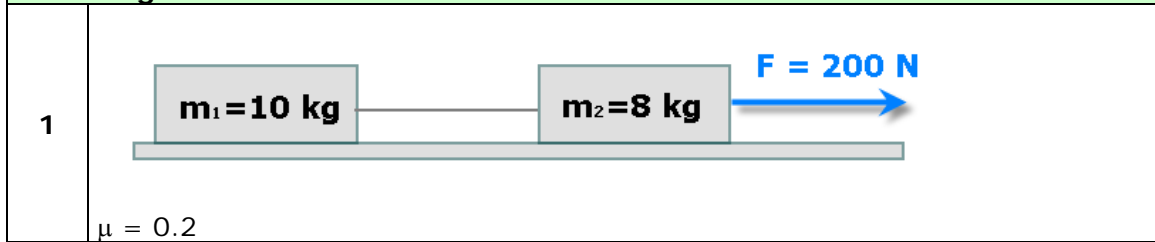
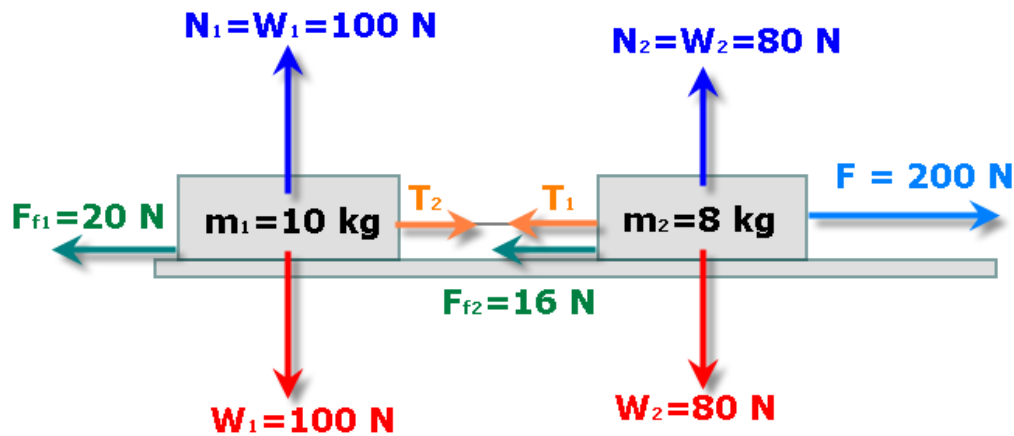


Determine the acceleration and the tension (when it exists) in the following cases:



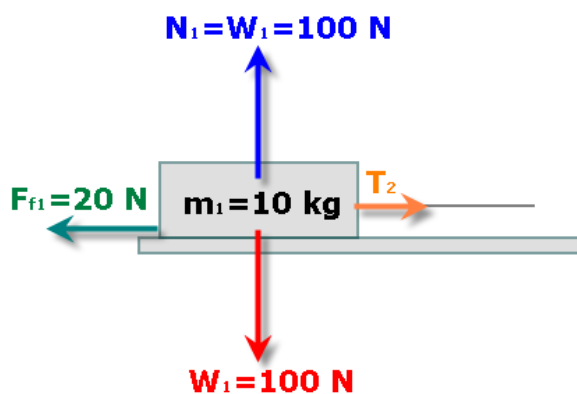
First, we'll apply Newton's main equation to the whole system:



$$F_{\text{net}} = 200 \text{ N} - \cancel{T_1} - 16 \text{ N} + \cancel{T_2} - 20 \text{ N} = 18 \text{ kg} * a$$

