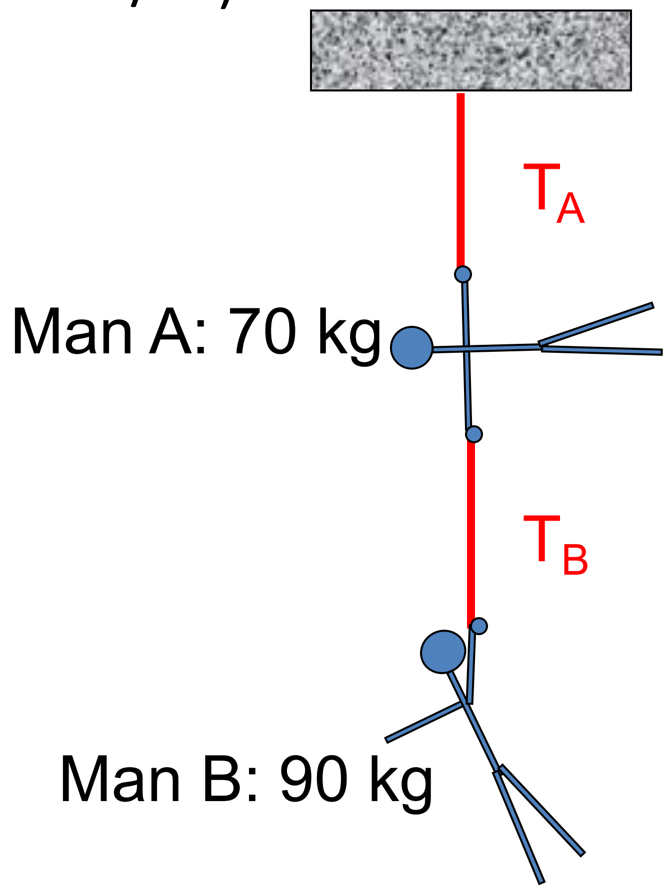
Man A (70kg) and Man B (90kg) are hanging motionless from a roof. What is the tension, T_A, in the top rope? (Assume the ropes are massless and use $g = 10\ m/s^2$.)



(A + B) × G

$T_A = (70+90)\,10$

$= 1600N$

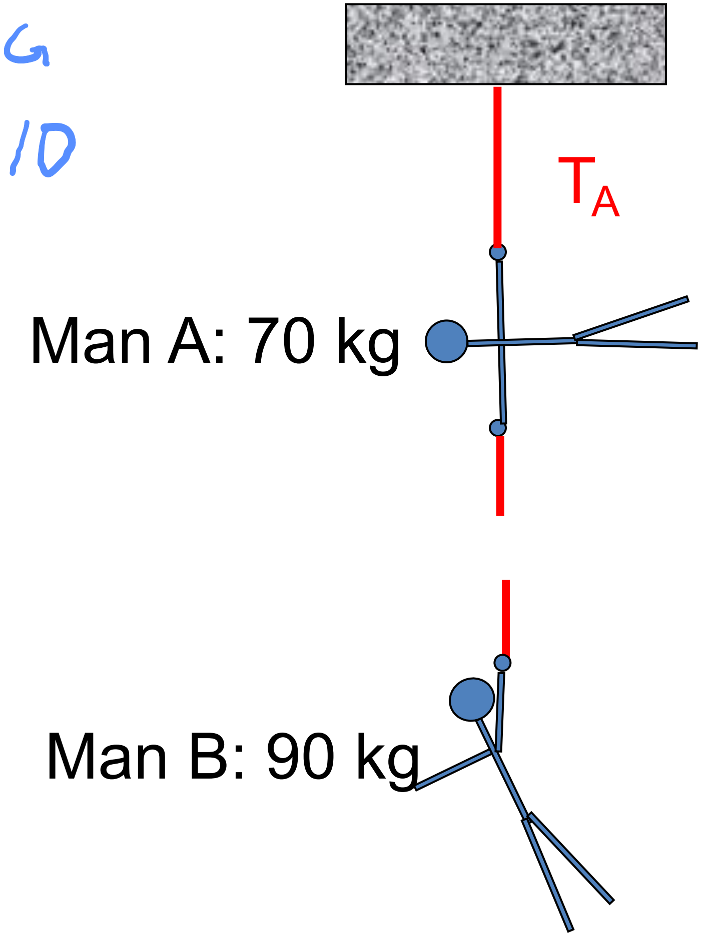
1. 0 N
2. 200 N
3. 700 N
4. 900 N
5. 1600 N
6. None of the Above

If you cut the rope between Man A and Man B so that Man A stays motionless, what is the tension, T_A, in the top rope? (Assume the ropes are massless and use $g = 10\ m/s^2$. Ignore any oscillations resulting from cutting the rope.)

