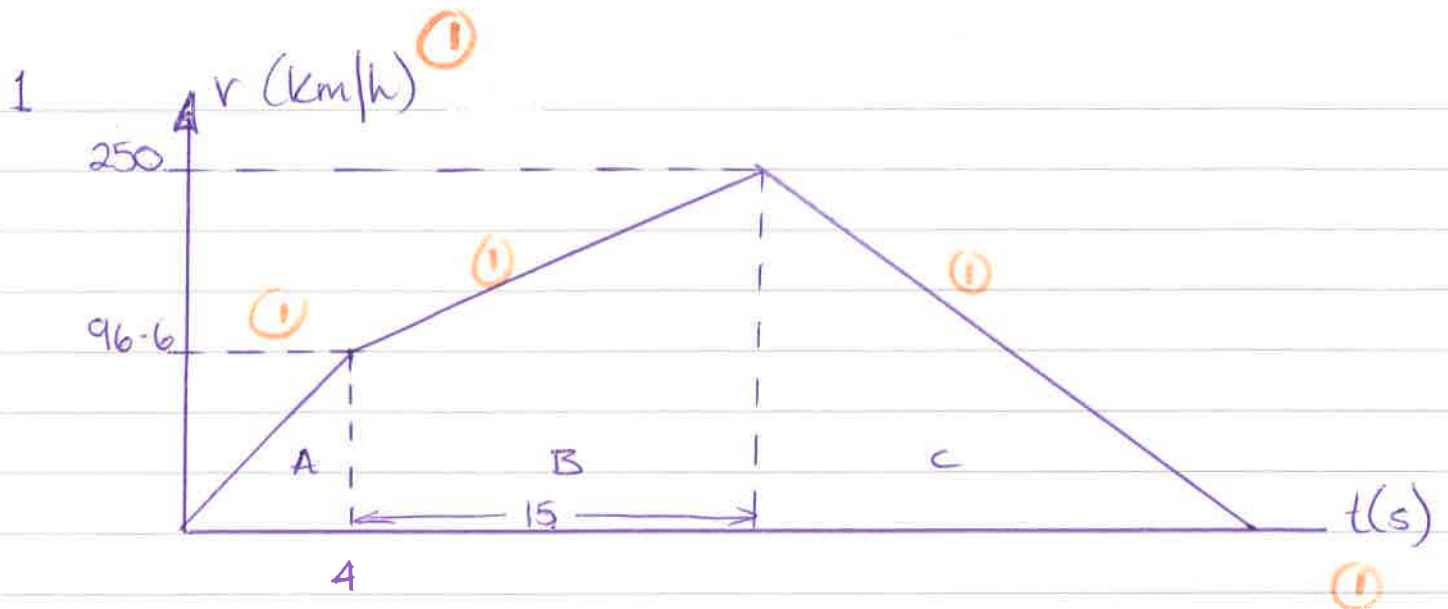




a) Looking @ 'C':

$$s = \frac{(u+v)t}{2}$$

$$u = \frac{250 \times 1000}{3600} = 69.44 \text{ m/s}$$

$$t = \frac{2s}{(u+v)}$$

$$v = 0$$

$$s = 350 \text{ m}$$

$$t = \frac{(2 \times 350)}{(69.44)} = 10.08 \text{ s}$$

$$\therefore \text{Total time} = 4 + 15 + 10.08 = \underline{\underline{29.08 \text{ s}}}$$

b) Looking @ 'A':

$$u = 0$$

$$s = \frac{(u+v)t}{2} = \frac{(26.83 \times 4)}{2}$$

$$v = \frac{96.6 \times 1000}{3600} = 26.83 \text{ m/s}$$

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

$$s = ?$$

$$s = 53.66 \text{ m}$$

Looking @ 'B':

$$s = \frac{(u+v)t}{2} = \frac{(26.83 + 69.44)15}{2} = 722.03 \text{ m}$$

$$u = 26.83 \text{ m/s}$$

$$v = 69.44 \text{ m/s}$$

$$t = 15 \text{ s}$$

$$s = ?$$

$$\therefore \text{Total distance} = 53.66 + 722.08 + 350 = 1125.69 \text{ m} = \underline{\underline{1.13 \text{ km}}}$$

2.

