

1) Resolving vertically:

$$R_A = 20g$$

$$\begin{aligned} F_r &= \mu R \\ &= 0.4(20g) \\ &= \underline{\underline{8g \text{ N}}} \end{aligned}$$

b) Resolving horizontally:

$$\begin{aligned} R_B &= F_r \\ &= 8g \text{ N} \end{aligned}$$

Taking moments about A:

$$2.5(20g \cos \theta) = 5 R_B \sin \theta$$

$$50g \cos \theta = 5(8g) \sin \theta$$

$$50g \cos \theta = 40g \sin \theta$$

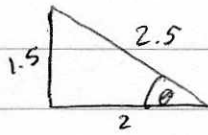
$$50g = 40g \tan \theta$$

$$\tan \theta = \frac{5}{4}$$

$$\theta = \tan^{-1} \left(\frac{5}{4} \right)$$

$$= \underline{\underline{51.3^\circ}} \text{ (1 dp)}$$

2a)



$$\sin \theta = \frac{1.5}{2.5} = \frac{3}{5}$$

$$\cos \theta = \frac{2}{2.5} = \frac{4}{5}$$

$$\tan \theta = \frac{1.5}{2} = \frac{3}{4}$$

Taking moments about A:

$$1(3g) = 2(T \sin \theta)$$

$$3g = 2T \frac{3}{5}$$

$$3g = \frac{6}{5}T$$

$$T = \underline{\underline{\frac{5}{2}g \text{ N}}}$$

b/

Forces up = Forces Down

$$T \sin \theta = 3g + R_A$$

$$\frac{5}{2}g \left(\frac{3}{5} \right) = 3g + R_A$$

$$\frac{3}{2}g = 3g + R_A$$

$$-\frac{3}{2}g = R_A$$

$$\uparrow \frac{3}{2}g$$

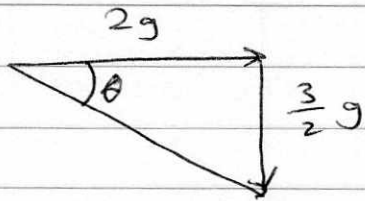
Forces left = Forces Right

$$T \cos \theta = R_A$$

$$\frac{5}{2}g \frac{4}{5} = R_A$$

$$2g = R_A$$

$$2g \rightarrow$$



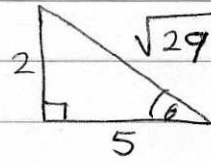
$$\tan \theta = \frac{1.5}{2}$$

$$\theta = \tan^{-1} \left(\frac{1.5}{2} \right)$$

2.5g N at an angle of 37° below
the horizontal

3/

$$\tan \theta = \frac{2}{5}$$



$$\cos \theta = \frac{5}{\sqrt{29}}$$

$$\sin \theta = \frac{2}{\sqrt{29}}$$

Taking moments about A:

$$3(10g \cos \theta) = 4 R_c$$

$$30g \frac{5}{\sqrt{29}} = 4 R_c$$

$$R_c = 68.243... \text{ N}$$

Forces up = Forces Down

$$R_c \cos \theta + R_A = 10g$$

$$R_A = 10g - "68.243" \left(\frac{5}{\sqrt{29}} \right)$$

$$= 34.637... \text{ N}$$

Forces left = Forces Right

$$R_c \sin \theta = \mu R_A$$

$$"68.243" \frac{2}{\sqrt{29}} = \mu ("34.637")$$

$$\mu = \frac{"68.243" \frac{2}{\sqrt{29}}}{"34.637"}$$

$$\mu = \underline{\underline{0.73}} \quad (2\text{sf})$$