$A \times G$

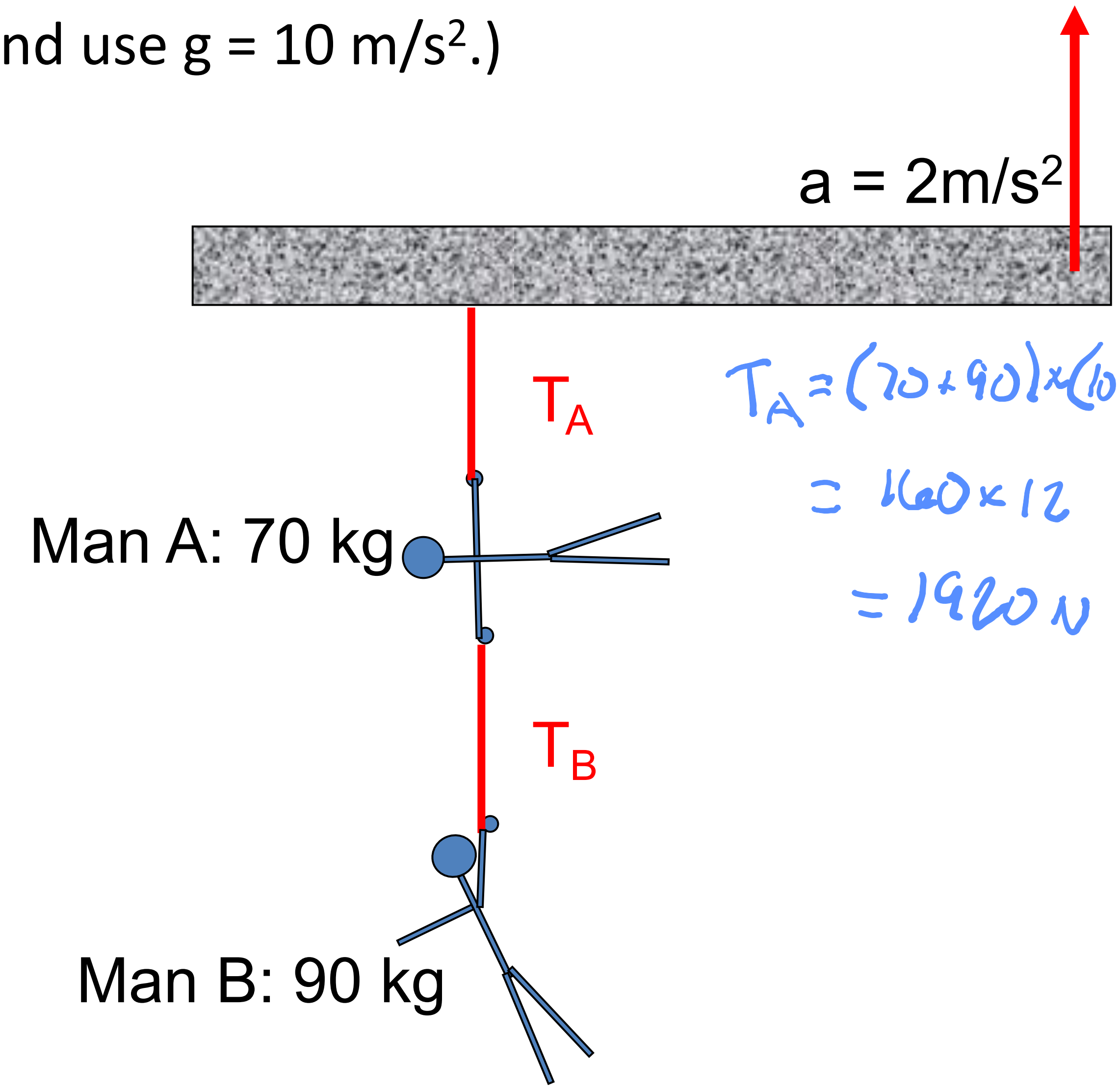
$T_A = 70 \times 10$

$= 700_N$



1. 0 N
2. 200 N
3. 700 N
4. 900 N
5. 1600 N
6. None of the Above

Man A (70kg) and Man B (90kg) are hanging motionless from a platform at rest. What is the tension, T_A, in the top rope if the platform accelerates upward at a constant rate of 2 m/s^2? (Assume the ropes are massless and use g = 10 m/s^2.)



