

Solutions

Each answer shows the steps, then the **result**.

2.1

- $a = \frac{v^2}{r} = \frac{16}{0.5} = 32 \text{ m s}^{-2}$

2.2

- $120 \text{ rev/min} = 2 \text{ rev/s} = 2 \times 2\pi = 4\pi = 12.6 \text{ rad s}^{-1}$

3.1 B

- $a = \frac{v^2}{r}$ (also $= r\omega^2$)

3.2

(a)

- $\omega = 3 \times 2\pi = 6\pi = 18.8 \text{ rad s}^{-1}$

(b)

- $T = mr\omega^2 = 0.2 \times 0.5 \times (6\pi)^2 = 0.2 \times 0.5 \times 355.3 = 35.5 \text{ N}$

3.3

(a)

- vertical: $T \cos 30^\circ = mg = 4 \Rightarrow T = \frac{4}{0.866} = 4.62 \text{ N}$

(b)

- horizontal: $T \sin 30^\circ = mr\omega^2$ with $r = 1 \times \sin 30^\circ = 0.5$; $4.62 \times 0.5 = 0.4 \times 0.5 \times \omega^2 \Rightarrow \omega^2 = 11.55 \Rightarrow \omega = 3.40 \text{ rad s}^{-1}$