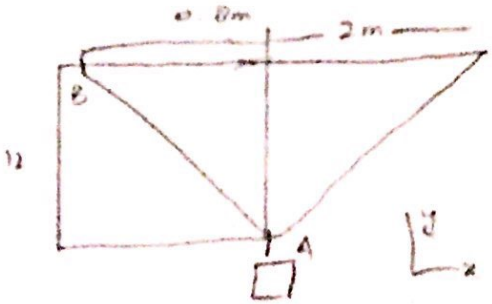
Name: M Manzzam Khan
ID: 16096
Department: Civil Engineering
Teacher:
Subject: Engineering Mechanics
Section: A.

Question 1



PART A

Given Data

$m = 400 lbs$

$\Delta AB = 15\%$

$\Delta AC = 35\%$

$AB = ?$

$BC = ?$

Solution

$$\theta = \tan^{-1}\left(\frac{12}{0.8}\right)$$

$$\boxed{\theta = 56.3^\circ}$$

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

$$\beta = 31.6$$

We know that

$m = 400 lbs \Rightarrow 400 / 2.204 = 181.48 kg$

$$T_{AB} = T_{AB}\Delta AB = 0.15 \times (181.48)(9.81)\{-(\cos 56i + \sin 56j)$$

$$= 207.047\{0.55i + 0.831i)$$

$$\boxed{T_{AB} = -146.87i + 221iN}$$

$T_{AC} = T_{AC}\ \Delta AC = 0.35(181.48) + 9.81\{-(0.331i + \sin 3i$

$T_{AC} = (623.11)\{0 - 0.857i\} + 0.515i\}$

$T_{AC} = -534i + 320jN$

$T_{AB} = -146j + 221iN$

$T_{AC} = -534i + 320jN$

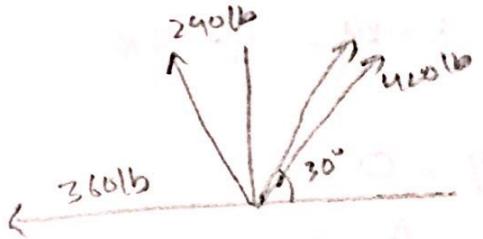
PART B If the volume of water tank increases then weight to their stability is not doubled.

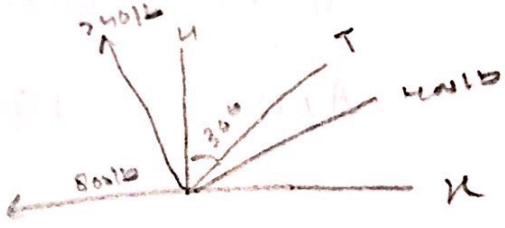
Question2 Given Data.

Sfeet of bold = 600lb

T = ?

Θ = ?





Sol^n

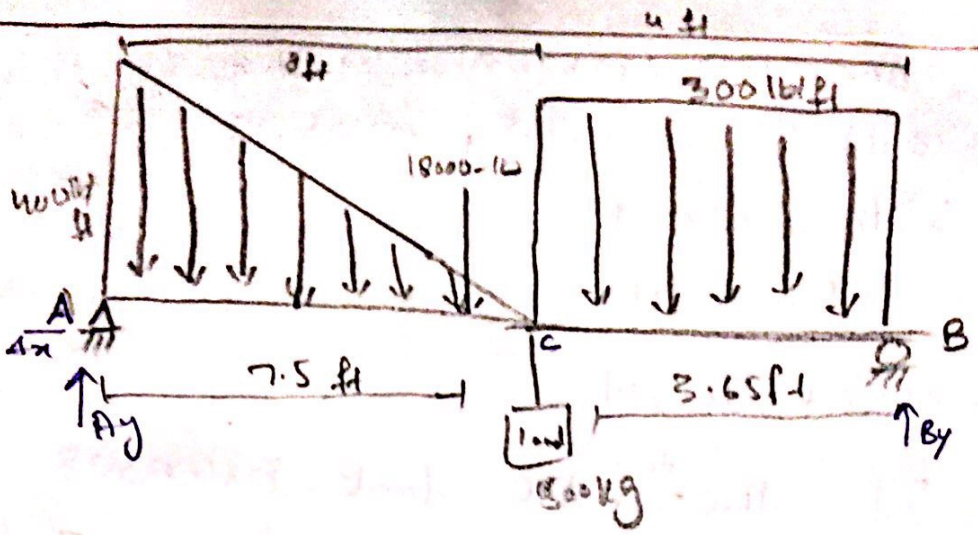
$\{F_x = 0 = -360 - 240\sin\Theta + T\sin 30 + 400\cos 30°$ ~~$\cos 30°\}$~~ $= 0$

$\{F_y = 0 = 240\cos\Theta + T\cos 30 + 400\sin 30° = 600$

~~Numerical~~

$\Theta = 21.7°$ $T = 204lb$ Ans.

Question 3



Solution

$1kg = 2.20lb$

So $500kg = 1100lbs$

$\Sigma F_y = 0$

$$A_y + B_y = 1100 + 18000 + 300(4) + \frac{1}{2}(400)(8)$$

$$A_y + B_y = 21900$$

$\Sigma M_A = 0$

$$-B_y(12) + (300)(4)(10) + (1100)(8.35) + (18000)(7.5) + \frac{1}{2}(400)(8)\left(\frac{1}{3}(8)\right) = 0$$

$$-B_y(12) + 12000 + 9185 + 135000 + 4266.6 = 0$$

$$-B_y(12) + 160451.2 = 0$$

$$+B_y(12) = +160451.2$$

$$B_y = 133710$$

$$A_y = 21900 - 133710 = -111810$$

Reactions are $A_y = -111810$, & $B_y = 133710$.