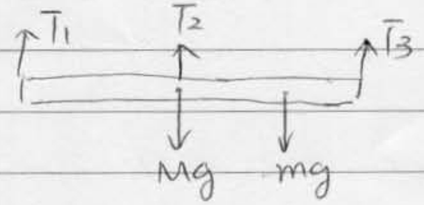
Date

NO

5. (a)



$M = 65\,kg$

$m = 12\,kg$

$$\begin{cases} T_1 + T_2 + T_3 = (M+m)g \\ T_1 \times \frac{L}{2} + mg \times \frac{L}{4} = T_3 \times \frac{L}{2} \end{cases}$$

$$\Rightarrow \begin{cases} T_1 + T_2 + T_3 = (M+m)g \\ 2T_1 + mg = T_3 \end{cases}$$

There're 3 variables and only two equations.

So the equilibrium condition do not determine the values of the forces.

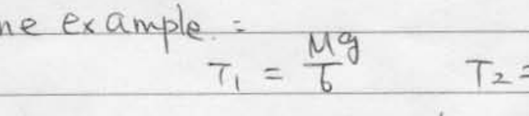
One example:

$$T_1 = \frac{Mg}{6} = 106.2\,N \qquad T_2 = \frac{Mg}{2} = 318.5\,N \qquad T_3 = \frac{Mg}{3} + mg = 329.9\,N$$

Another example.

$$T_1 = \frac{Mg}{4} = 159.3\,N \qquad T_2 = \frac{Mg}{4} = 159.3\,N \qquad T_3 = \frac{Mg}{2} + mg = 436.1\,N$$

(b)



$2\Delta X_2 = \Delta X_1 + \Delta X_3 \Rightarrow T_1 + T_3 = 2T_2$

$$\begin{cases} T_1 + T_2 + T_3 = (M+m)g \\ 2T_1 + mg = T_3 \\ T_1 + T_3 = 2T_2 \end{cases} \Rightarrow \begin{aligned} T_1 &= \frac{2T_2 - mg}{3} = \frac{2M - m}{9} g \\ T_2 &= \frac{(M+m)g}{3} \\ T_3 &= \frac{4M + 7m}{9} g \end{aligned}$$