

Exercise 173

The diameter of a wheel rolling on the ground is 40 in. If the wheel rotates through an angle of 120° , how many inches does it move? Approximate to the nearest whole inch.

Solution

Use the formula for the arc length of a circle.

$$s = r\theta$$

The radius is half the diameter: $r = d/2$.

$$s = \left(\frac{d}{2}\right)\theta$$

Therefore, since $120^\circ = 2\pi/3$ radians,

$$s = \left(\frac{40 \text{ in}}{2}\right)\left(\frac{2\pi}{3}\right) \approx 42 \text{ in.}$$