

$$\tan \theta = \frac{1.5}{0.5}$$

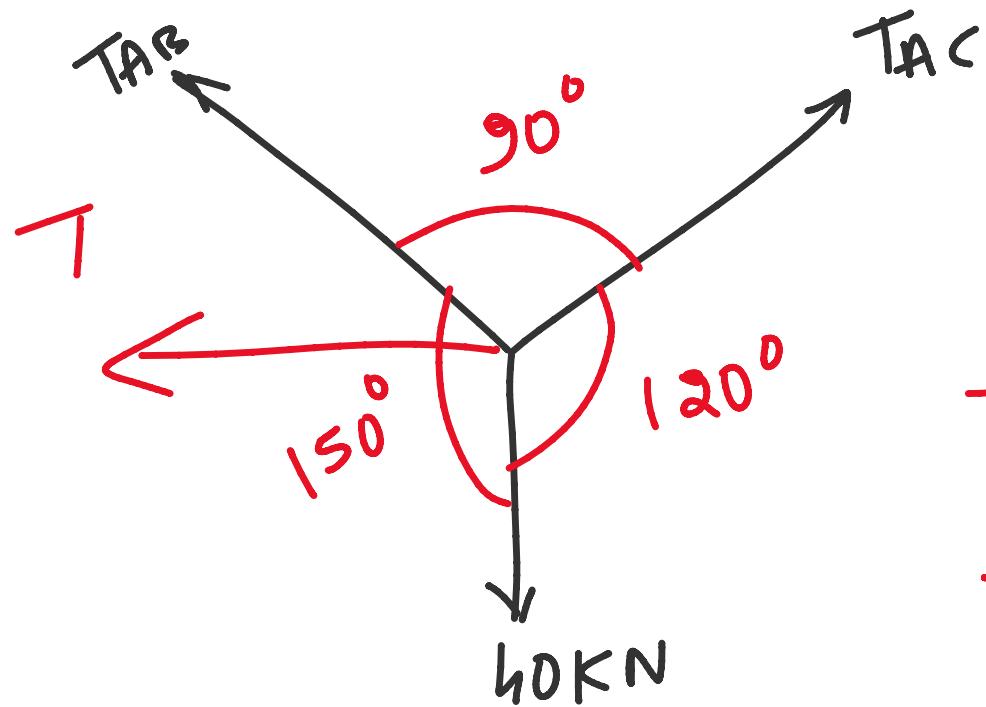
$$\boxed{\theta = 71.56^\circ}$$

By using Lami's theorem

$$\frac{150}{\sin(2 \times 71.56^\circ)} = \frac{T_{AC}}{\sin(108.44^\circ)} = \frac{T_{AB}}{\sin 108.44^\circ}$$

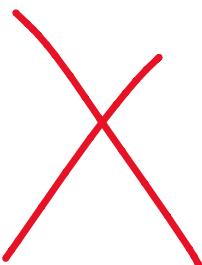
$$\boxed{T_{AB} = T_{AC} = w = 241.93 \text{ N}}$$