$$a = \frac{164 \text{ N}}{18 \text{ kg}} = 9.11 \frac{\text{m}}{\text{s}^2}$$

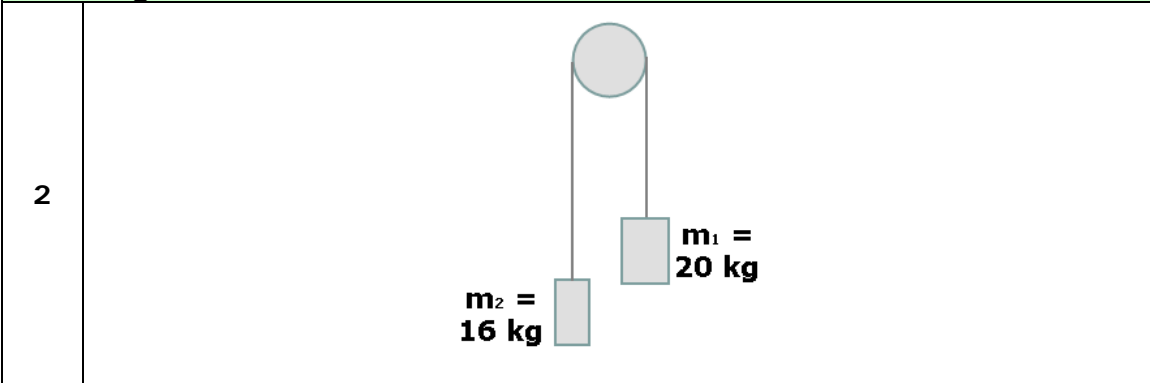
To calculate the tensions, let's apply the same equation to an (any) isolated mass:



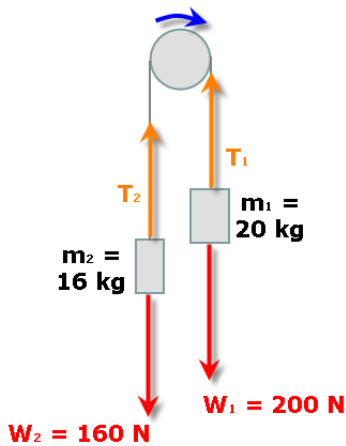
$$F_{\text{net}} = T_2 - 20 \text{ N} = 10 \text{ kg} * 9.11 \frac{\text{m}}{\text{s}^2} = 91.1 \text{ N}$$

$$T_2 = T_1 = 111.1 \text{ N}$$

Determine the acceleration and the tension (when it exists) in the following cases:



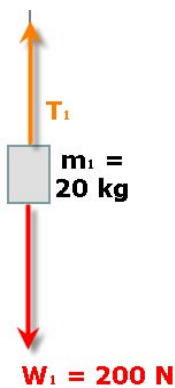
First, we'll apply Newton's main equation to the whole system:



$$F_{\text{net}} = 200 \text{ N} - T_1 + T_2 - 160 \text{ N} = 36 \text{ kg} \cdot a$$

$$a = \frac{40 \text{ N}}{36 \text{ kg}} = 1.11 \frac{\text{m}}{\text{s}^2}$$

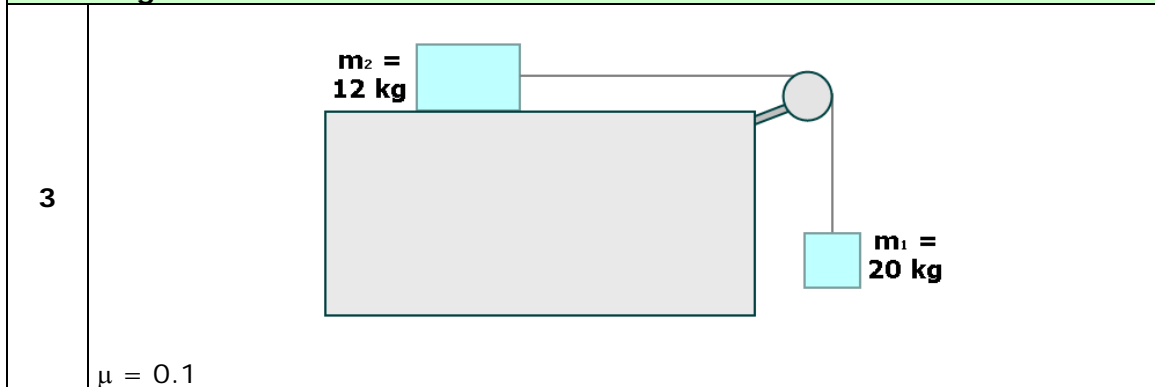
To calculate the tensions, let's apply the same equation to an (any) isolated mass:



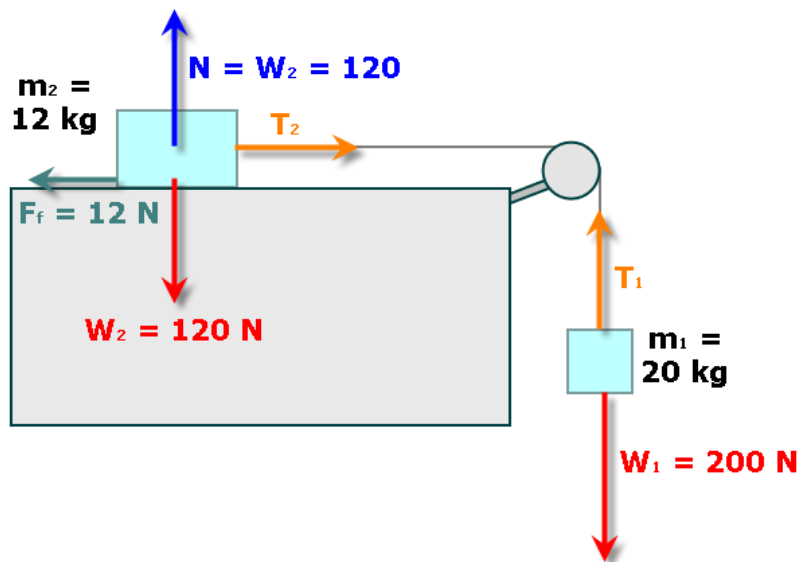
$$F_{\text{net}} = 200 \text{ N} - T_1 = 20 \text{ kg} \cdot 1.11 \frac{\text{m}}{\text{s}^2} = 22.2 \text{ N}$$

$$T_1 = 177.8 \text{ N}$$

Determine the acceleration and the tension (when it exists) in the following cases:



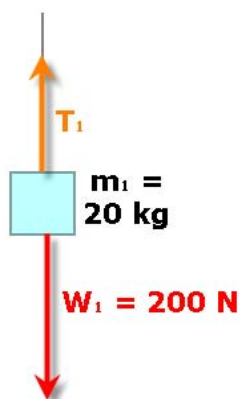
First, we'll apply Newton's main equation to the whole system:



$$F_{\text{net}} = 200 \text{ N} - \cancel{T_1} + \cancel{T_2} - 12 \text{ N} = 32 \text{ kg} * a$$

$$a = \frac{188 \text{ N}}{32 \text{ kg}} = 5.88 \frac{\text{m}}{\text{s}^2}$$

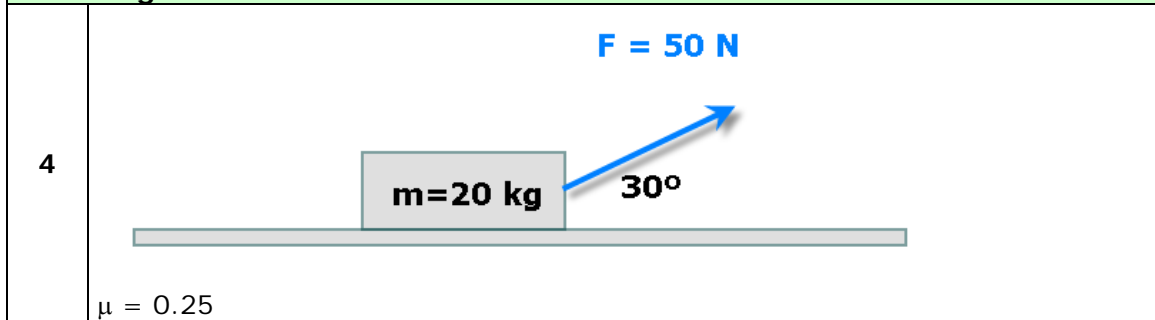
To calculate the tensions, let's apply the same equation to an (any) isolated mass:



