

A carousel at the local carnival rotates once every 45 seconds.

1. What is the linear speed at a point 2.75m from the axis of rotation?
2. What is the linear speed at a point 1.75m from the axis of rotation.
3. What is the speed of the carousel in rpm?

$$1. \quad \omega = \frac{\Delta\theta}{\Delta t}$$

$$v = r\omega$$

$$1 \text{ rev} = 2\pi \text{ rad} \quad \omega = \frac{2\pi \text{ rad}}{45 \text{ s}}$$

$$v = 2.75 \text{ m} \left(\frac{2\pi \text{ rad}}{45 \text{ s}} \right) = 0.384 \text{ m/s}$$

$$\boxed{0.38 \text{ m/s}}$$

2. $v = r\omega$ $\frac{\Delta\theta}{\Delta t} = \omega$

$$v = r \left(\frac{\Delta\theta}{\Delta t} \right) = 1.75 \text{ m} \left(\frac{2\pi \text{ rad}}{45 \text{ s}} \right)$$

$$= 0.244 \text{ m/s}$$

$$\boxed{0.24 \text{ m/s}}$$

3.

$$\omega = \frac{2\pi \text{ rad}}{45 \text{ s}} \times \frac{60 \text{ s}}{1 \text{ min}} \times \frac{1 \text{ rev}}{2\pi \text{ rad}} = 1.33 \frac{\text{rev}}{\text{min}}$$

$$\boxed{1.3 \frac{\text{rev}}{\text{min}}}$$