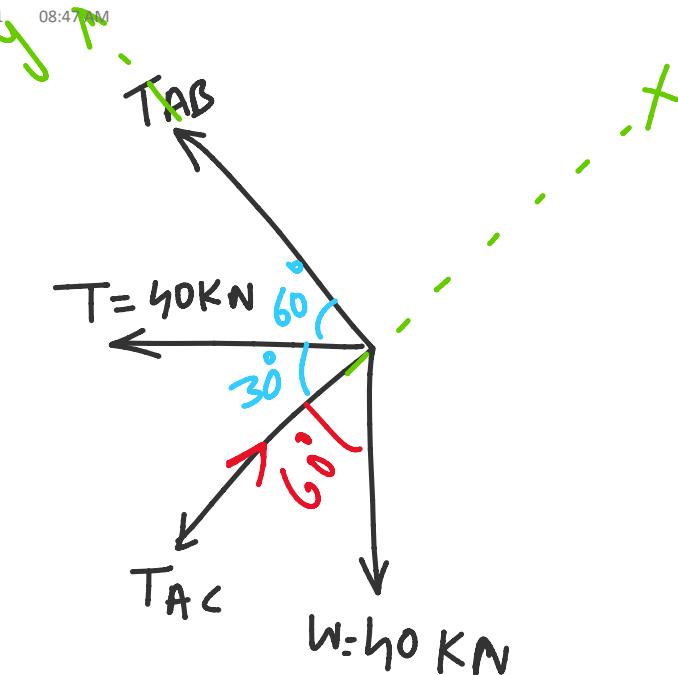
✓  
241.93 N



$$T_{AC} = 20 \text{ kN} \quad (\text{Compression})$$

$$T_{AB} = 34.64 \text{ kN} \quad (\text{Tensile})$$





$$\sum F_x = 0 = (-40 \cos 30^\circ) - T_{AC} \\ (-40 \cos 60^\circ) w$$

$T_{AC} = -54.64 \text{ kN}$

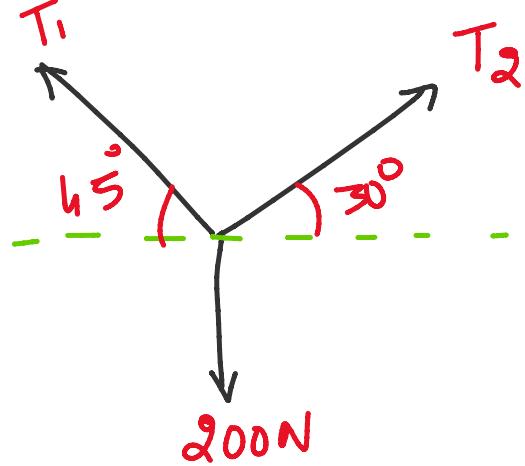
(Compression)

$$\sum F_y = 0 = T_{AB} + (40 \cos 60^\circ) \\ (-40 \sin 60^\circ) w$$

$T_{AB} = 14.64 \text{ kN}$

(Tensile)

N3)



$$\frac{T_1}{\sin 120^\circ} = \frac{T_2}{\sin 135^\circ} = \frac{200}{\sin 105^\circ}$$

$$T_1 = 179.31\text{ N}$$

$$T_2 = 146.41\text{ N}$$

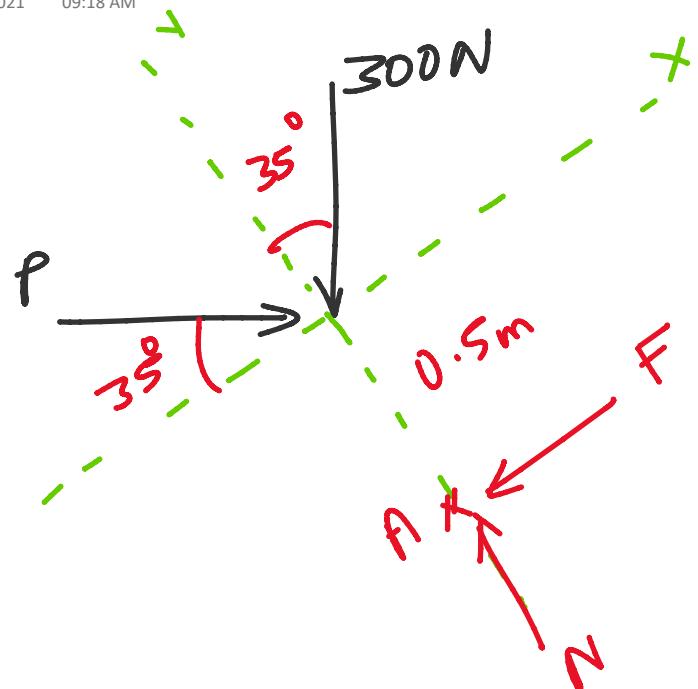
$$\sum F_x = 0 = T_2 \cos 30^\circ - T_1 \cos 45^\circ \quad (1)$$

$$\sum F_y = 0 = T_2 \sin 30^\circ + T_1 \sin 45^\circ - 200 \quad (2)$$

Solving (1) & (2)

