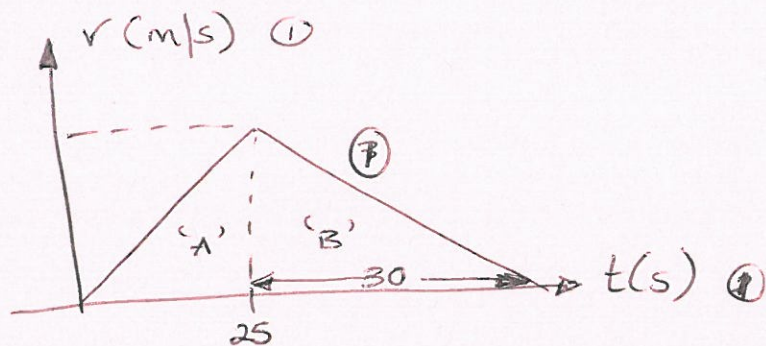


1.



a) $a = ?$

$u = 0$

$t = 25\text{s}$

$v = 2\text{ m/s}$

$v = u + at$

$$a = \frac{v-u}{t} = \frac{2-0}{25} = 0.08\text{ m/s}^2$$

b) $u = 2\text{ m/s}$

$v = 0$

$t = 30\text{s}$

$a = ?$

$$a = \frac{v-u}{t} = \frac{0-2}{30} = -0.067\text{ m/s}^2$$

c) $t_{\text{Tot}} = 25 + 30$

$= 55\text{s}$

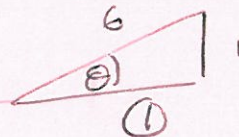
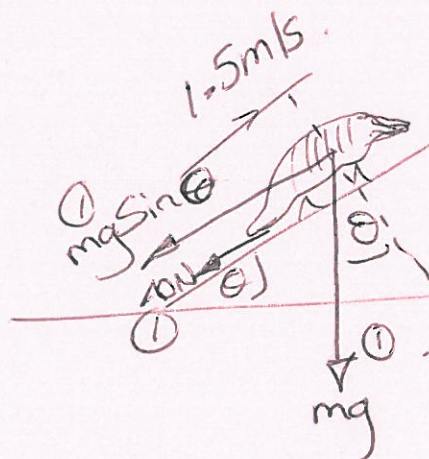
$v = 2\text{ m/s}$

$S_{\text{Tot}} = \frac{1}{2}bh$

$= \frac{1}{2} \times 55 \times 2$

$= 55\text{ m}$

2.



$\sin \theta = \frac{\text{opp}}{\text{hyp}}$

$\sin \theta = \frac{1}{6}$

Forces opposing motion:

$$F = mg \sin \theta + 40$$

$$= (5.75 \times 9.81 \times \frac{1}{6}) + 40$$

$$= 49.4\text{ N}$$

$P = F \cdot v$

$P = 49.4 \times 1.5$

$P = 74.1\text{ W}$

$P = F \cdot v$

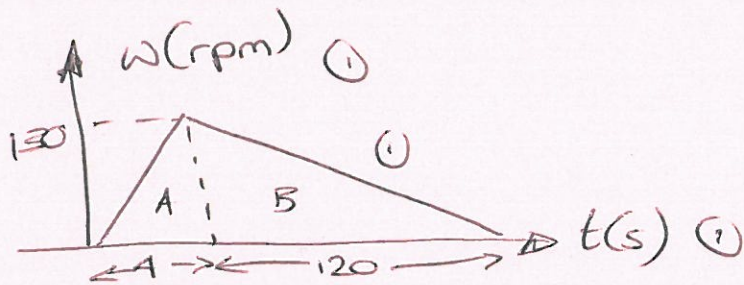
$F = \mu mg$

$P = \mu mg \cdot v$

$P = 0.2 \times 5.75 \times 9.81 \times 0.5$

$P = 5.64\text{ W}$

3.



a) looking @ 'A':

$$\omega_2 = 130 \times \frac{2\pi}{60} = 13.61 \text{ rad/s} \quad (1)$$

$$\omega_1 = 0$$

$$t = 4 \text{ s}$$

$$\alpha = ?$$

$$\omega_2 = \omega_1 + \alpha t \quad (1)$$

$$\alpha = \frac{\omega_2 - \omega_1}{t} \quad (1)$$

$$\alpha = \frac{13.61}{4} = \underline{\underline{3.4 \text{ rad/s}^2}} \quad (1)$$

$$b) \quad t_{\text{TOT}} = 124 \text{ s} \quad (1)$$

$$\omega = 13.61 \text{ rad/s}$$

$$\theta = \frac{1}{2} b \times h = \frac{1}{2} \times 124 \times 13.61 = 844.04 \quad (1) \quad (1) \text{ radians.}$$

$$\text{No of revs} = \frac{844.04}{2\pi} \quad (1) = 134.3 \text{ revs} \quad (1)$$

$$c) \quad I = m k^2 \quad (1)$$

$$I = m \frac{d^2}{8} \quad (1)$$

$$I = (2 \times 30) \left(\frac{1.8^2}{8} \right) \quad (1)$$

$$I = 24.3 \text{ kgm}^2 \quad (1)$$

$$d) \quad I = m k^2$$

$$I = m \frac{d^2}{8}$$

$$I = \left[(2 \times 30) + 350 \right] \left(\frac{1.8^2}{8} \right) = 166.05 \text{ kgm}^2 \quad (1)$$

$$T = I \alpha = 166.05 \times 3.4 = 564.57 \text{ Nm} \quad (1)$$

$$e) \quad KE = \frac{1}{2} I \omega^2 = \frac{1}{2} \times 166.05 \times 13.61^2 = 15378.895 \text{ J} \quad (1)$$

$$= 15.38 \text{ kJ} \quad (1)$$

4.

$$A = 2\text{m} \quad (1)$$

$$n = 5\text{Hz} \quad (1)$$

$$a) \quad N = \frac{\omega}{2\pi} \quad (1) \quad \omega = 2\pi N = 2\pi \times 5 = \underline{31.42 \text{ rad/s}} \quad (1)$$

$$b) \quad T = \frac{2\pi}{\omega} = \frac{2\pi}{31.42} = \underline{0.2 \text{ sec}} \quad (1)$$

$$c) \quad a = \omega^2 A \quad (1) \\ = (31.42^2 \times 2) \quad (1) \\ = 1974.4328 \text{ m/s} \quad (1)$$

$$d) \quad F = m\omega^2 A \quad (1) \\ = 70 \times 31.42^2 \times 2 \quad (1) \\ = 138210.296 \quad (1) \\ = 138.2 \text{ N} \quad (1)$$