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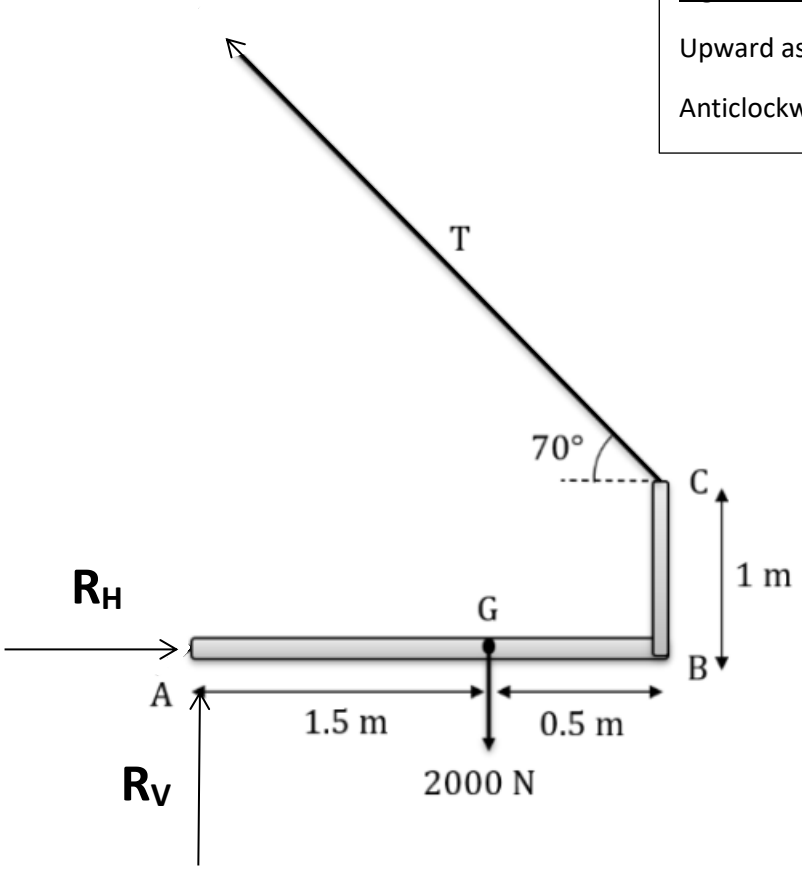
Question 1:-