$$T_1 = 179.31\text{ N}$$

$$T_2 = 146.41\text{ N}$$



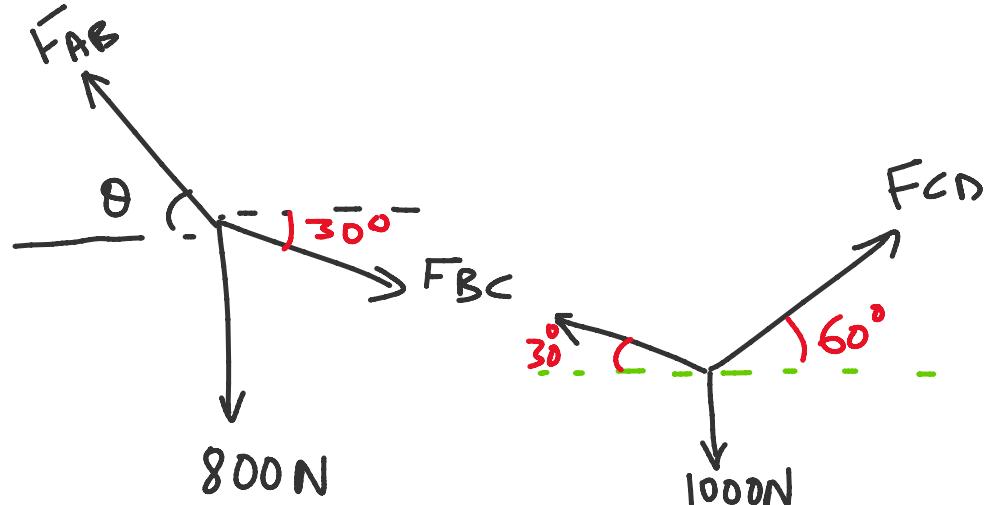
$$\sum M_A = 0 = -P \cos 35^\circ \times 0.5 + 300 \sin 35^\circ \times 0.5$$

$P = 210.06 N$

$$\sum F_x = 0 = P \cos 35^\circ - 300 \sin 35^\circ$$

$P = 210.06 N$

T2)

F.B.D @ 'B'

$$\tan \theta = \frac{1050}{500 \cos 30^\circ}$$

$$F_{AB} \cos \theta = 500 \cos 30^\circ$$

$$\theta = 67.58^\circ$$
~~$$F_{AB} \sin \theta = 1050$$~~

FBD @ 'C'at 'C'

$$\frac{F_{CD}}{\sin 120^\circ} = \frac{F_{BC}}{\sin 150^\circ} = \frac{1000}{\sin 70^\circ}$$

$$F_{CD} = 866.02 \text{ N}$$

$$F_{BC} = 500 \text{ N}$$

at 'B'

$$\sum F_x = 0 = 500 \cos 30^\circ - F_{AB} \cos \theta$$

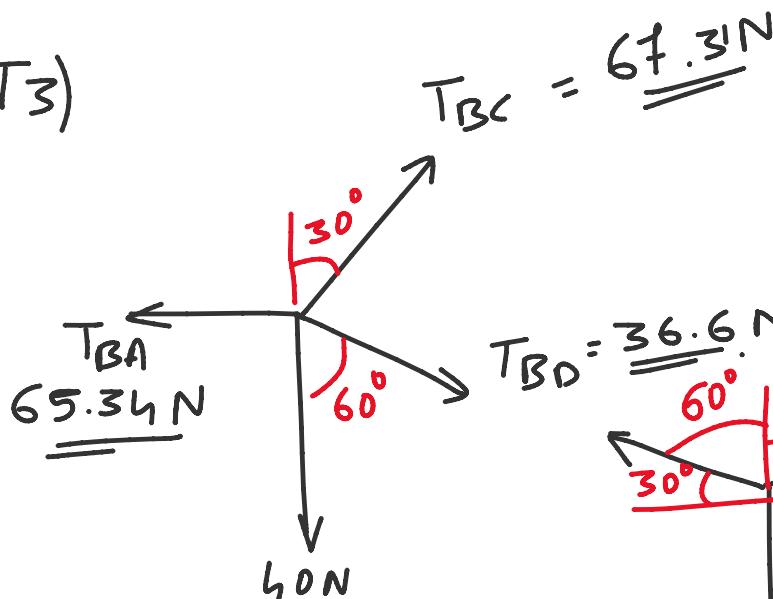
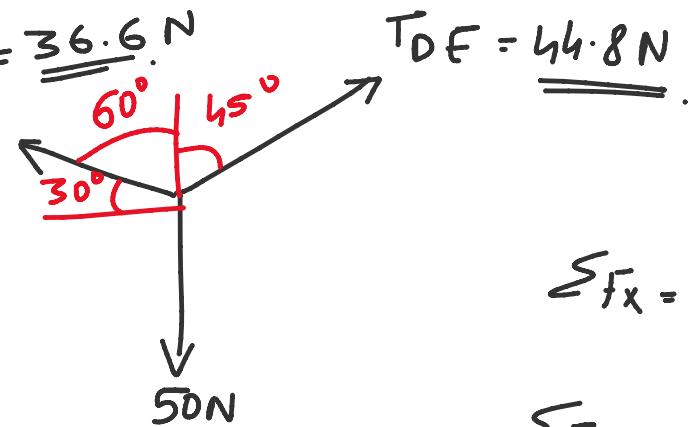
$$\sum F_y = 0 = -800 - 500 \sin 30^\circ$$

$$+ F_{AB} \sin \theta$$

$$\theta = 67.58^\circ$$

$$F_{AB} = 1135.85 \text{ N}$$

T3)

