

A 75 cm diameter wheel is spinning at 2 sec period. What is the speed and acceleration of a particle at the edge of the wheel.

Given:

Diameter

$$d = 75 \text{ cm} = 0.75 \text{ m}$$

Radius

$$r = 37.5 \text{ cm} = 0.375 \text{ m}$$

Time period of rotation of wheel

$$T = 2 \text{ sec}$$

Determine: speed of the wheel: v

$$v = \omega \times r \quad \text{---(1)}$$

“ ω ” is the angular speed in radians / second.

$$\omega = 2\pi / T = (2 \times 3.14) / 2 = 3.14 \text{ rad/sec}$$

Substituting for “ ω ” and “ r ” in (1):

$$v = 3.14 \times 0.375 = 1.18 \text{ m/s}$$

Acceleration “ a ” on the wheel is:

$$a = v^2 / r = (1.18)^2 / 0.375 = 3.71 \text{ m/s}^2$$