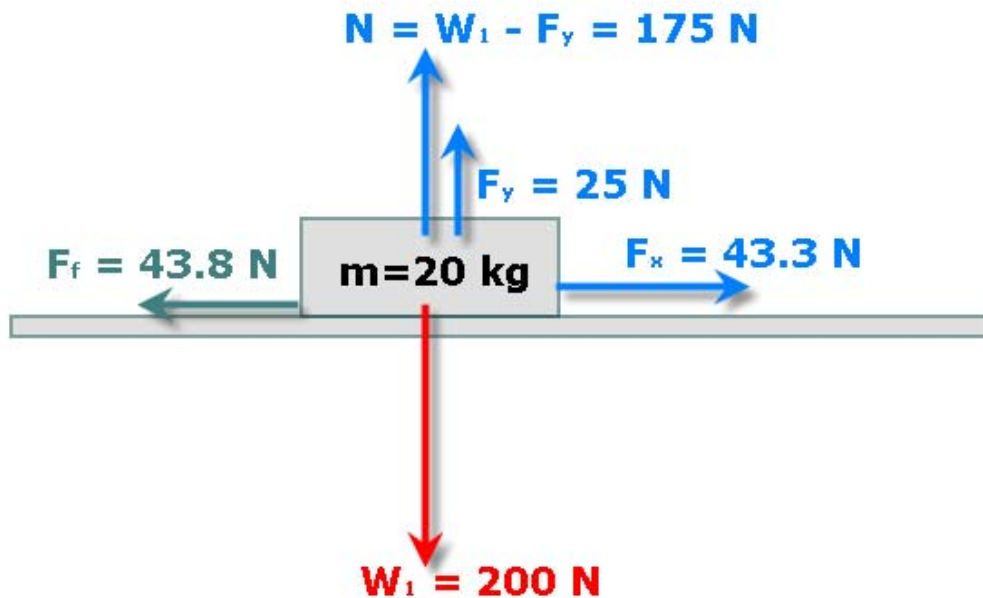
$$F_{\text{net}} = 200 \text{ N} - T_1 = 20 \text{ kg} * 5.88 \frac{\text{m}}{\text{s}^2} = 117.6 \text{ N}$$

$$T_1 = T_2 = 82.4 \text{ N}$$

Determine the acceleration and the tension (when it exists) in the following cases:



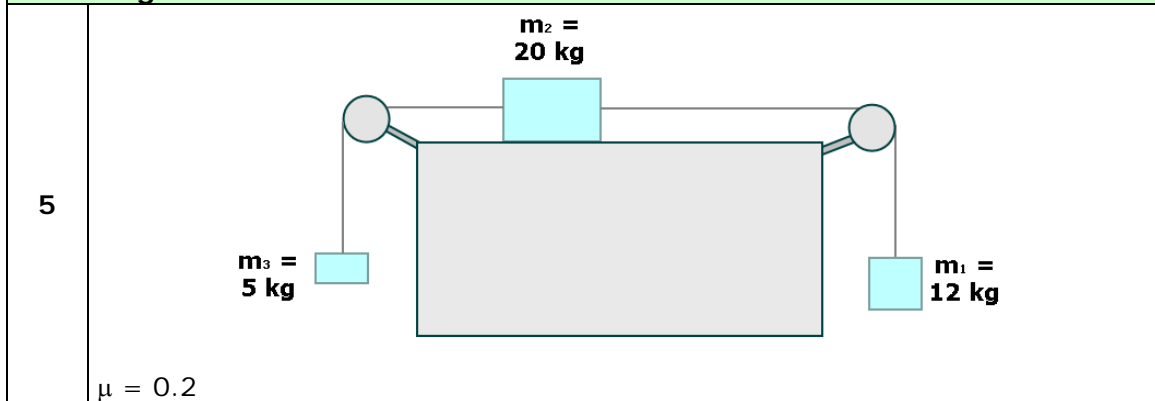
We'll apply Newton's main equation:



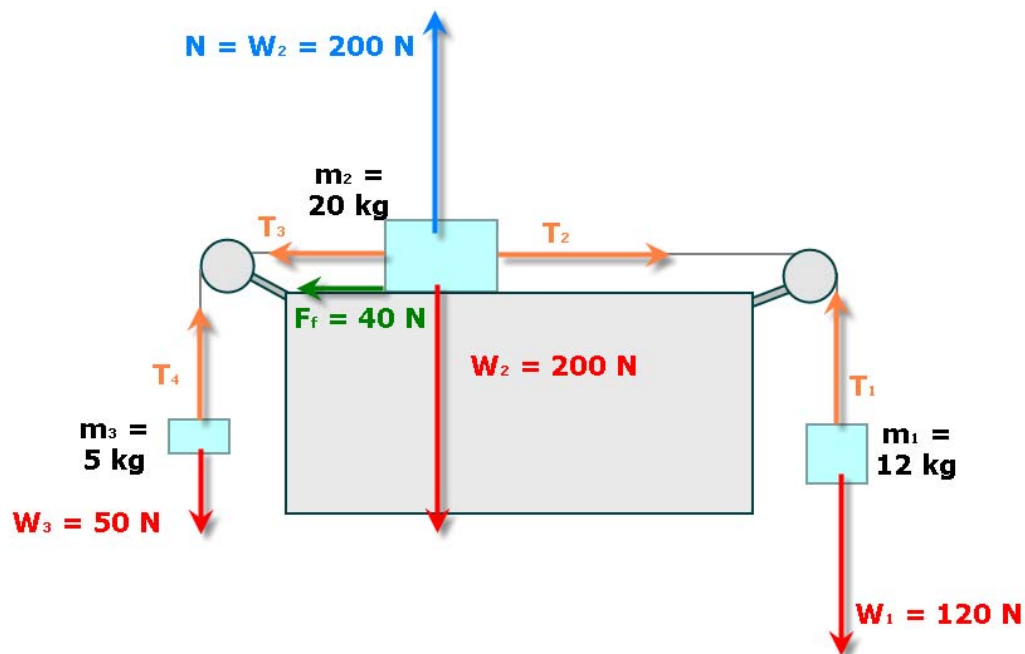
$$F_{\text{net}} = 43.3 \text{ N} - 43.8 \text{ N} = 20 \text{ kg} * a$$

$$a = \frac{-0.5 \text{ N}}{20 \text{ kg}} = -0.025 \frac{\text{m}}{\text{s}^2}$$

Determine the acceleration and the tension (when it exists) in the following cases:



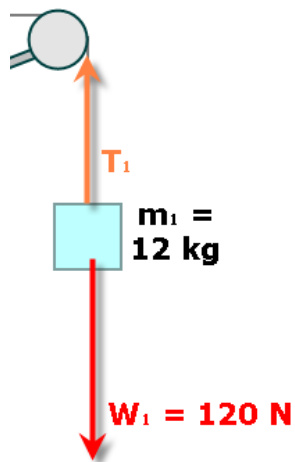
First, we'll apply Newton's main equation to the whole system:



$$F_{\text{net}} = 120 \text{ N} - T_1 + T_2 - T_3 + T_4 - 50 \text{ N} - 40 \text{ N} = 37 \text{ kg} \cdot a$$

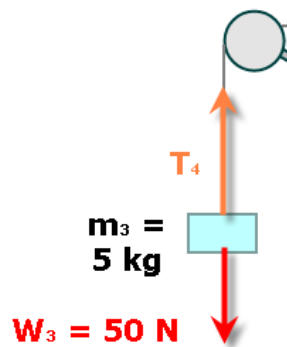
$$a = \frac{30 \text{ N}}{37 \text{ kg}} = 0.81 \frac{\text{m}}{\text{s}^2}$$

Then we apply the same equation to isolated masses, in order to calculate tensions:



$$F_{\text{net}} = 120 \text{ N} - T_1 = 12 \text{ kg} * 0.81 \frac{\text{m}}{\text{s}^2} = 9.72 \text{ N}$$

$$T_1 = T_2 = 110.3 \text{ N}$$



$$F_{\text{net}} = T_4 - 50 \text{ N} = 5 \text{ kg} * 0.81 \frac{\text{m}}{\text{s}^2} = 4.05 \text{ N}$$

$$T_4 = T_3 = 54.05 \text{ N}$$