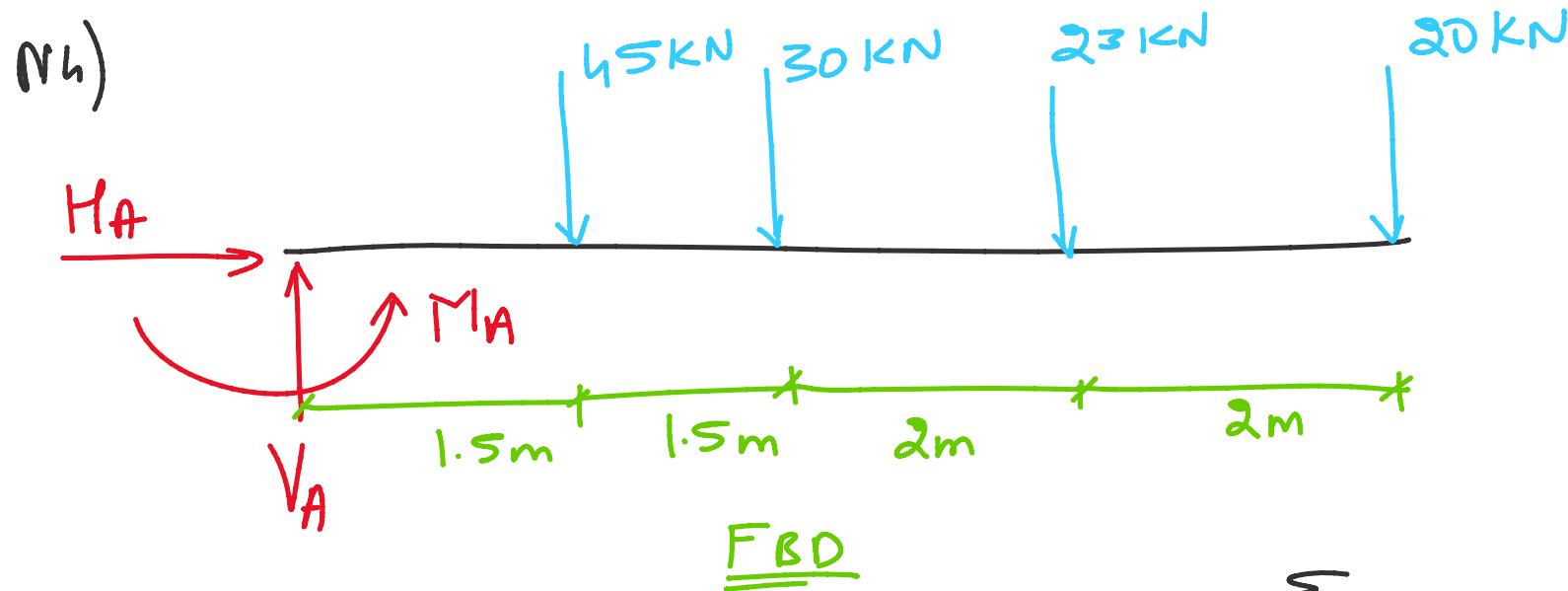
 $F_{BD}$  at 'B' $F_{BD}$  at 'D'

$$\frac{\underline{\underline{50}}}{\sin 105^\circ} = \frac{T_{DE}}{\sin 120^\circ} = \frac{\underline{\underline{T_{BD}}}}{\sin 135^\circ}$$

