

## Problem 1

In the support system shown in the diagram, assume load  $P = 800$  N and mass  $m = 70$  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?

P	800
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m	70
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M1	
$T_{BC}$	$T_{AB}$
-0.8660254	-0.5
-0.5	0.8660254

M2
-692.82032
286

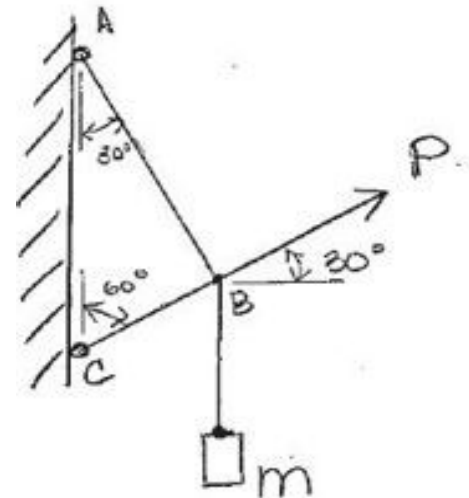
Solve by taking the inverse of M1 then multiplying it by M2.

$$[M1]^{-1} * [M2]$$

$T_{BC}$	457 N
$T_{AB}$	594.093427 N

Units should be expressed in newtons of force.

The figure shows a simple support system with cables **AB** and **BC** supporting mass  $m$  and load  $P$ . The direction of load  $P$  is along cable **BC**. The figure

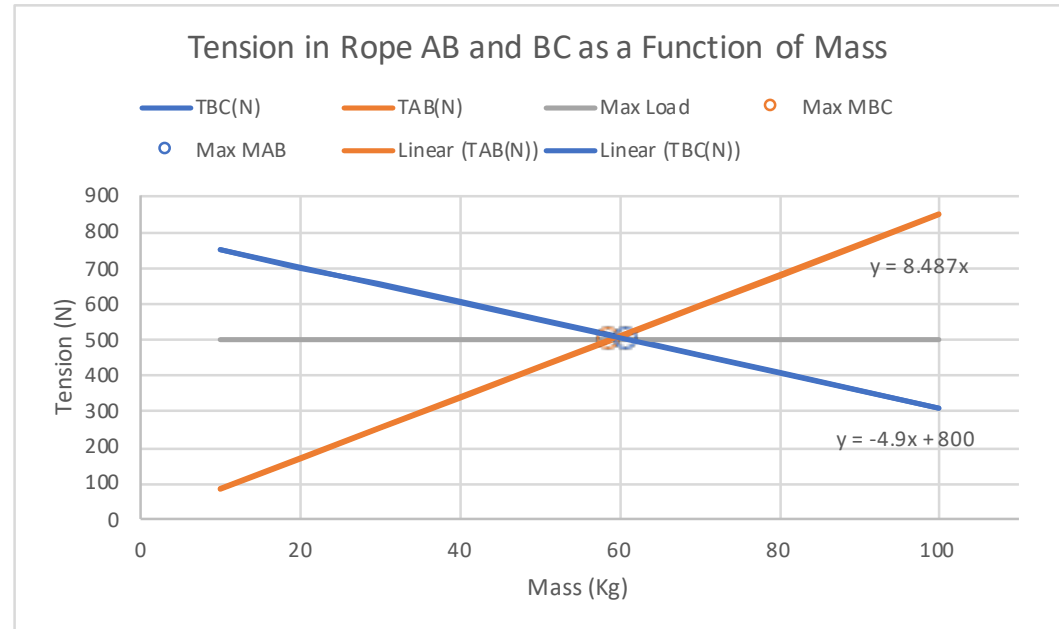


Simple Support System for Problems 1 & 2

## 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.

Mass(Kg)	$T_{BC}(\text{N})$	$T_{AB}(\text{N})$
10	751	84.87
20	702	169.74
30	653	254.61
40	604	339.48
50	555	424.35
60	506	509.22
70	457	594.09
80	408	678.96
90	359	763.83
100	310	848.70



Max  $M_{BC}$  58.91 N

Max  $M_{AB}$  61.22 N

The chosen cables cannot support the current load placed on the system with cable BC breaking at  $58.9 \text{ N}$  before cable AB breaking at  $61.2 \text{ N}$ .