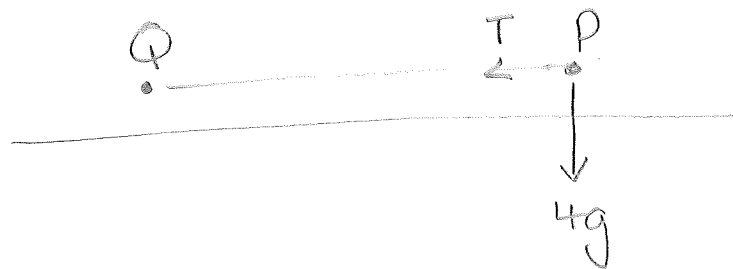


3B

①



a) $T =$

$$\lambda = 40$$

$$x = 0.3$$

$$L = 0.5$$

$$T = \frac{40(0.3)}{0.5}$$

$$T = 24$$

$$F = ma$$



$$24 = 4a$$

$$a = \underline{\underline{6 \text{ ms}^{-2}}}$$

b)

$$T =$$

$$\lambda = 40$$

$$x = 0.1$$

$$L = 0.5$$

$$T = \frac{40(0.1)}{0.5}$$

$$T = 8$$

$$F = ma$$

$$8 = 4a$$

$$a = \underline{\underline{2 \text{ ms}^{-2}}}$$

3B
2)



$$\lambda = 20$$

$$L = 0.8$$

$$x =$$

$$T = 0.4g$$

$$T_1 = \frac{\lambda x}{L}$$

$$0.4g = \frac{20(x)}{0.8}$$

$$x = 0.1568$$



$$\lambda = 20$$

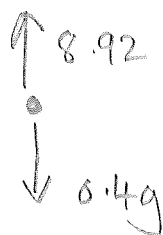
$$L = 0.8$$

$$x = 0.1568 + 0.2 = 0.3568$$

$$T_2$$

$$T_2 = \frac{20(0.3568)}{0.8}$$

$$T_2 = 8.92 \text{ N}$$



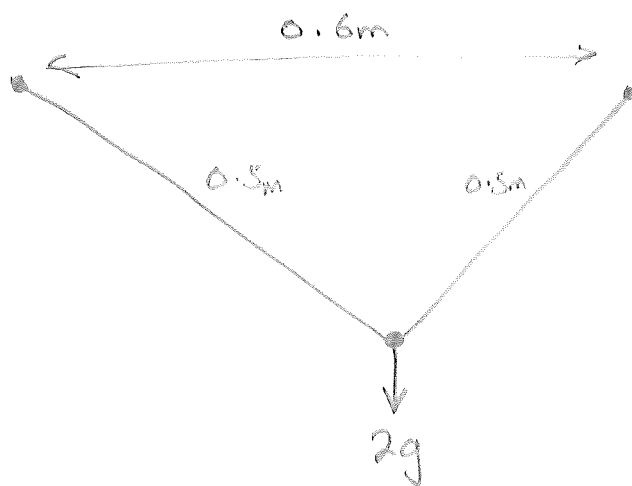
$$F = ma$$

$$8.92 - 3.92 = 0.4a$$

$$a = \underline{\underline{12.5 \text{ ms}^{-2}}}$$

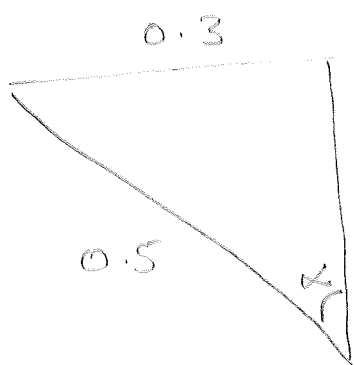
3B

3)



