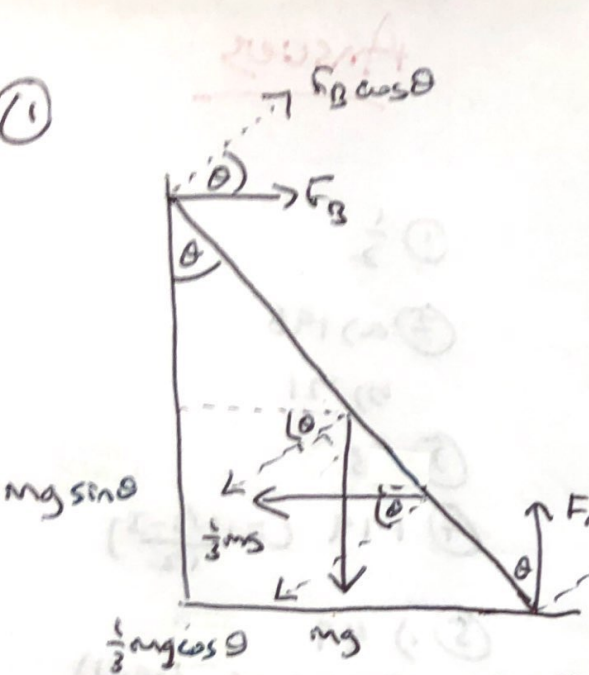
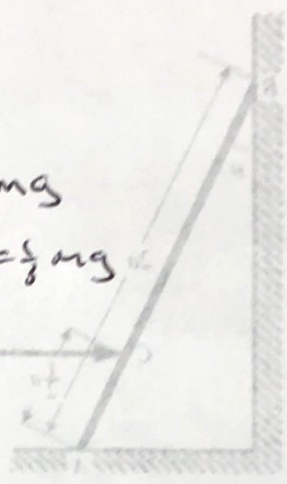


①



$$F_A = mg$$

$$F_B = \frac{1}{3} mg$$



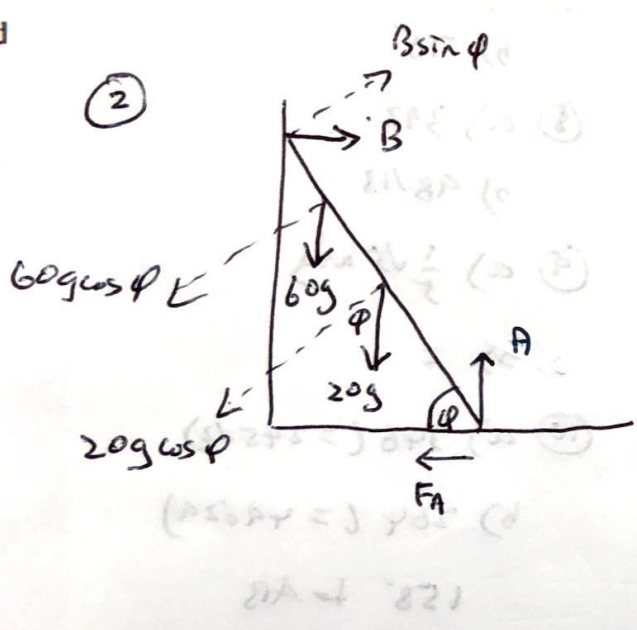
MCA) $\frac{1}{3} mg \cos \theta (\frac{1}{2} a) + mg \sin \theta (a) = \frac{1}{3} mg \cos \theta (2a)$

