

Name :- Bilal Khan

ID :- 16320

Subject :- Engineering Mechanics

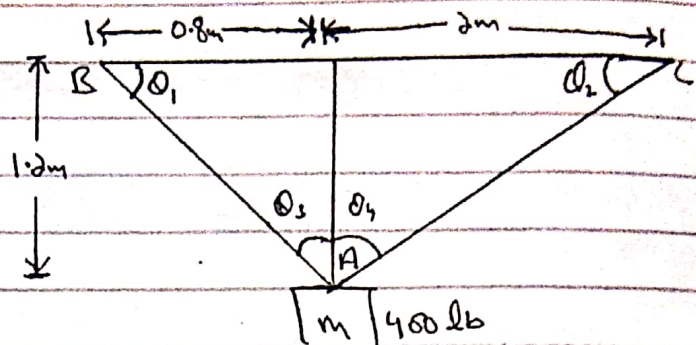
Section :- "B"

Department :- Civil

Date :- 27/4/2020.

1

Question No :- "1":



Volume = 3000 litres

Solution:-

$$\overline{AB} = \sqrt{(0.8)^2 + (1.2)^2} = 1.44 \text{ m}$$

$$\overline{AC} = \sqrt{(2)^2 + (1.2)^2} = 2.33 \text{ m}$$

$$\theta_1 = \tan^{-1}\left(\frac{1.2}{0.8}\right) = 56.31^\circ$$

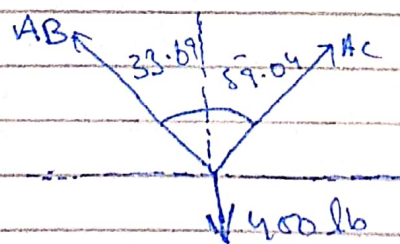
$$\theta_2 = \left(\frac{1.2}{2}\right) = 30.96^\circ$$

$$\theta_3 = 90 - 56.31$$

$$\theta_4 = 90 - 30.96$$

$$\theta_3 = 33.69$$

$$\theta_4 = 59.04$$



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

$$-400 + AB \cos(33.69) + AC \cos(59.04) = 0$$

$$0.832 AB + 0.514 AC = 400 \quad \text{--- (A)}$$

$$\sum F_x = 0 \rightarrow +$$

$$-AB \sin(33.69) + AC \sin(59.04) = 0$$

$$-0.555 AB + 0.858 AC = 0$$

$$AB - 1.55 AC = 0 \quad \text{--- (B)}$$

②

Putting of value AB in eq. (B)

$$0.832 [1.55AC] + 0.514 AC = -400$$

$$1.2896 AC + 0.514 AC = -400$$

$$1.8036 AC = 400$$

$$AC = 221.78 \text{ lb}$$

So eq. 'B' becomes

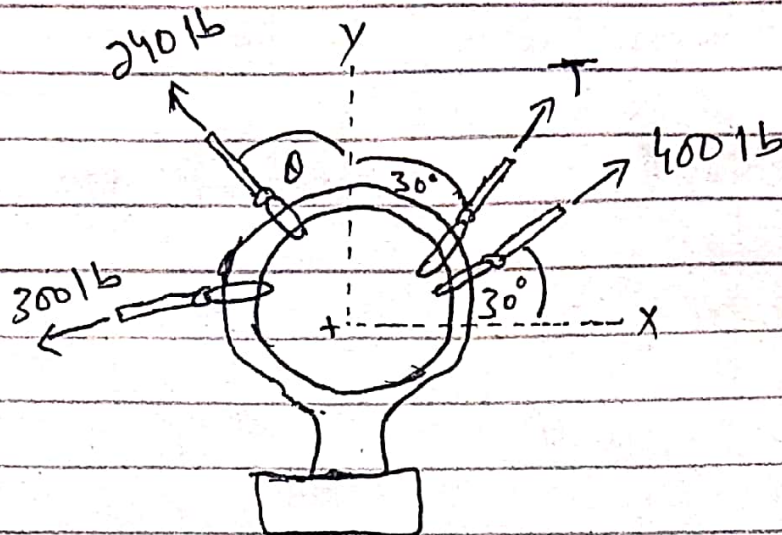
$$AB - 1.55 AC = 0$$

$$AB - 1.55 (221.78) = 0$$

$$AB = 343.76 \text{ lb}$$

3

Question No: "2"



