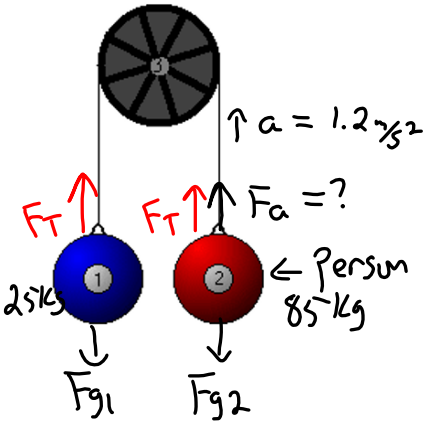
A counter weight of 25 kg is used to help a person of mass 85 kg do chin ups.

1. Calculate the force applied by the person if he accelerates at 1.2 m/s^2.
2. Calculate the magnitude of tension in the wire.



$$\sum \vec{F} = \sum_{masses} \times \vec{a}$$

− +

$$F_{g1} + F_{g2} + F_a = (m_1 + m_2)a$$ (neg down)

$$-(25)(9.81) + (85)(9.81) + F_a = (25+85)(-1.2)$$

$$-245 + 834 + F_a = -132$$

$$\boxed{F_a = -721 \text{ N}}$$

2) $F_T = ?$

$$\sum \text{Forces on } m_1 = m_1 a$$

$$F_{g1} + F_T = m_1 a$$

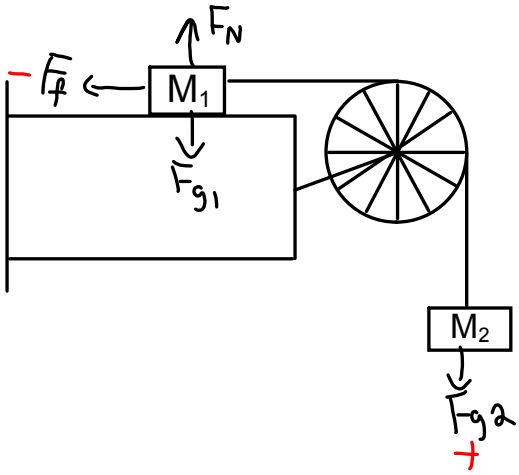
$$-(25)(9.81) + F_T = (25)(-1.2)$$

$$F_T = -30 + 245$$

$$\boxed{F_T = 215 \text{ N}}$$

Fletcher's Trolley

Calculate the acceleration of the masses if $M_1 = 5.2$ kg, $M_2 = 4.5$ kg, and $\mu_k = 0.22$. Then calculate the tension in the wire.



***Pay close attention to the direction of the forces!**

$\vec{a} = ?$ and $F_T = ?$

$$\sum \vec{F} = \sum m \times \vec{a}$$

↖only forces acting in direction of motion.

$$F_f + F_{g2} = (m_1 + m_2)a$$

↳ $F_f = \mu F_N$

$= \mu F_{g1}$

$$-\mu F_{g1} + F_{g2} = (m_1 + m_2)a$$

$$-(0.22)(5.2)(9.81) + (4.5)(9.81) = (5.2 + 4.5)a$$

$$-11.2 + 44.1 = 9.7a$$

$$\frac{32.9}{9.7} = \frac{9.7a}{9.7}$$

$$\boxed{3.4\ m/s^2 = a}$$

Attachments

forces-and-motion-basics_all.jar

forces-1d_all.jar