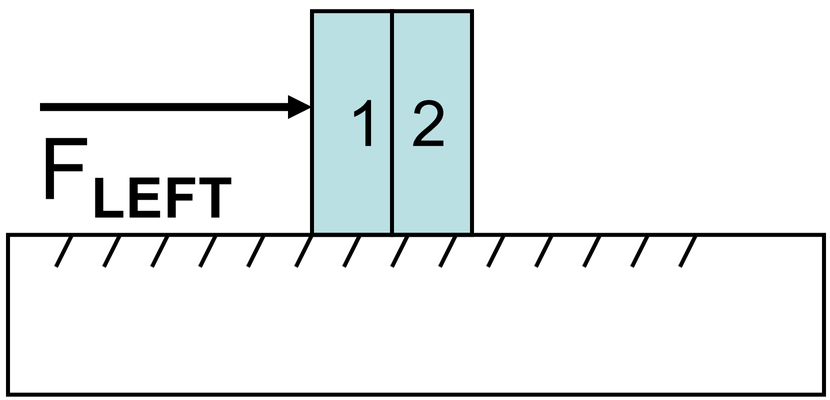
$T_A = (70+90) \times (10+2)$

$= 160 \times 12$

$= 1920$ N

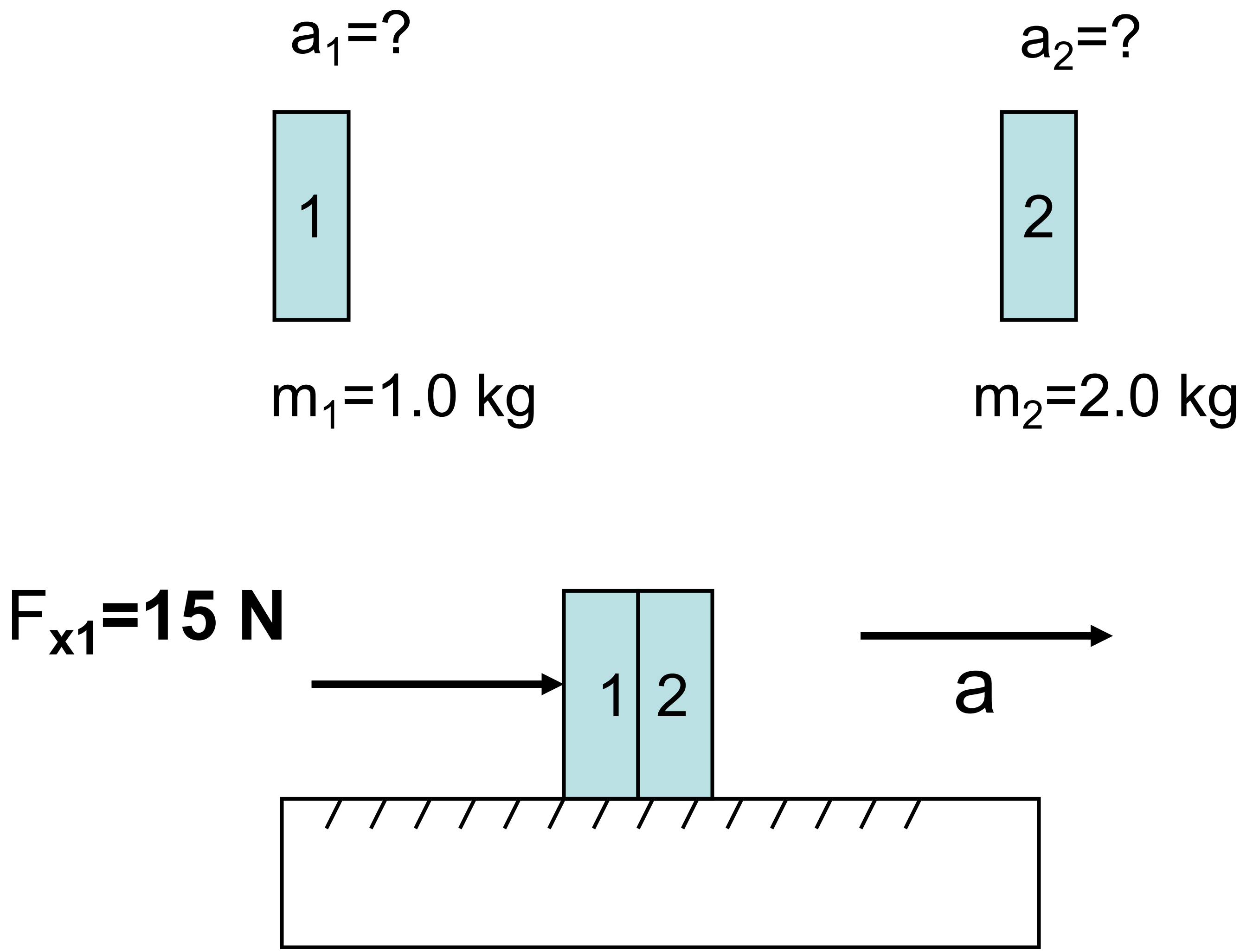
1. 0 N
2. 200 N
3. 700 N
4. 840 N
5. 900 N
6. 1600 N
7. 1740 N
8. 1920 N
9. None of the Above

