frac{\pi}{3}$ radians
   (b) $100°$
   (c) $300°$
   (d) $\frac{\pi}{4}$ radians
   (e) $\frac{\pi}{6}$ radians
   (f) $70°$
   (g) $\frac{7\pi}{6}$ radians
   (h) $\frac{2\pi}{3}$ radians
   (i) $90°$
   (j) $155°$
2. The area of a circle is $38cm^2$. Determine the length of one-quarter of the circumference.

