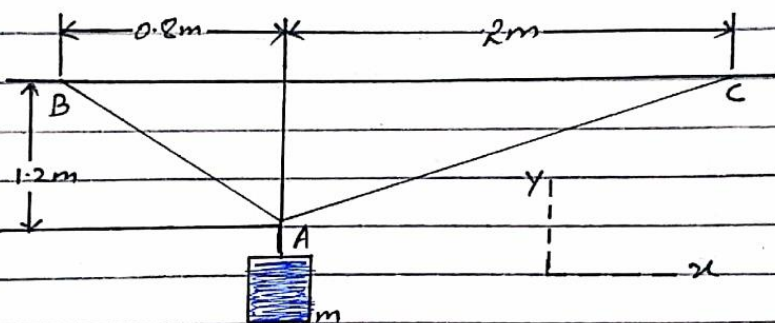


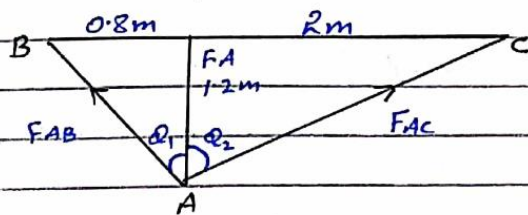
Paper: Engineering Mechanics:

ID: 7313 : Ahmad Faraz Khan.

Q-1: Two high strength results of Part a (3).



Solution:- Part a



$$Q_1 = \tan^{-1} \left(\frac{0.8}{1.2} \right)$$

$$Q_1 = 33.6^\circ$$

$$Q_2 = \tan^{-1} \left(\frac{2}{1.2} \right)$$

$$Q_2 = 59.0^\circ$$

Resolve the component.

$$F_A = F_{AC} \cos Q_2.$$

$$F_{AC} = \frac{F_A}{\cos \theta_2} = \frac{1773.8 \text{ N}}{\cos(59.5^\circ)}$$

$$F_{AC} = 3444.0 \text{ N.}$$

$$F_A = F_{AB} \cos \theta_1$$

$$F_{AB} = \frac{F_A}{\cos \theta_1} = \frac{1773.8 \text{ N}}{\cos(33.6^\circ)}$$

$$F_{AB} = 2129.6 \text{ N.}$$

Percentage of weight carried by
AB above is.

Force in point A.

$$F_A = mg.$$

$$F_A = (400)(9.8)$$

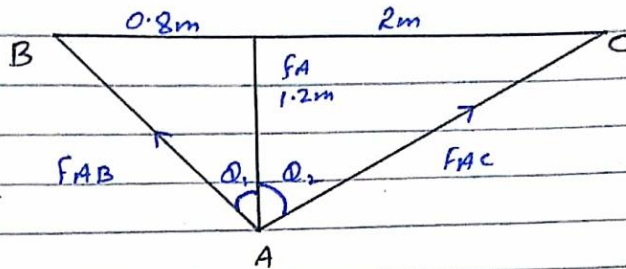
$$F_A = 3920$$

Percentage of weight.

$$F_{AB} = \frac{2129}{3920} \times 100$$

$$F_{AB} = 54.31 \%$$

Solution: Part B:



$$\theta_1 = \tan^{-1} \left(\frac{0.8}{1.2} \right)$$

$$\theta_1 = 33.6^\circ$$

$$\theta_2 = \tan^{-1} \left(\frac{2}{1.2} \right)$$

$$\theta_2 = 59.0^\circ$$

Resolve the components.

$$F_A = F_{AC} \cos \theta_2$$

$$F_{AC} = \frac{F_A}{\cos \theta_2} = \frac{1773.8 \text{ N}}{\cos(59.0^\circ)}$$

$$F_{AC} = 3444.0 \text{ N.}$$

$$F_A = F_{AB} \cos \theta_1$$

$$F_{AB} = \frac{F_A}{\cos \theta_1} = \frac{1773.8 \text{ N}}{\cos(33.6^\circ)}$$

$$F_{AB} = 2129.6 \text{ N.}$$

Percentage of weight carried by AB
done is:

Force in point A.

$$F_A = mg.$$

$$F_A = (340 \text{ pound}) (9.8)$$

$$F_A = 3332$$

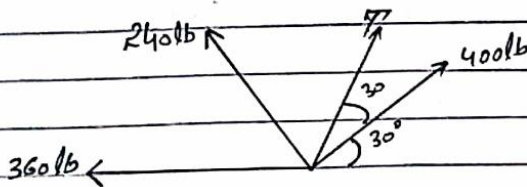
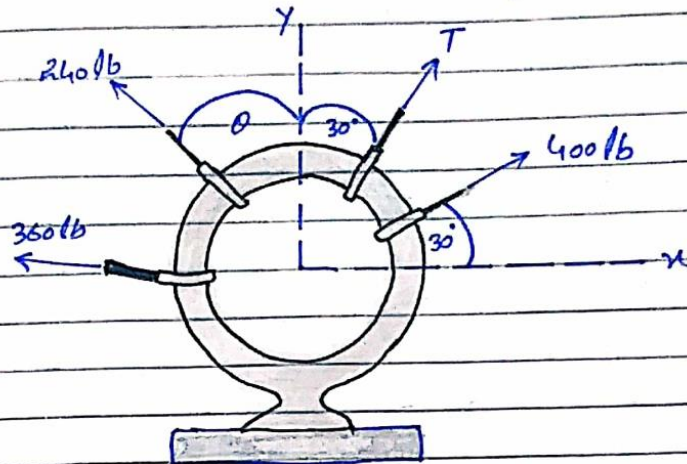
Percentage of weight

$$F_{AB} = \frac{2129}{3332} \times 100.$$

$$F_{AB} = 63.8 \%$$

|| ~~~~~ || ~~~~~ || ~~~~~ || ~~~~~ ||

Q.No.2: Four forces are -----
 ----- values of T and.