at D

$$\sum F_x = 0 = T_{BC} \sin 30^\circ + 36.6 \sin 60^\circ - T_{BA}$$

$$\sum F_y = 0 = -40 - 36.6 \cos 60^\circ + T_{BC} \cos 30^\circ$$



$$\sum M_A = 0$$

$$\sum F_x = 0 = \boxed{H_A = 0}$$

$$\sum F_y = 0 = V_A - 45 - 30 - 23 - 20$$

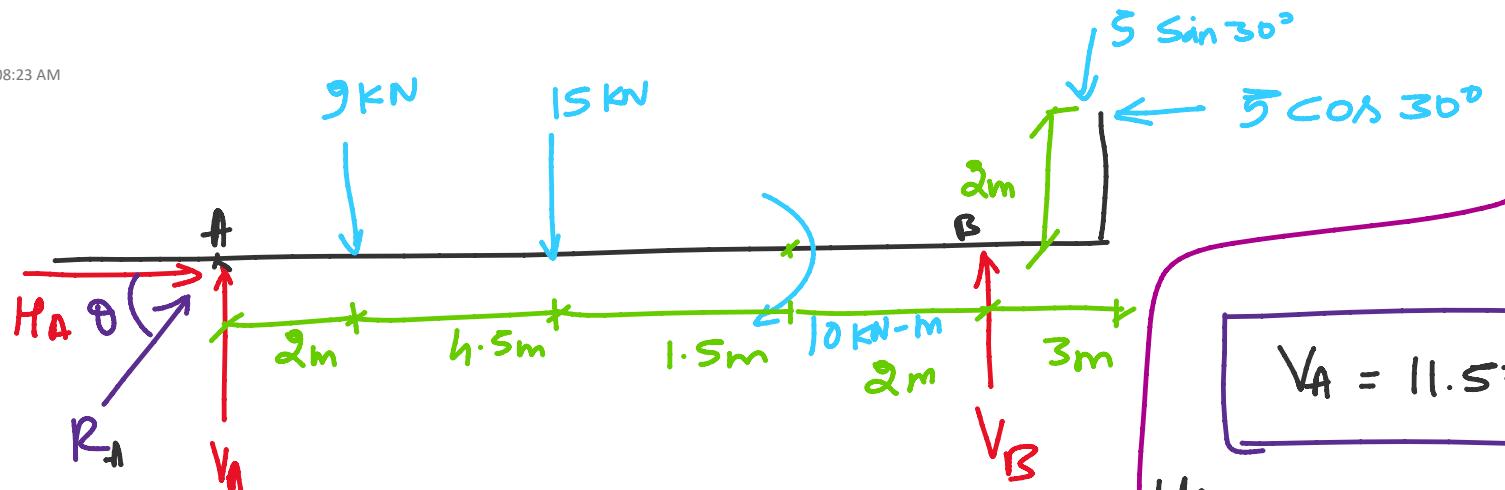
$$\boxed{V_A = 118 \text{ kN}}$$

$$M_A - 45 \times 1.5 - 30 \times 3$$

$$- 23 \times 5 - 20 \times 7 = 0$$

$$\boxed{M_A = 412.5 \text{ kN-m}}$$

T4)



$$\sum F_x = 0 \Rightarrow H_A - 5 \cos 30^\circ = 0$$

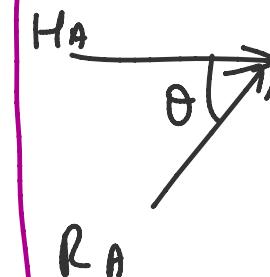
$$H_A = 4.33 \text{ kN}$$

$$\sum F_y = 0 \Rightarrow V_A + V_B - 9 - 15 - S \sin 30^\circ = 0$$

$$V_A + V_B = 26.5 \text{ kN}$$

$$\sum M_A = 0 \Rightarrow -9 \times 2 - 15 \times 6.5 - 10 + V_B \times 10 + 5 \cos 30^\circ \times 2 - 5 \sin 30^\circ \times 13 = 0$$

