

5 Rotational motion and torque – Part 1 —Answers

Answers

Work through these after you have tried the questions yourself.

2.1 $\omega = \frac{\Delta\theta}{\Delta t} = \frac{18}{3.0} = 6.0 \text{ rad/s}.$

2.2 $v = r\omega = 0.20 \times 10 = 2.0 \text{ m/s}.$

2.3 $\tau = Fr = 15 \times 0.40 = 6.0 \text{ N m}.$

2.4 the handle is far from the hinge (a large moment arm), so a small push gives a large turning torque; near the hinge you would need a much bigger force.

2.5 the point on the rim moves faster, because $v = r\omega$ and it has the larger r (same ω for both).

2.6 $\tau = Fr = 30 \times 0.25 = 7.5 \text{ N m}$; pushing halfway along ($r = 0.125 \text{ m}$) halves the torque to $3.75 \text{ N m}.$