

Radian Measure

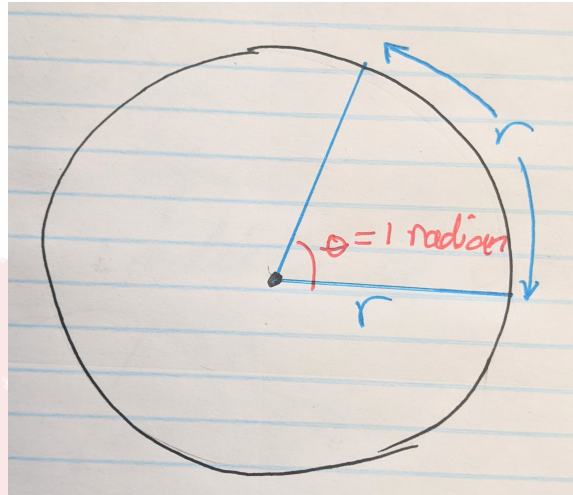
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Radians

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



From here we have the ratio:

$$\frac{1 \text{ radian}}{360^\circ} = \frac{\text{arc length}}{\text{circumference}}$$

$$\frac{1 \text{ radian}}{360^\circ} = \frac{r}{2\pi r}$$

$$\pi \text{ radian} = \frac{360^\circ}{2}$$

Therefore, $2\pi \text{ radians} = 360^\circ$. From here we have,

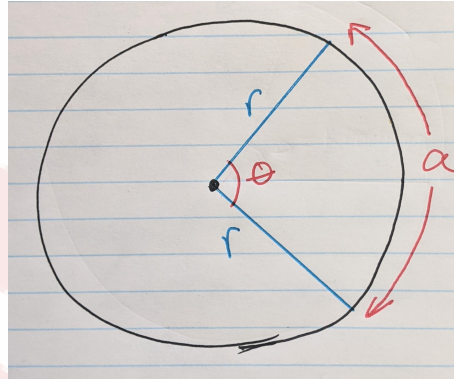
$$\frac{\pi}{2} \text{ radians} = 90^\circ \quad \frac{\pi}{4} \text{ radians} = 45^\circ$$

$$\frac{\pi}{3} \text{ radians} = 60^\circ \quad \frac{\pi}{6} \text{ radians} = 30^\circ$$

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,

$$a = r\theta$$



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

Convert to radians.

- (a) 240
- (b) 135
- (c) 225
- (d) 60
- (e) 330
- (f) 30
- (g) 120
- (h) 180
- (i) 45
- (j) 150