a) Free body diagram of the platform is

Sign Convention:-

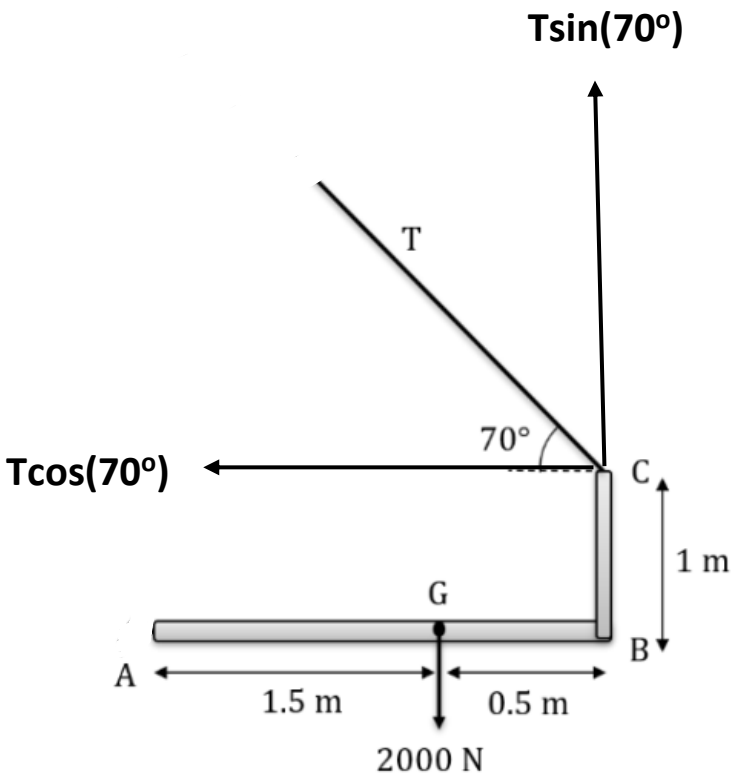
Upward as +ve and downward as -ve

Anticlockwise as +ve and clockwise as -ve



b) Resolving tension in two mutually perpendicular directions:-

PTO



c) Equations of force equilibrium in x and y directions respectively are:-

$\Sigma F_x = 0$

$\Rightarrow R_H - Tcos(70^o) = 0 \quad \cdots (1)$

$\Sigma F_Y = 0$

$\Rightarrow Tsin(70^0) + R_V - 2000N = 0 \quad \cdots (2)$

d)Taking moment about point A:-

$M_A = 2000X1.5 - Tsin(70^0)X2 - Tcos(70^0)X1$

e)Finding T using $\Sigma M_A = 0$

$\Rightarrow T = \frac{2000X1.5}{2sin70^0 + cos70^o} \quad \Rightarrow \boldsymbol{T = 1350.49N} \cdots (3)$

