

NAME : Sargeen Khan

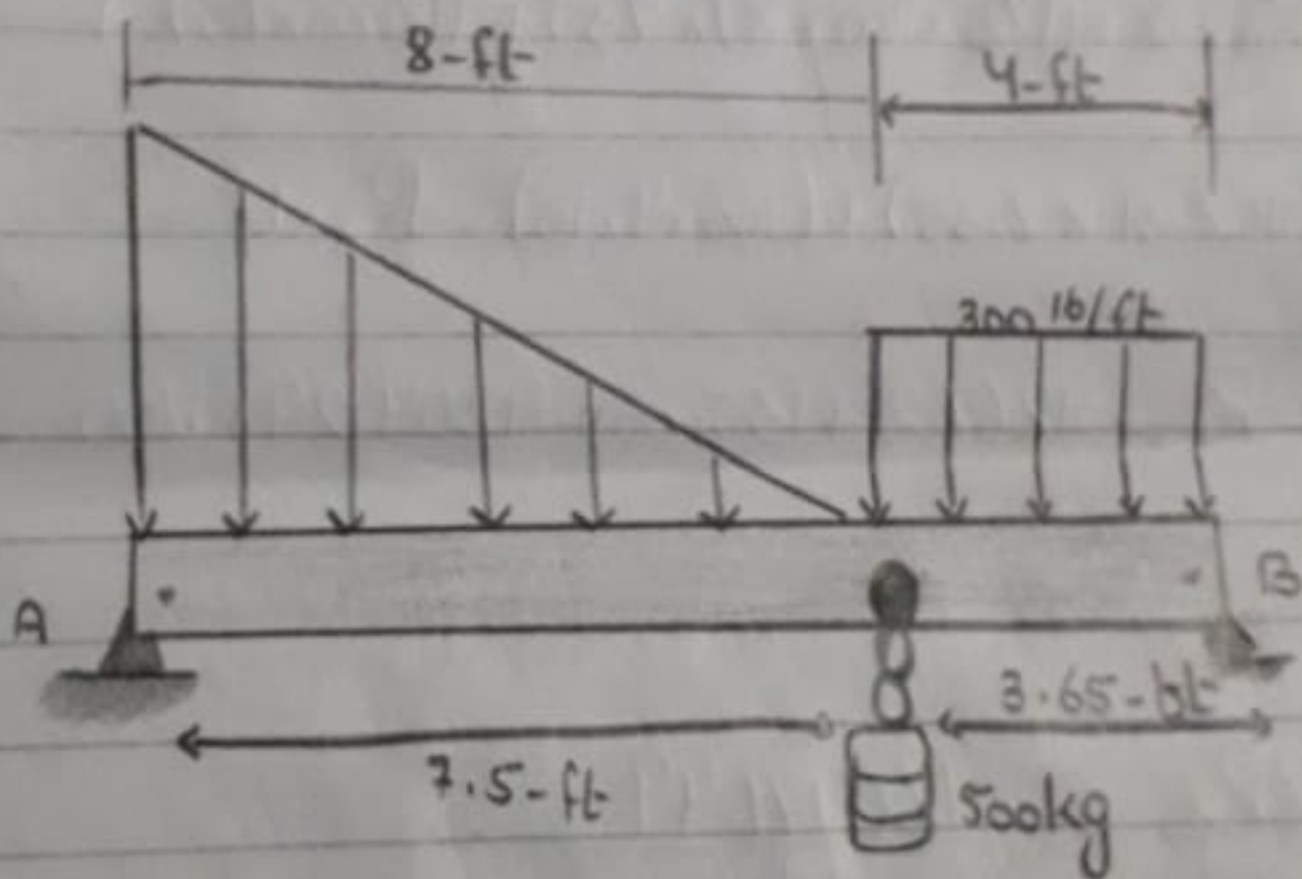
ID : 16098

SECTION : A

SUBJECT : Engineering Mechanics

QUESTION : 03

Calculate the reactions at supports.



VERTICAL COMPONENTS :-

$$\sum F_y = 0$$

$$-R_A + \left( \frac{1}{2} \times 400 \frac{\text{lb}}{\text{ft}} \times 8 \right) + 18000 \text{ lb} + \left( 300 \times 4 \text{ ft} \right) +$$

$$1102.31 \text{ lb} - R_B$$

2.

