

Problem 2: Two weights $W_1 = 100 \text{ N}$ and $W_2 = 200 \text{ N}$ are suspended from the cable.

1. Determine the vertical distance h_2
2. Determine the tension in cable segment 2.

$\sum M_B = 0 = -A_y(3) + 100(2) + 200(1)$
 $A_y = 133.3 \text{ N} \uparrow$
 $\sum F_y = 0 = A_y + B_y - 300$
 $B_y = 166.7 \text{ N} \uparrow$

Joint A

$\sum F_y = 0 = 133.3 - \frac{1}{\sqrt{2}} T_1 \Rightarrow T_1 = 188.5 \text{ N}$

Joint C

$\sum F_x = 0 = T_2 \cos \theta - \frac{1}{\sqrt{2}} (188.5) \Rightarrow T_2 \cos \theta = 133$
 $\sum F_y = 0 = -T_2 \sin \theta + \frac{1}{\sqrt{2}} (188.5) - 100 \Rightarrow T_2 \sin \theta = 33.27$
 $\frac{T_2 \sin \theta}{T_2 \cos \theta} = \frac{33.27}{133} \Rightarrow \theta = 14^\circ \quad T_2 = 137.1 \text{ N}$
 $\tan 14^\circ = \frac{h}{1} \Rightarrow h = 0.25 \text{ m}$
 $h_2 = 1 + 0.25 \text{ m} = 1.25 \text{ m}$

ANSWER: $A_y = 133.3 \text{ N} \uparrow$, $B_y = 166.7 \text{ N} \uparrow$, $A_x = B_x = 133.3 \text{ N}$,
 $T_1 = 188.5 \text{ N (T)}$, $T_2 = 137.0 \text{ N (T)}$