1) Resolving vertically:

$$R_A = 20g$$

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

b/ Resolving horizontally:

$$R_B = F_r$$
$$= 8g \text{ N}$$

Taking moments about A:

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

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

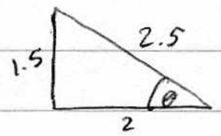
$$50g \cos\theta = 40g \sin\theta$$

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

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

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

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

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:

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

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

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

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

b) Forces up = Forces Down

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

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

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

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

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

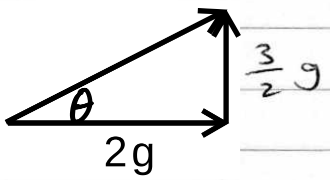
Forces left = Forces Right

$$T\cos\theta = R_A$$

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

$$2g = R_A$$

$$\xrightarrow{2g}$$



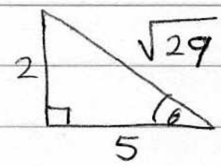
$$\tan\theta = \frac{1.5}{2}$$

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

$\underline{\underline{2.5g}}$ N at an angle of $\underline{\underline{37^\circ}}$ above the horizontal

3/

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



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

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

Taking moments about A:

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

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

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

Forces up = Forces Down

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

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

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

Forces left = Forces Right

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

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

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

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