

a fraction of the whole turn, and one equation built from Pythagoras

## Degrees, radians and what the sheet gives you

- the reference sheet tells you a full circle is  $360^\circ$  and  $2\pi$  radians, and it gives the area and the circumference. That is all of it
- arc length, sector area and the equation of a circle are not on the sheet, so those three are the ones to carry in your head
- a radian is just a different unit for the same turn, so converting is one multiplication and never a formula worth fearing
- answers stay in terms of  $\pi$  far more often than they go decimal. Read the options, or the wording, before you reach for 3.14

## The lines to memorise

circumference and area, both given on the sheet

$$C=2\pi r, A=\pi r^2$$

degrees into radians

$$\times \frac{\pi}{180}$$

radians into degrees

$$\times \frac{180}{\pi}$$

arc length, angle in degrees

$$s = \frac{\theta}{360} \times 2\pi r$$

sector area, angle in degrees

$$A = \frac{\theta}{360} \times \pi r^2$$

arc length when the angle is already in radians

$$s=r\theta$$

the two middle lines are one idea:  $\pi$  radians and  $180^\circ$  are the same half turn, so you are multiplying by a fraction that equals 1

## Worked: a conversion each way \*

Q. convert  $150^\circ$  into radians, then convert  $\frac{7\pi}{9}$  radians into degrees

① degrees into radians:  $150 \times \frac{\pi}{180} = \frac{150\pi}{180}$

② cancel 30 from top and bottom:  $\frac{5\pi}{6}$

③ the other way:  $\frac{7\pi}{9} \times \frac{180}{\pi}$ , and the  $\pi$  cancels

④  $7 \times \frac{180}{9} = 7 \times 20 = 140$

Answer

$$150^\circ = \frac{5\pi}{6} \text{ radians, and } \frac{7\pi}{9} \text{ radians} = 140^\circ$$

the  $\pi$  cancelling is the tell that you multiplied the correct way round. If it does not cancel, you used the fraction upside down