$$\omega_1 = 0$$

$$\omega_2 = 18000 \text{ rpm} \times \frac{2\pi}{60} = 1884.96 \text{ rad/s}$$

$$t = 1.5 \text{ s}$$

$$\alpha = ?$$

$$d = 310 \text{ mm}$$

$$d = 0.31 \text{ m}$$

$$\omega_2 = \omega_1 + \alpha t$$

$$\alpha = \frac{\omega_2 - \omega_1}{t} = \frac{1884.96}{1.5}$$

$$\alpha = 1256.64 \text{ rad/s}^2$$

$$I = \frac{md^2}{8}$$

$$I = mk^2$$

$$T = I\alpha$$

$$\therefore T = \frac{md^2}{8} \cdot \alpha$$

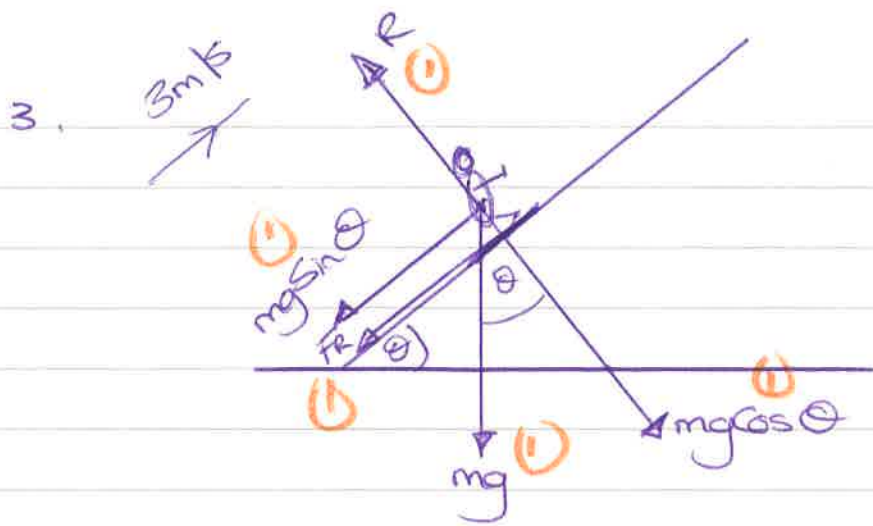
Rearrange for m

$$m = \frac{8T}{d^2 \alpha} = \frac{(8 \times 601)}{(0.31^2 \times 1256.64)} = \underline{\underline{39.81 \text{ kg}}}$$

$$KE = \frac{1}{2} I \omega^2 = \frac{1}{2} \cdot \frac{md^2}{8} \cdot \omega^2$$

$$KE = \frac{1}{2} \times 39.81 \times \frac{0.31^2}{8} \times 1884.96^2$$

$$KE = 849571.35 \text{ J} = \underline{\underline{849.57 \text{ kJ}}}$$



$$P = F \cdot v$$

$$F = \frac{P}{v} = \frac{51000}{3} = 17000 \text{ N}$$

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

$$F = mg \sin \theta + \mu R$$

$$F = mg \sin \theta + \mu mg \cos \theta$$

$$F = m [(g \sin \theta) + (\mu g \cos \theta)]$$

$$m = \frac{F}{(g \sin \theta) + (\mu g \cos \theta)}$$

$$m = \frac{17000}{(9.81 \times \sin 45) + (0.4 \times 9.81 \cos 45)}$$

$$m = 1750.52 \text{ kg}$$

$$m \text{ for 1 skier} = \frac{1750.52}{10} = \underline{\underline{175.05 \text{ kg}}}$$

A.

a) $T = 0.008s$

$$T = \frac{1}{n}$$

$$n = \frac{1}{T} = \frac{1}{0.008} = 125 \text{ Hz}$$

b) $n = \frac{\omega}{2\pi}$

$$\omega = 2\pi n = 2\pi \times 125 = 785.4 \text{ rad/s} \times \frac{60}{2\pi} = \underline{7500 \text{ rpm}}$$

c) $V_{\text{max}} = \omega A$
 $A = \frac{V_{\text{max}}}{\omega} = \frac{5}{785.4} = 6.37 \times 10^{-3} \text{ m}$

$$\therefore l = 2 \times A = \underline{0.013 \text{ m}}$$

d) $F = m\omega^2 A$
 $F = 0.125 \times 785.4^2 \times 0.013$
 $F = \underline{1002.39 \text{ N}}$