$$R_A + R_B = 1600 \text{ lb} + 18000 \text{ lb} + 1200 \text{ lb} + 1102.31 \text{ lb}$$

$$R_A + R_B = 21902.31 \text{ lb} \rightarrow (i)$$

Now Moment axm.:

$$\sum M_A = 0 \quad (\text{Took moment at } A=0)$$

$$R_A \times 0 + \left\{ \left( \frac{1}{2} \times 400 \times 8 \right) \times \frac{8}{3} \right\} + (18000 \times 7.5) +$$

$$(1102.31 \times 8.35) + (300 \times 4 \times 10) - R_B \times 12 = 0$$

$$12 R_B = 4267.2 + 135000 + 9204.29 + 1200$$

Dividing Both sides by '12':-

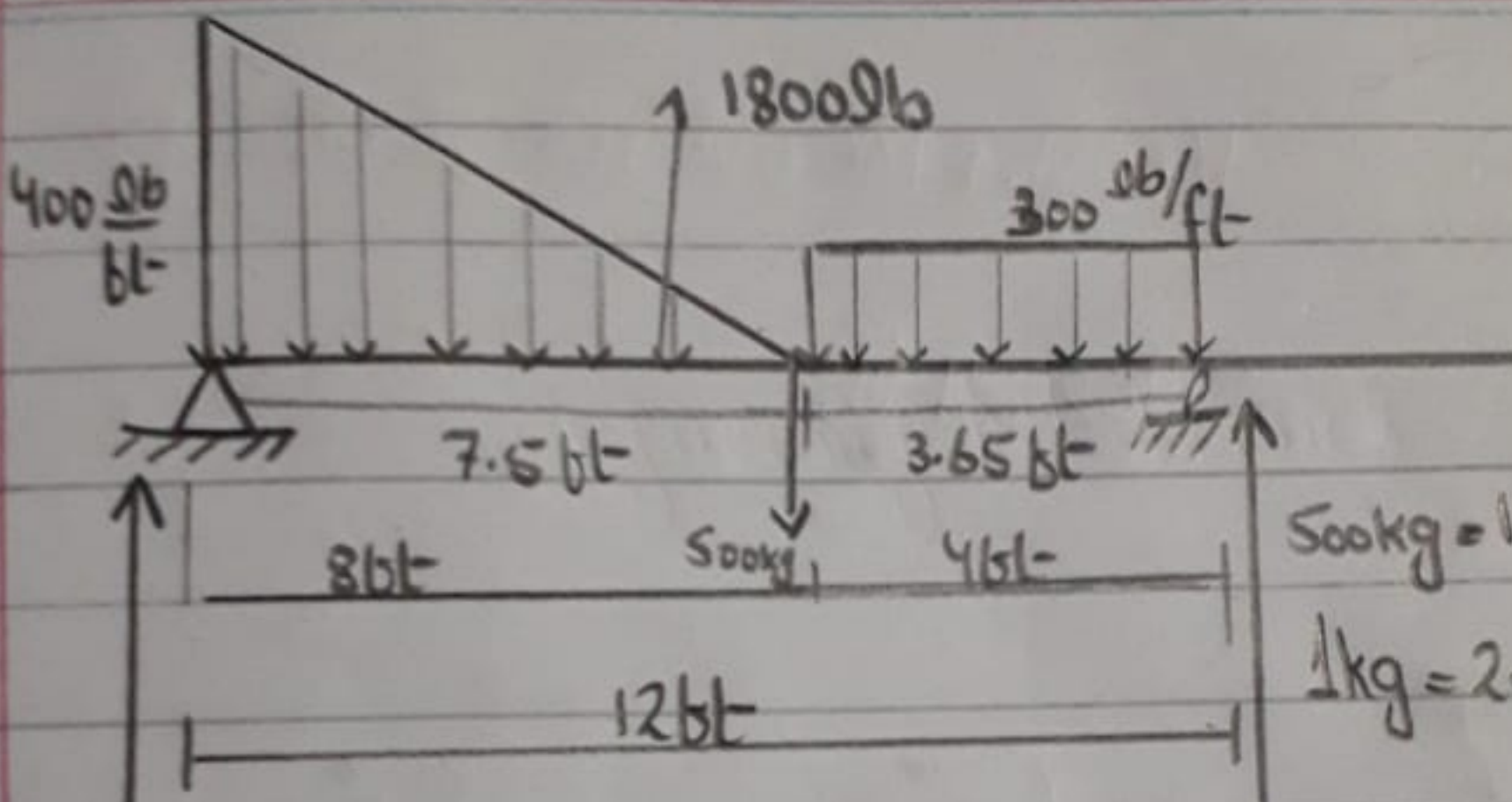
$$\frac{12 R_B}{12} = \frac{160471.49}{12}$$

$$R_B = 13372.64 \text{ lb} \rightarrow \text{Put in eq (i):-}$$

$$R_A = (21902.31 - 13372.64) \text{ lb}$$

$$R_A = 8529.69 \text{ lb}$$

3.



$$500 \text{ kg} = 1102.31 \text{ lb}$$

$$1 \text{ kg} = 2.204 \text{ lb}$$

$$R_A = 8529.686 \text{ lb}$$

$$R_B = 13372.624 \text{ lb}$$

4.