Solution:

$$\sum F_x = 0: = 360 - 240 \sin \theta + T \sin 30^\circ + 400 \cos 30^\circ = 0 \quad \text{①}$$

$$\sum F_y = 600: = 240 \cos \theta + T \cos 30^\circ + 400 \sin 30^\circ = 600 \quad \text{②}$$

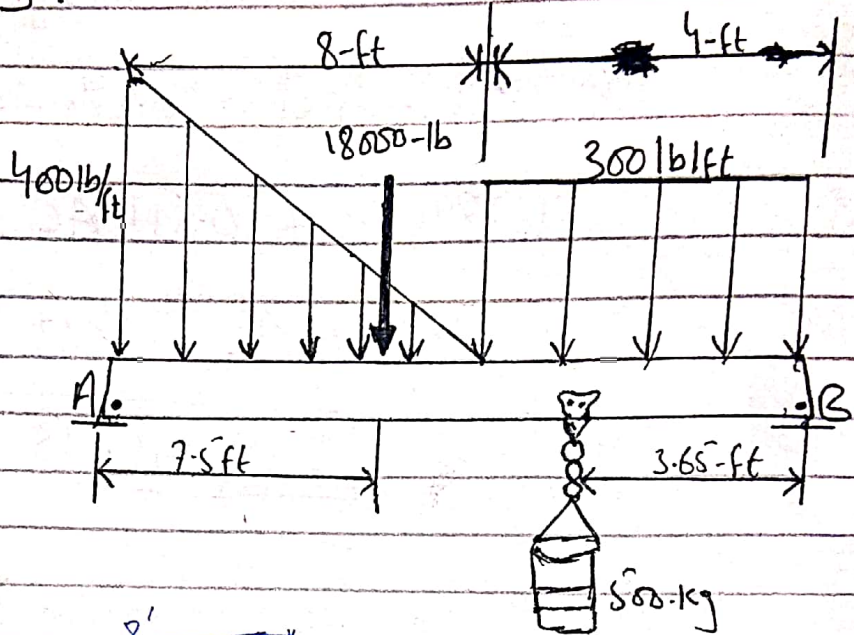
Now the solution of equation "1" & "2" are as following:

$$\theta = 21.7^\circ, \quad T = 204 \text{ lb}$$

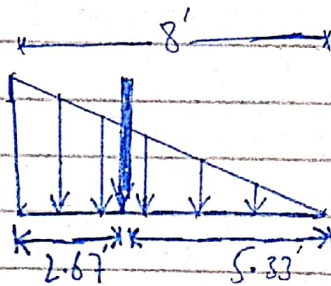
(we could eliminate "T" between eqs "1" & "2", but the resulting equation is still transcendental.)

(4)

Question No: - "3":

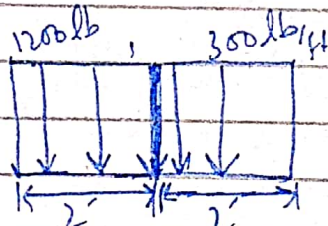


Solution:-

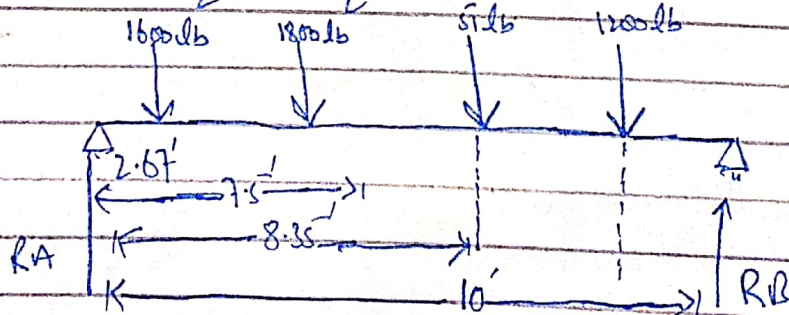


$$500 = 51 \text{ lb}$$

$$\frac{400 \times 8}{2} = 1600 \text{ lb}$$



$$300 \times 4 = 1200 \text{ lb}$$



$$\sum M_A = 0$$

$$(1600 \times 2.67) + (1800 \times 11.5) + (51 \times 8.35) + (1200 \times 11.5) - R_B(12) = 0$$

$$R_B = 2294 \text{ lb}$$

5

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

$$R_A - 1600 - 1800 - 51 - 1200 + 2294 = 0$$

$$R_A = 2357 \text{ lb}$$