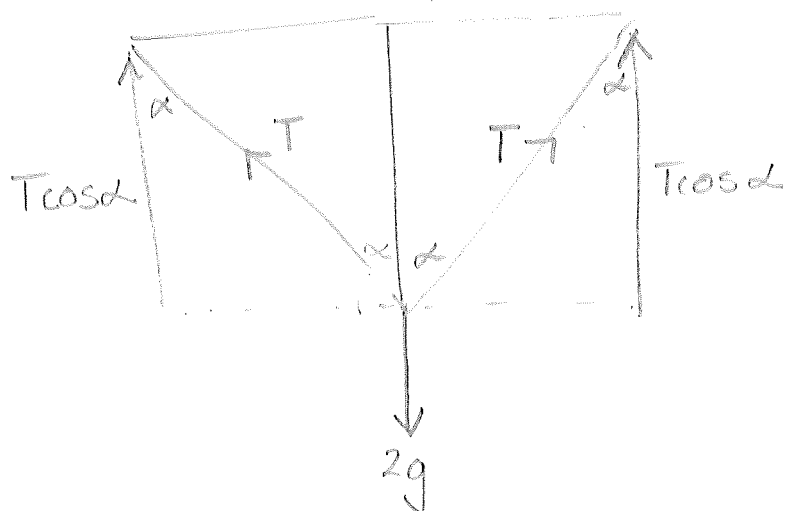
$$\lambda = 20$$

$$l = 0.4$$



$$\sin \alpha = \frac{3}{5}$$

$$\cos \alpha = \frac{4}{5}$$



$$F = ma$$

$$2T \cos \alpha - 2g = 2a$$

$$2T \left(\frac{4}{5} \right) - 2g = 2a$$

$$\frac{8T}{5} - 2g = 2a$$

$$a = \frac{4T}{5} - g$$

$$T =$$

$$x = 1 - 0.4 = 0.6$$

$$l = 0.4$$

$$\lambda = 20$$

$$T = \frac{\lambda x}{l}$$

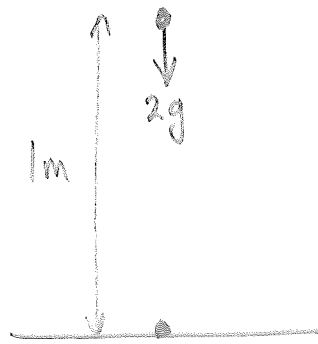
$$T = \frac{20(0.6)}{0.4}$$

$$T = 30 \text{ N}$$

$$a = \frac{4(30)}{5} - g$$

$$a = 14.2 \text{ ms}^{-2} \text{ upwards.}$$

(3B)
4)



$$\lambda = 40$$

$$L = 1.5$$

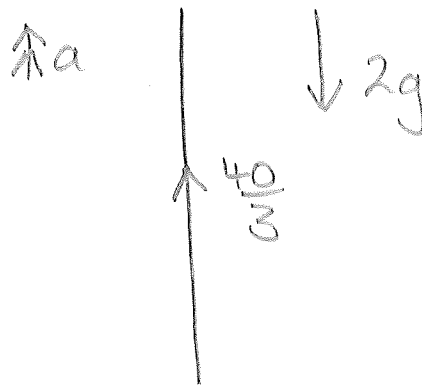
$$x = 0.5$$

$$T =$$

$$T = \frac{\lambda x}{L}$$

$$T = \frac{40(0.5)}{1.5}$$

$$T = \frac{40}{3}$$



$$F = ma$$

$$\frac{40}{3} - 2g = 2a$$

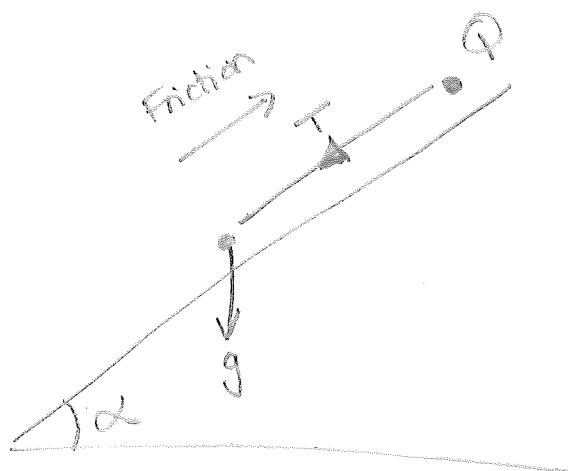
$$a = -3.13$$

mag is 3.13
downwards.

(3B)

5)

a)



$$\tan \alpha = \frac{5}{12}$$

$$\sin \alpha = \frac{5}{13}$$

$$\cos \alpha = \frac{12}{13}$$

T

$$T = \frac{\lambda x}{L}$$

$$\lambda = 21.5$$

$$L = 1.6$$

$$x = 0.4$$

$$T = \frac{21.5(0.4)}{1.6}$$

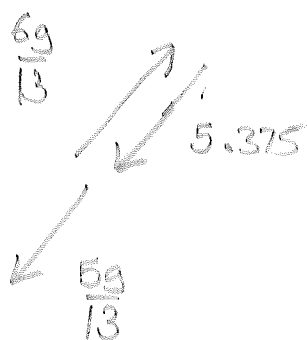
$$T = 5.375$$

$$\text{Friction} = \mu R$$

$$= \frac{1}{2} g \cos \alpha$$

$$= \frac{1}{2} (9.8) \left(\frac{12}{13} \right)$$

$$= \frac{12g}{26} = \frac{6g}{13}$$



$$F = ma$$

$$\frac{5g}{13} - \frac{6g}{13} + 5.375 = a$$

$$a = 4.62 (3sf)$$

b) Friction would increase

$\therefore$ acceleration would decrease