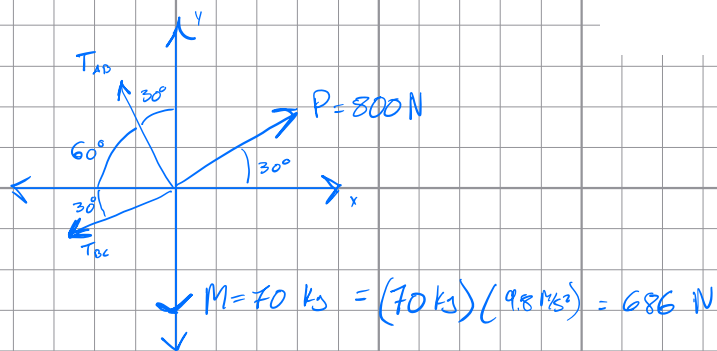
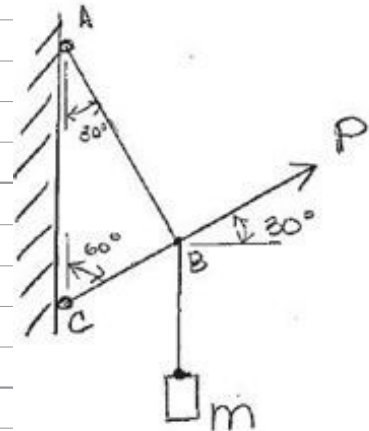


### Problem 1

In the support system shown in the diagram, assume load  $P = 800 \text{ N}$  and mass  $m = 70 \text{ kg}$ . Use equations in Excel to determine the tensions in cables AB & BC. Of course, you should solve this equation by hand before trying to input and solve in Excel. In what units will your answer be expressed?



$$\sum F_x = 0$$

$$0 = 800 \cos(30^\circ) - T_{BC} \cos(30^\circ) - T_{AB} \cos(60^\circ)$$



$$-\cos(30^\circ) T_{BC} - \cos(60^\circ) T_{AB} = -800 \cos(30^\circ)$$

$$\sum F_y = 0$$

$$0 = 800 \sin(30^\circ) - 686 - \sin(30^\circ) T_{BC} + \sin(60^\circ) T_{AB}$$



$$-\sin(30^\circ) T_{BC} + \sin(60^\circ) T_{AB} = 686 - 800 \sin(30^\circ)$$

ASSEMBLE MATRIX

$$\begin{bmatrix} -\cos(30^\circ) & -\cos(60^\circ) \\ -\sin(30^\circ) & +\sin(60^\circ) \end{bmatrix} \begin{bmatrix} T_{BC} \\ T_{AB} \end{bmatrix} = \begin{bmatrix} -800 \cos(30^\circ) \\ 686 - 800 \sin(30^\circ) \end{bmatrix}$$

## Problem 2

In the support system shown in the diagram, assume again load  $P = 800 \text{ N}$ . If the maximum allowable force in either cable AB or BC is  $500 \text{ N}$ , what is the maximum mass of the cylinder? Solve this problem by plotting the tension in the cables as the mass of the cylinder increases. The ordinate axis (y-axis) should show cable tension, and the abscissa (x-axis) should show the cylinder mass. Create a legend to label the two different cable tensions, and be sure your plot is labeled correctly with a chart title and axes titles with correct units.

GENERATE 2 EQ

SOLVE FOR  $F_{BC}$

$$\sum F_x = 0$$
$$0 = -\sin(30)mg + F_{BC} + P$$

$$F_{BC} = P - \sin(30)mg$$

$$\sum F_y = 0$$
$$0 = -\cos(30)mg + F_{AB}$$

$$F_{AB} = \cos(30)mg$$