f)Putting (3) in (1) we get :-

$R_H = Tcos70^o$

$\Rightarrow \boldsymbol{R_H = 461.89N}$

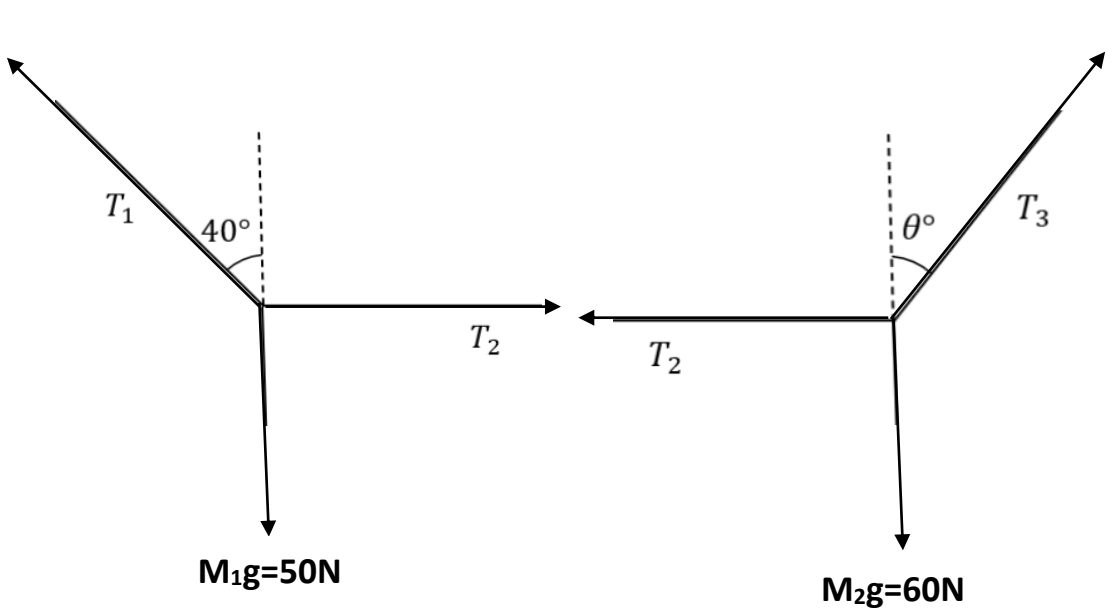
Putting (3) in (2) we get :-

$R_V = 2000 - Tsin70^0$

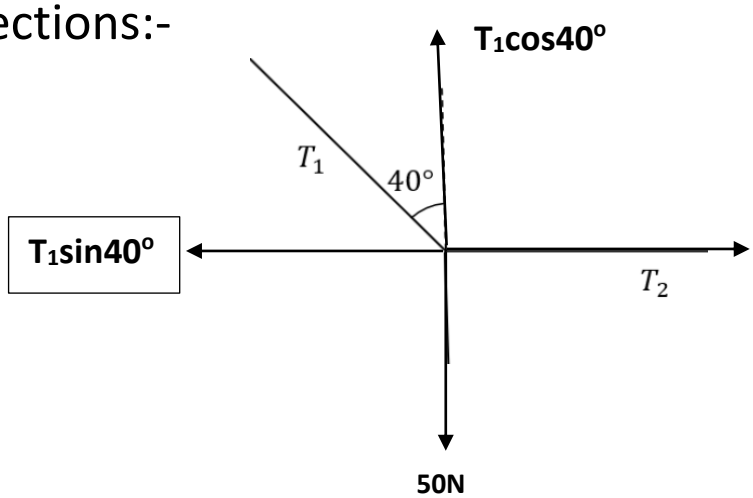
$\Rightarrow \boldsymbol{R_V = 730.95N}$

Question 2:-

a) Free body diagram is:-



b)Resolving T1 in two mutually perpendicular directions:-



c) Force equation for the m_1 system:-

$$\sum F_x = 0$$

$$\Rightarrow T_2 - T_1 sin40^o = 0 \qquad \cdots (1)$$

$$\sum F_Y = 0$$

$$\Rightarrow T_1 cos40^o - 50 = 0 \qquad \cdots (2)$$

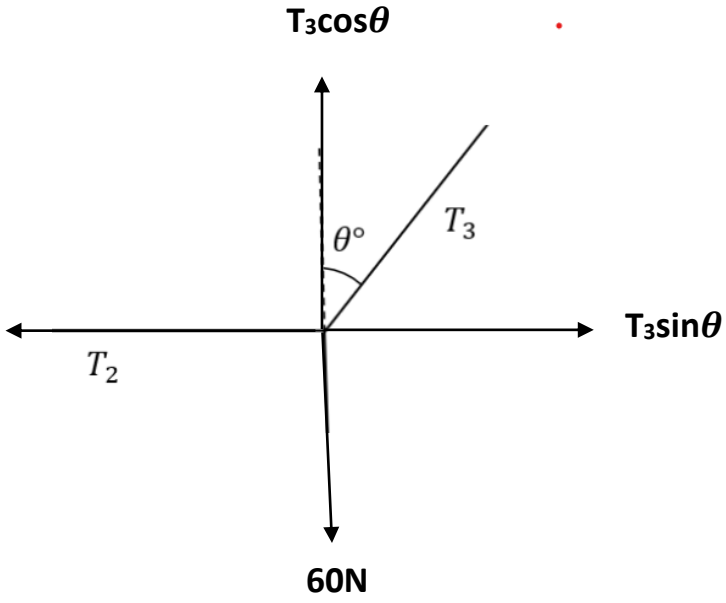
d)From (2) we get

$$T_1 = \frac{50}{cos40^o} \Rightarrow \boldsymbol{T_1 = 65.27N}$$

Using T_1 in (1) we get

$$T_2 = T_1 sin40^o = 50tan40^o \Rightarrow \boldsymbol{T_2 = 41.95N}$$

e) Resolving T_3 in two mutually perpendicular directions:-



f) Force equations for the m_2 system :-

$$\sum F_x = 0$$

$$\Rightarrow T_3 sin\theta - T_2 = 0 \qquad \cdots (3)$$

$$\sum F_Y = 0$$

$$\Rightarrow T_3 cos\theta - 60 = 0 \qquad \cdots (4)$$

g) using (1), (3) and (4) we get

$$tan\theta = \frac{T_2}{60} = 0.6991 \Rightarrow \boldsymbol{\theta = 34.95^o} \cdots (5)$$

using (5) in (4) we get

$$T_3 = \frac{60}{cos\theta} \Rightarrow \boldsymbol{T_3 = 73.20N}$$