

1 a)

B:

$$F = ma$$

$$3g - T = 3(2)$$

$$3g - T = 6$$

$$3g - 6 = T$$

$$T = \underline{\underline{3g - 6 \text{ N}}}$$

$$[23.4 \text{ N}]$$

b/ A: perp to plane:  $2g \cos 40 = R$ 

$$R = 15 \text{ N}$$

$$F = ma$$

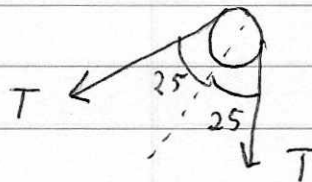
$$T - 2g \sin 40 - \mu R = 2(2)$$

$$23.4 - 2g \sin 40 - 15\mu = 4$$

$$-15\mu = -6.801\dots$$

$$\mu = 0.45 \quad (2 \text{ sf})$$

c/



$$T \cos 25 + T \cos 25$$

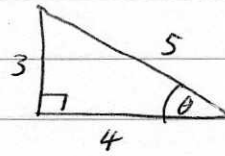
$$2T \cos 25$$

$$42.415\dots$$

$$\underline{\underline{42 \text{ N} \quad (2 \text{ sf})}}$$

2

$$\cos \theta = \frac{4}{5} = \frac{A}{H}$$



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

P: perp to plane:  $R = 4g \cos \theta$

$$= 4g \left( \frac{4}{5} \right)$$

$$= \frac{16}{5} g \text{ N}$$

whole system:  $F = ma$

$$5g - 4g \sin \theta - 0.2R = 9a$$

$$5g - 4g \left( \frac{3}{5} \right) - \frac{1}{5} \left( \frac{16}{5} g \right) = 9a$$

$$\frac{49}{25} g = 9a$$

$$a = \frac{49}{225} g \text{ ms}^{-2}$$

$$s = 2$$

$$u = 0$$

$$v = ?$$

$$a = \frac{49}{225} g$$

t

$$v^2 = u^2 + 2as$$

$$v^2 = (0)^2 + 2 \left( \frac{49}{225} g \right) (2)$$

$$v = \underline{\underline{2.9 \text{ ms}^{-1} \text{ (2sf)}}}$$

$$3a) \quad Q \text{ perp to plane: } R = 2g \cos 45$$

Assuming motion towards P

$$Q: \quad F = ma$$

$$T - 2g \sin 45 - 0.3(2g \cos 45) = 2a \quad (1)$$

$$P: \quad F = ma$$

$$6g \sin 30 - T = 6a \quad (2)$$

$$(1) \times 3 \quad 3T - 6g \sin 45 - 0.9(2g \cos 45) = 6a$$

$$3T - 6g \sin 45 - 0.9(2g \cos 45) = 6g \sin 30 - T$$

$$4T = 6g \sin 30 + 6g \sin 45 + 0.9(2g \cos 45)$$

$$4T = 83.45$$

$$T = 20.86 \dots$$

$$= \underline{\underline{21 \text{ N}}} \quad (2sf)$$

$$b) \quad P: \quad F = ma$$

$$6g \sin 30 - 21 = 6a$$

$$a = \frac{6g \sin 30 - 21}{6}$$

$$= 1.4 \text{ ms}^{-2} \quad (2sf)$$

~~Towards~~ Down the smooth slope.