Tom pushes two identical blocks on a horizontal frictionless table ***from the left***. The force that block 1 exerts on block 2 is F_{12}. The force that block 2 exerts on block 1 is F_{21}. Compare ***the magnitude*** of F_{12} and F_{LEFT}.



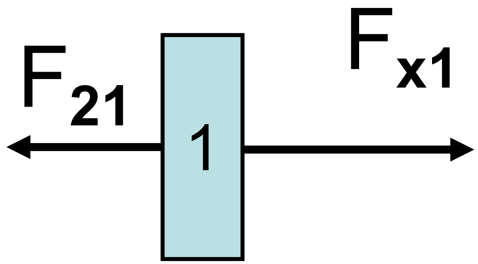
1. $F_{12} < F_{LEFT}$
2. $F_{12} = F_{LEFT}$
3. $F_{12} > F_{LEFT}$
4. Cannot be determined

Free Body Diagrams for 1 and 2. (no friction). Find the acceleration and the magnitudes of the normal forces between 1 and 2.

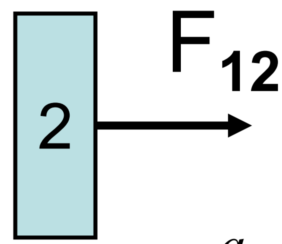


Free Body Diagrams for 1 and 2. (no friction). Find the acceleration and the magnitudes of the normal forces between 1 and 2.

m_1=1.0 kg



m_2=2.0 kg



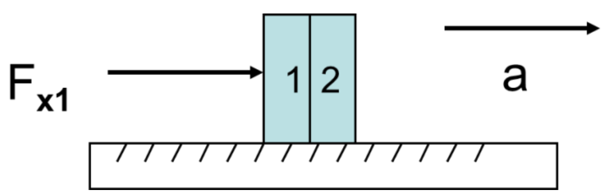
$$a_2 = \frac{F_{net2}}{m_2} = \frac{F_{21}}{m_2}$$

