Question

Explain the relationships among angle measure in degrees, angle measure in radians, and arc length.

Solution

For angle $d°m's''$ with d integer degrees m minutes and s seconds the decimal degrees is equal to

$$d° + \left(\frac{m}{60}\right)° + \left(\frac{s}{3600}\right)°$$

Angle measure of $x°$ corresponds to angle measure of $x° \frac{\pi}{180°} = \frac{x\pi}{180}$ (in radians).

Angle measure of y radians corresponds to $y \cdot \frac{180°}{\pi}$ (in degrees).

In the following lines, s represents the length of an arc of the circle, θ is the angle which the arc subtends at the centre of the circle, r is the radius of a circle.

If θ is in radians, then arc length is $s = r\theta$.

If θ is in degrees, then arc length is $s = \frac{\pi r \theta°}{180°} = \frac{\pi r \theta}{180}$.