

Exercise 4

If you roll a 1-m-diameter wheel forward 30 cm over level ground, through what angle will the wheel turn? Answer in radians (to the nearest tenth) and degrees (to the nearest degree).

Solution

The formula relating arc length, central angle, and radius is

$$s = r\theta,$$

where θ is in radians. Plug in the given quantities, noting that the radius is 50 centimeters.

$$(30 \text{ cm}) = (50 \text{ cm})\theta$$

$$\frac{3}{5} = \theta$$

$$\theta = 0.6 \text{ rad}$$

In degrees this is

$$\theta = 0.6 \text{ rad} \times \frac{180^\circ}{\pi} \approx 34^\circ.$$