QUESTION: 01

Part a: two high strength flexible steel cable AB and AC

Part b:

of the water tank weight and volume of water

:- Part A:-

GIVEN DATA:-

$$M = 400 \text{ lb}$$

Increase of volume  $\Rightarrow$  AB = 15%

Increase of volume  $\Rightarrow$  AC = 35%

:- Required:-

$$AB = ?$$

$$BC = ?$$

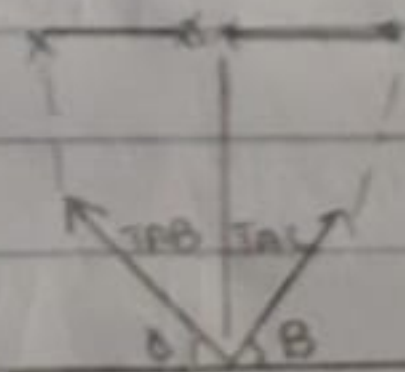
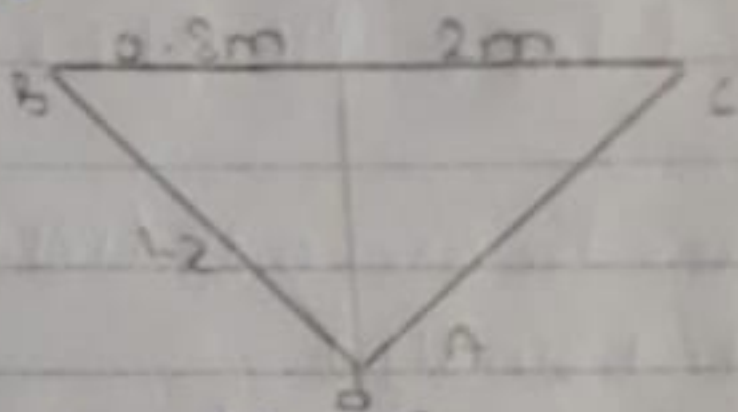
:- Sol:-

$$\theta = \tan^{-1} (1.2 / 0.8)$$

$$\theta = 56.3$$

$$\beta = \tan^{-1} (1.2 / 2)$$

$$\beta = 31.0$$



5.

we know that,

$$m = 400 \text{ lbs} \Rightarrow \frac{400}{2.204} \Rightarrow 181.48 \text{ kg}$$

$$\bar{T}_{AB} = T_{AB} \Delta_{AB} = 0.15 \times (181.48)(9.81) [-\cos 56.3i + \sin 56.3j]$$

$$\Rightarrow 267.047 \{-0.55i + 0.83j\}$$

( $T_{AB} = -146.87i + 221j \text{ N}$ )

$$\bar{T}_{AC} = T_{AC} \Delta_{AC} = 0.35 (181.48)(9.81) \{-\cos 31i + \sin 31j\}$$

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

$$T_{AC} = -534i + 320j \text{ N}$$

$$T_{AB} = -146i + 221j \text{ N}$$

$$\bar{T}_{AC} = -531i + 320j \text{ N}$$

Part: a

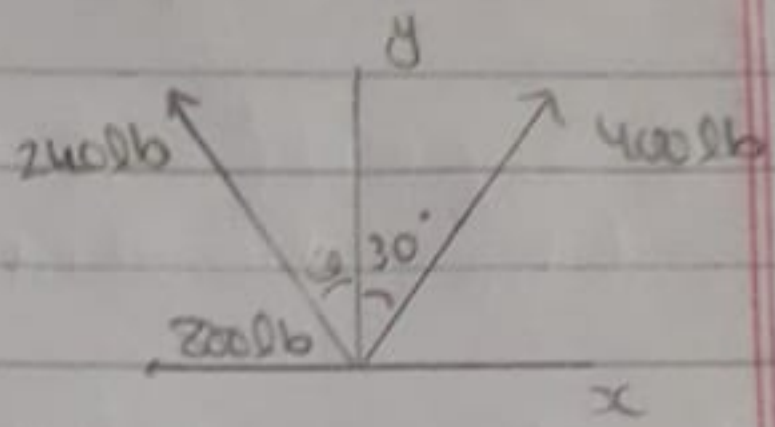
If the water tank increases then weight is % stability is no double.

QUESTION: Q2

Four boxes are ... determine value of T.

GIVEN:-

bold = 600 lb



Required:-

T = ?

theta = ?

Sol:-

$$\sum F_x = 0 = -360 - 240 \sin \theta + T \sin 30 + 400 \cos 30 = 0$$

$$\sum F_y = 240 \cos \theta + T \cos 30 + 400 \sin 30 = 600$$

Numerical Solution of Eq (i) & (ii)

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

"We can eliminate T b/n Eq 1 & 2 the resulting Eq Transcendental."