$$-600 \text{ lb} = 400 \sin 30^\circ + \frac{T \cos 30^\circ}{0.866} + 240 \cos \theta$$

$$600 \text{ lb} = 200 + 0.866 T + 240 \cos \theta$$

$$400 \text{ lb} = 0.866 T + 240 \cos \theta \quad \text{--- (i)}$$

$$360 \text{ lb} = 240 \sin \theta - \frac{T \sin \theta}{200} - 400 \sin 30^\circ$$

$$560 = 240 \sin \theta - 0.5 T \quad \text{--- (ii)}$$

$$\text{(i)} \quad \frac{400 \text{ lb}}{0.866} = \frac{0.866 T}{0.866} + \frac{240 \cos \theta}{0.866}$$

$$462 = T + 277.14 \cos \theta \quad \text{--- (iii)}$$

$$\text{(ii)} \quad \frac{560}{0.5} = \frac{240 \sin \theta}{0.5} - \frac{0.5 T}{0.5}$$

$$1120 = 480 \sin \theta - T \rightarrow \textcircled{iv}$$

Divide (iv) by (iii)

$$\frac{1120}{462} = \frac{480 \sin \theta - T}{277.14 \cos \theta + T}$$

$$2.42 = 1.73 \tan \theta$$

$$\theta = \tan^{-1} \left(\frac{2.42}{1.73} \right)$$

$$\theta = 54.43$$

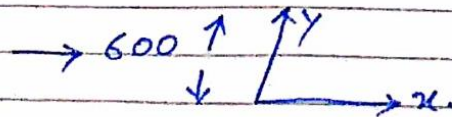
$$Q = 600 \text{ lb} = 200 + 0.866 T = 240 (0.5 (54.43))$$

$$-400 \text{ lb} - 139.6 = 0.866 T$$

$$-539.6 = 0.866 T$$

$$\frac{-539.6}{0.866} = T$$

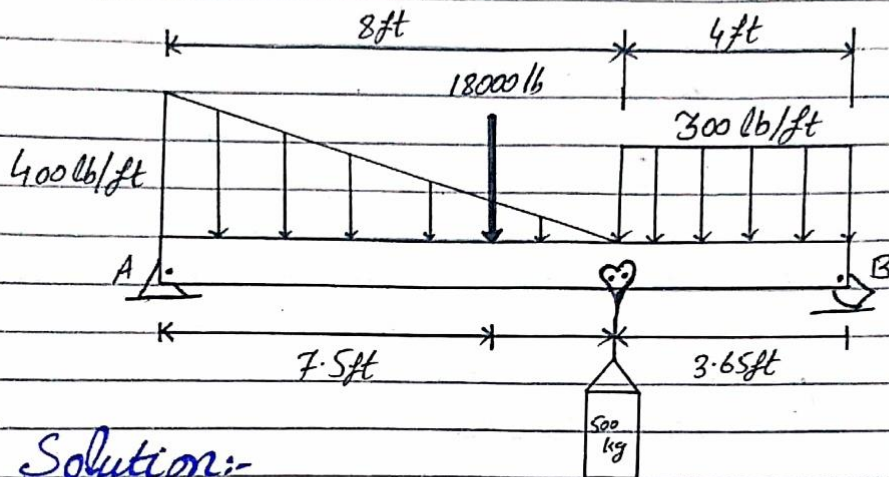
$$T = 623.09 \text{ lb}$$



May be given direction of 600 lb is taken in opposite direction.

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Q No. 3:- Calculate the reactions at supports.



Solution:-

Since we know that:

$$1 \text{ kg} = 2.205 \text{ lbs.}$$

$$\Rightarrow 500 \text{ kg} = 500 \times 2.205 = 1102.5 \text{ lbs.}$$

Now calculate reactions.

$$\sum F_y = 0 \uparrow +ve.$$

$$R_1 + R_2 = 18000 + 1102.5 + (300 \times 4) + \frac{(400 \times 8)}{2}$$

$$= 21902.5 \text{ lbs.}$$

Also:-

$$\sum MA = 0 \uparrow +ve.$$

$$R_1 \times 0 + (18000 \times 7.5) + 1102.5(8 + 0.35) + (300 \times 4) \times 10 + \frac{(400 \times 8)}{2} \times \frac{1}{3}$$

$$(8) \uparrow = R_2 \times 12.$$

$$\Rightarrow 160472.54 = 12R_2$$

$$\Rightarrow R_2 = \frac{160472.54}{12}$$

$$\Rightarrow R_2 = 13372.71 \text{ lbs.} \quad \text{--- eq ②}$$

Put eq (2) in (1).

$$\Rightarrow R_1 + 13372.71 = 21902.5$$

$$R_1 = 21902.5 - 13372.71$$

$$R_1 = 8529.79 \text{ lbs.}$$

So that the support Reaction are.

$$R_1 = 8529.79 \text{ lbs.}$$

$$R_2 = 13372.71 \text{ lbs.}$$