$$a_1 = \frac{F_{net1}}{m_1} = \frac{F_{x1} - F_{12}}{m_1}$$

$$a_1 = a_2 = a$$

$$F_{12} = F_{21}$$

F_{x1}=15 N



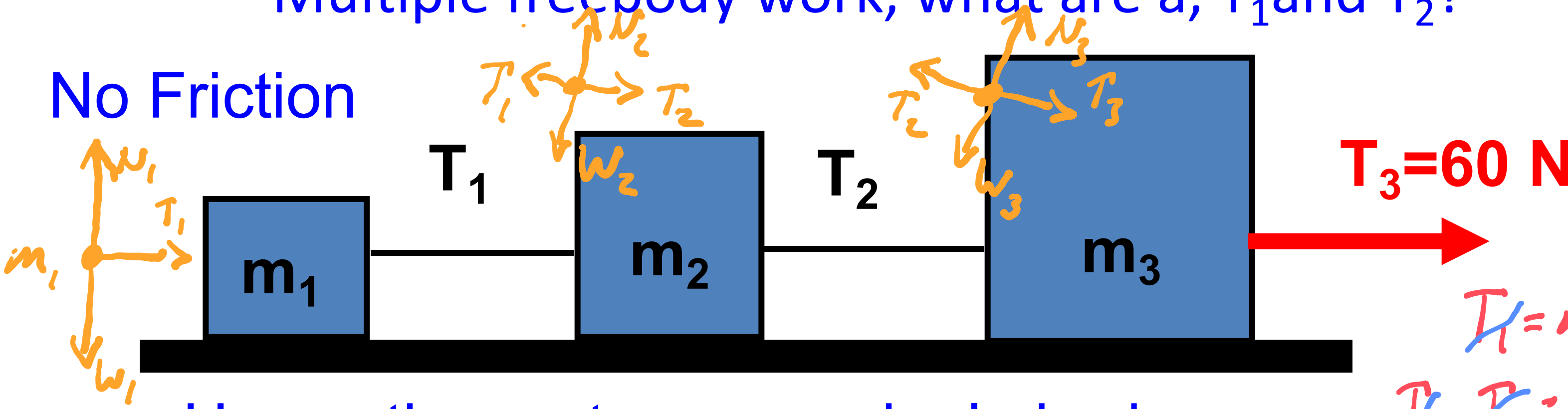
$$\frac{F_{x1} - F_{12}}{m_1} = \frac{F_{12}}{m_2}$$

$$\frac{15 - F_{12}}{1.0} = \frac{F_{12}}{2.0}$$

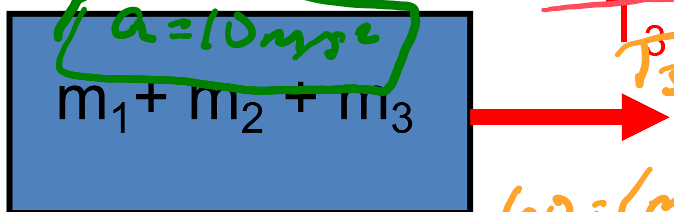
$$F_{12} = F_{21} = 10N$$

$$a = \frac{F_{12}}{m_2} = \frac{10}{2} = 5m/s^2$$

Multiple freebody work, what are a, T_1 and T_2?



Use entire system as a single body:



$\cancel{T_1} = m_1 a$

$\cancel{T_2} - \cancel{T_1} = m_2 a$

$+ \quad T_3 - \cancel{T_2} = m_3 a$

$T_3 = (m_1 + m_2 + m_3) \times a$

$a = \frac{60}{(1+2+3)} = 10\ m/s^2$

$\boxed{a = 10\ m/s^2}$

$60 = (m_1 + m_2 + m_3) a$

$60 = (m_1 + m_2 + m_3) 10$

$6 = m_1 + m_2 + m_3$

$m_1 = 1$

$m_2 = 2$

$m_3 = 3$

$T_2 = T_3 - m_3 a$

$T_2 = 60 - 3(10)$

$\boxed{T_2 = 30\ N}$

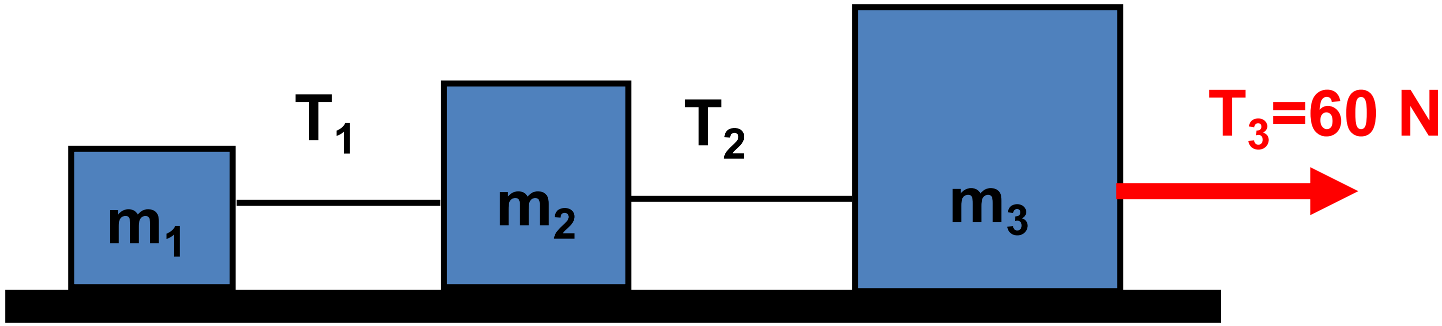
$T_1 = m_1 a$

$T_1 = 1(10)$

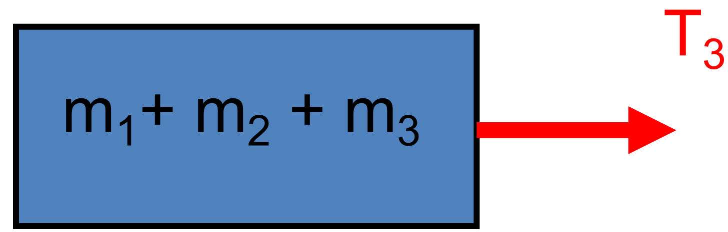
$\boxed{T_1 = 10\ N}$

m_1=1.0 kg, m_2=2.0 kg, m_3=3.0 kg

Multiple freebody work, what are a, T_1 and T_2?



Use entire system as a single body:



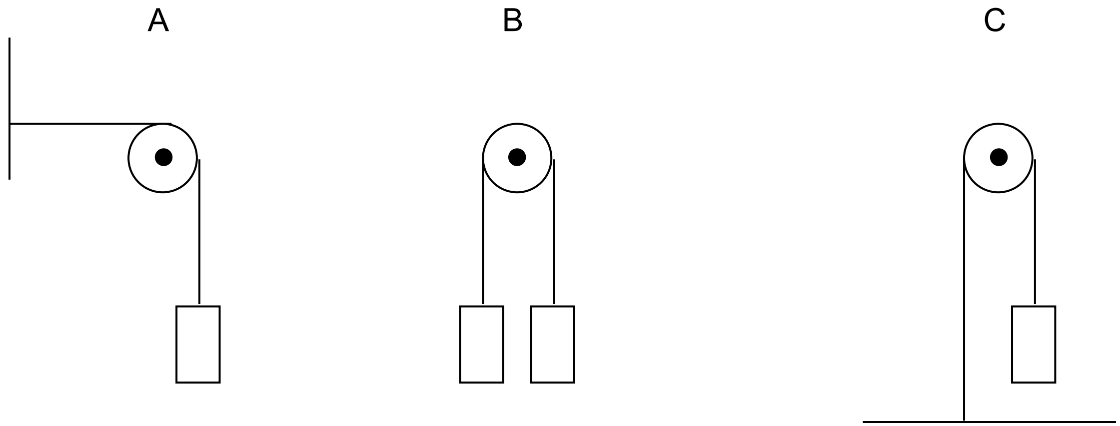
$$a = \left(\frac{T_3}{1.0kg + 2.0kg + 3.0kg} \right) = 10 \, {}^{m}\!/_{s^2}$$

$$T_3 - T_2 = m_3 a$$

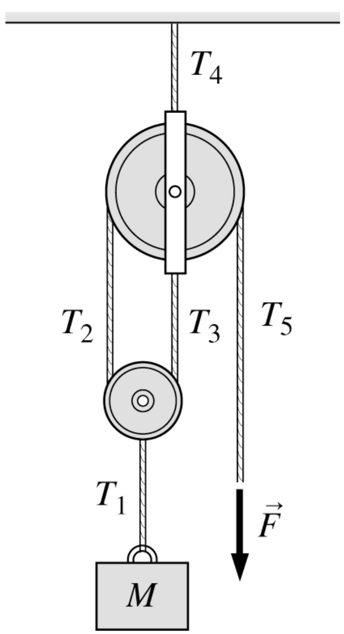
$$T_2 = T_3 - m_3 a = 60N - (3kg)\left(10 \, {}^{m}\!/_{s^2}\right) = 30\,N$$

$$T_1 = m_1 a = 1.0kg \cdot 10 \, {}^{m}\!/_{s^2} = 10N$$

All three systems are stationary. Rank the rope tensions.



All blocks have the same mass



A cart with mass m_2 is connected to a mass m_1 using a string that passes over a frictionless pulley, as shown below. Initially, the cart is held motionless. The tension in the string is

1. $m_1 g$
2. $m_2 g$
3. $(m_1+m_2)g$
4. $(m_1-m_2)g$
5. Cannot tell from the information given

A cart with mass m_2 is connected to a mass m_1 using a string that passes over a frictionless pulley, as shown below. Initially, the cart is held motionless. After the cart is released, the tension in the string

1. Increases.
2. Decreases.
3. Remains the same.
4. Cannot tell from the information given.