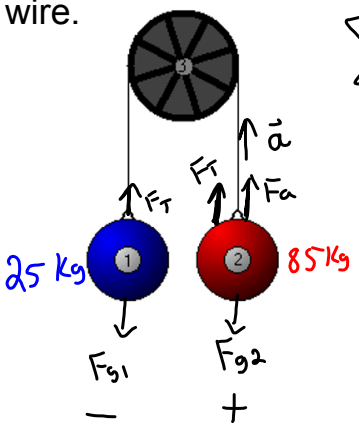
A counter weight of 25 kg is used to help a person of mass 85 kg do chin ups.

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



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

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

$$F_{g1} = -m_1 g$$
$$= -(25)(9.81)$$
$$= -245\ N$$

$$F_{g2} = +m_2 g$$
$$= (85)(9.81)$$
$$= 834\ N$$

$$a = -1.2\ m/s^2$$

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

$$-245 + 834 + F_a = (25 + 85)(-1.2)$$

$$589 + F_a = (110)(-1.2)$$

$$F_a = -132 - 589$$

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

(#2) Focus on m_2

$$\sum_{\text{on } m_2} \vec{F} = m_2 \vec{a}$$

$$F_{g2} + F_T + F_a = m_2 a$$

$$834 + F_T + (-721) = (85)(-1.2)$$

$$F_T + 113 = -102 \quad (-113 \text{ from both})$$

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

Attachments

forces-and-motion-basics_all.jar

forces-1d_all.jar