$$V_B = 14.93 \text{ kN}$$



$$V_A = 11.57 \text{ kN}$$

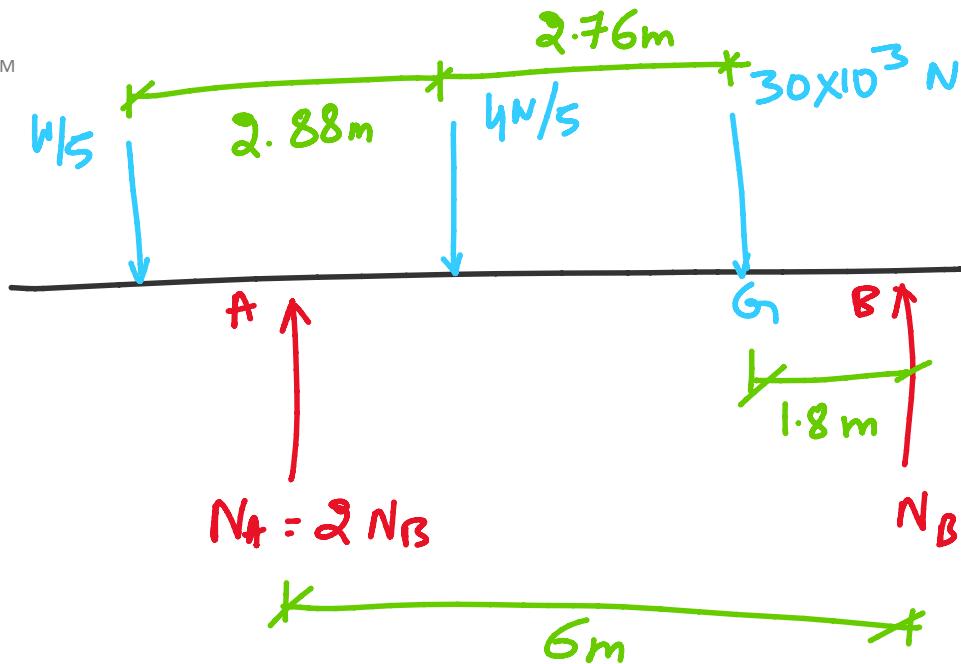
$$R_A = \sqrt{11.57^2 + 4.33^2}$$

$$R_A = 12.35 \text{ kN}$$

$$\theta = \tan^{-1} \frac{11.57}{4.33}$$

$$\theta = 69.48^\circ$$

TS)



Solving (1) &amp; (2)

$$w = 58.09 \text{ kN}$$

$$\sum F_y = 0, \quad 2N_B + N_B - w/5 - 4w/5 - 30 \times 10^3 = 0$$

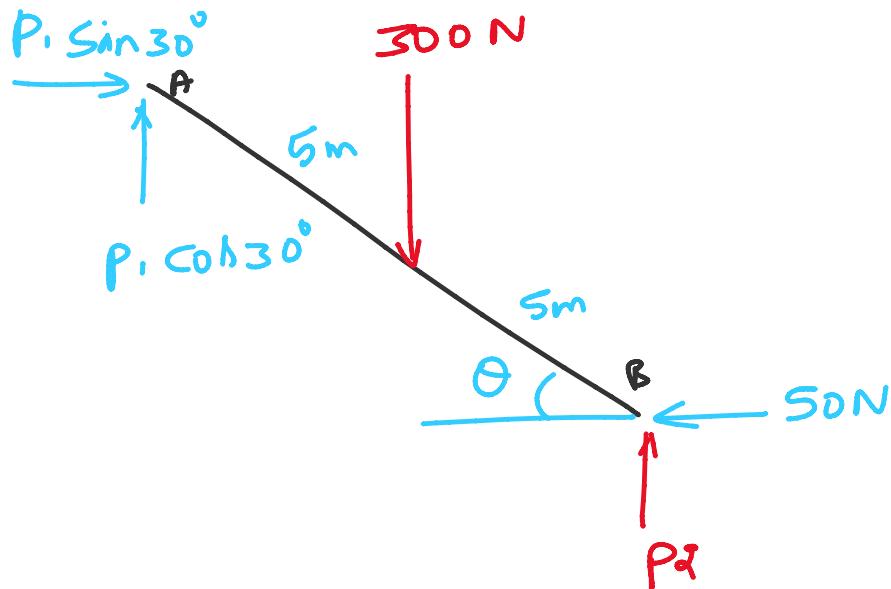
$$3N_B - w - 30 \times 10^3 = 0$$

$$3N_B = w + 30 \times 10^3 \quad \text{--- (1)}$$

$$\sum M_B = 0, \quad w/5 \times 7.44 - 2N_B \times 6 + w/5 \times 4.56 + 30 \times 10^3 \times 1.8 = 0$$

$$N_B = 0.4280w + 4500 \quad \text{--- (2)}$$

T6)



$$\sum F_x = 0, P_1 \sin 30^\circ - 50 = 0 \quad (1)$$

$$\sum F_y = 0, P_1 \cos 30^\circ - 300 + P_2 = 0 \quad (2)$$

Solving (1) & (2)

$$P_1 = 100 \text{ N}$$

$$P_2 = 213.6 \text{ N}$$

$$\sum M_B = 0, -P_1 \sin 30^\circ \times (10 \sin \theta)$$

$$-P_1 \cos 30^\circ \times (10 \cos \theta)$$

$$+ 300 \times (5 \cos \theta) = 0$$

$$\theta = 51.7^\circ$$