~~$\frac{1}{6} + \tan \theta = \frac{2}{3}$~~

$$\frac{1}{6} + \tan \theta = \frac{2}{3}$$

$$\tan \theta = \frac{1}{2}$$

d

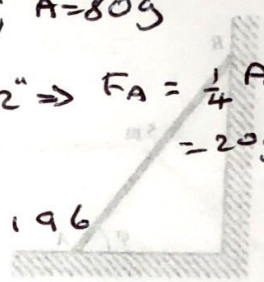


$$N = \frac{1}{4}$$

$$A = 80g$$

$$F = NR \Rightarrow F_A = \frac{1}{4} A = 20g = 196$$

$$B = 196$$

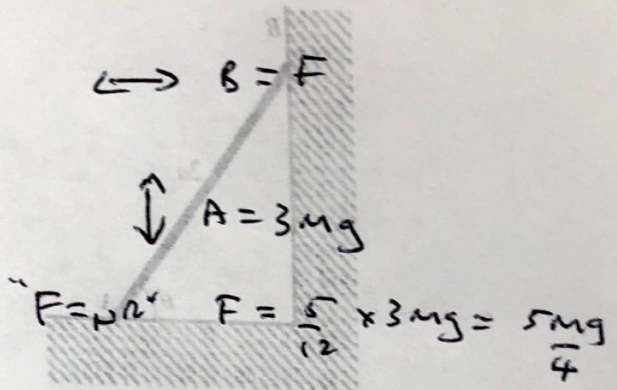
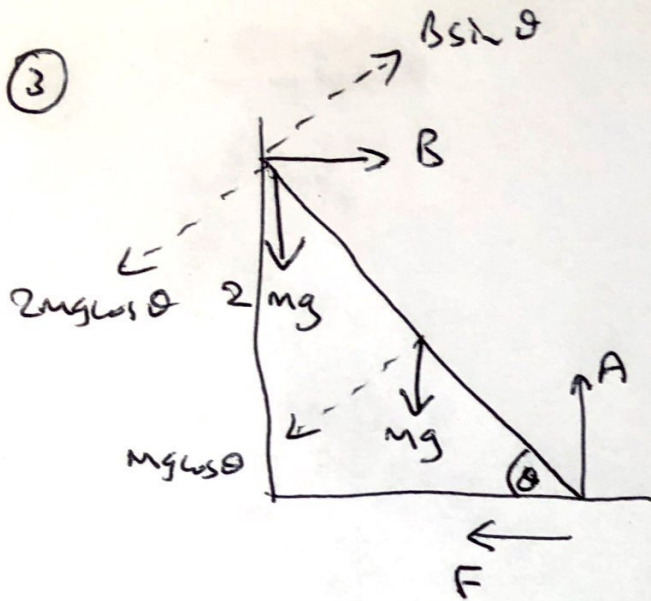


$$M(A) \quad 20g \cos \phi (2.5) + 60g \cos \phi (4)$$

$$= 20g \sin \phi (5)$$

$$\therefore \tan \phi = \frac{50 + 240}{100}$$

$$\phi = 71^\circ$$



$$M(A) \quad mg \cos \theta (4) + 2mg \cos \theta (2a)$$

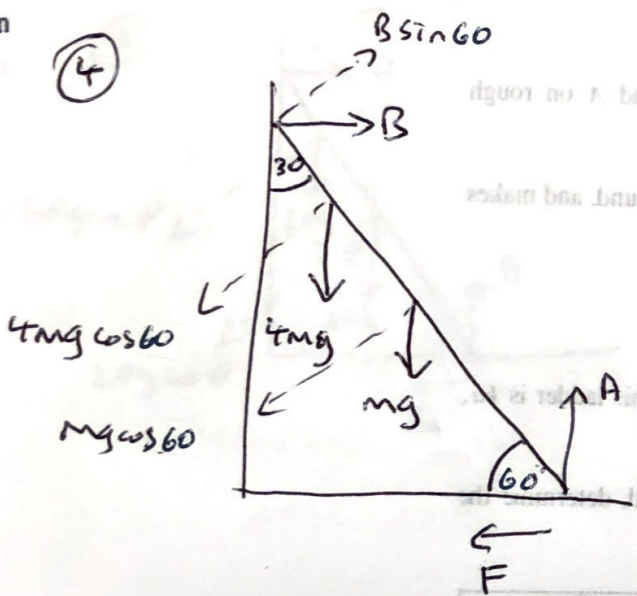
$$= B \sin \theta (2a)$$

$$1 + 4 = \frac{5}{4} \tan \theta$$

$$\tan \theta = 2$$

$$\theta = 63.4^\circ$$

(4)



A uniform ladder AB of mass m and length $2a$ has one end A on rough horizontal ground and the other end B against a smooth vertical wall.

$$\leftrightarrow B = F$$

$$\downarrow A = 5mg$$

$$F = \mu R \quad \mu = \frac{1}{3} \quad F = \frac{1}{3} A = \frac{5}{3} mg$$

The greatest distance from A that a man of mass $4m$ can walk up the ladder is $\frac{1}{3}a$ where k is a positive constant.

$$m g \cos 60 (a) + 4 m g \cos 60 (ka) = \frac{5}{3} m g \sin 60 (2a)$$

$$1 + 4k = \frac{10}{3} \sqrt{3}$$

$$\therefore 1 + 4k = \frac{10}{3} \sqrt{3}$$

$$k = \frac{\frac{10\sqrt{3}}{3} - 1}{4} = \frac{10\sqrt{3} - 3}{12}$$