May 24, 2018

1) answers #19-21 WS

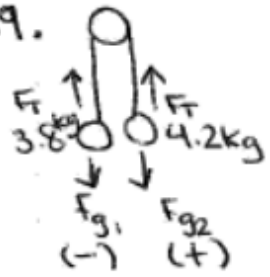
2) more guided practice (counterweights)

Test next Thurs on Newtons Laws!!

Dec 11-1:52 PM

Practice Problems

19.



$a = ?$ $\Sigma F = \Sigma m \times a$

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

$(3.8)(9.81) + (4.2)(9.81) = (3.8 + 4.2)a$

$-37.3 + 41.2 = 8a$

$\frac{3.9}{8} = \frac{8a}{8}$

$0.49 = a$

$F_T = ?$ $\Sigma F = m_1 a$

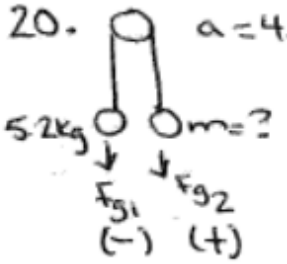
$F_{g1} + F_T = m_1 a$

$-37.3 + F_T = (3.8)(0.49)$

$-37.3 + F_T = 1.862 + 37.3$ (+37.3)

$F_T = 39\,N$

20.



$\Sigma F = \Sigma m \times a$

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

$(5.2)(-9.81) + (m)(9.81) = (5.2 + m)(4.6)$

$-51.01 + 9.81m = (23.92 + 4.6m)$ (−23.92)

$74.93 + 9.81m = 4.6m - 9.81m$ (−9.81)

$\frac{74.93}{5.21} = \frac{-5.21m}{5.21}$

$14\,kg = m$

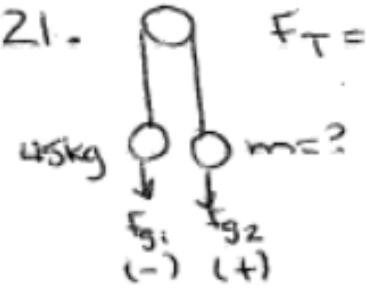
$F_T = ?$ $\Sigma F = m_1 a$

$F_{g1} + F_T = m_1 a$

$-51.01 + F_T = (5.2)(4.6)$

$-51.01 + F_T = 23.92 + 51.01$ (+51.01)

$F_T = 75\,N$

21. 

$F_T = 512\ N$

$\Sigma F = m_1 a$

$F_{g_1} + F_T = m_1 a$

$(45)(-9.81) + (512) = (45)a$

$-441.45 + 512 = 45a$

$\frac{70.55}{45} = \frac{45a}{45}$

$1.6\ m/s^2 = a$

$\Sigma F = \Sigma m \times a$

$F_{g_1} + F_{g_2} = (m_1 + m_2)a$

$-441.45 + m(9.81) = (45 + m)(1.6)$

$-441.45 + 9.81m = 72 + 1.6m + 441.45$

$-1.6m \quad -1.6m$

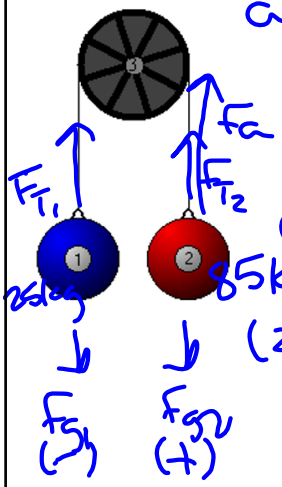
$9.81m = 513.45 + 1.6m - 1.6m$

$\frac{8.21m}{8.21} = \frac{513.45}{8.21}$

$m = 63\ kg$

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 ← magnitude
2. Calculate the magnitude of tension in the wire.



$a = -1.2 m/s^2$

$\Sigma F = \Sigma ma$

$F_{g_1} + F_{g_2} + F_a = (m_1 + m_2)a$

$(m_1)(g) + (m_2)(g) + F_a = (m_1 + m_2)a$

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

$(25+85)(-1.2)$

$-245 + 834 + F_a = (110)(-1.2)$

$589 + F_a = -132$ (−589)

$F_a = -721\ N$

2. $F_T = ?$ $\Sigma F = m_1 a$

$F_{T_1} + F_{g_1} = m_1 a$

$F_{T_1} + -245 = (25)(-1.2)$ (+245)

$F_{T_1} = -30 + 245$

$F_T = 215$

$\Sigma F = m_2 a$

$F_{g_2} + F_{T_2} + F_a = m_2 a$

$834 + F_{T_2} + (-721) = (85)(-1.2)$ (−113)

$F_{T_2} + 113 = -102 - 113$

$F_{T_2} = -215$

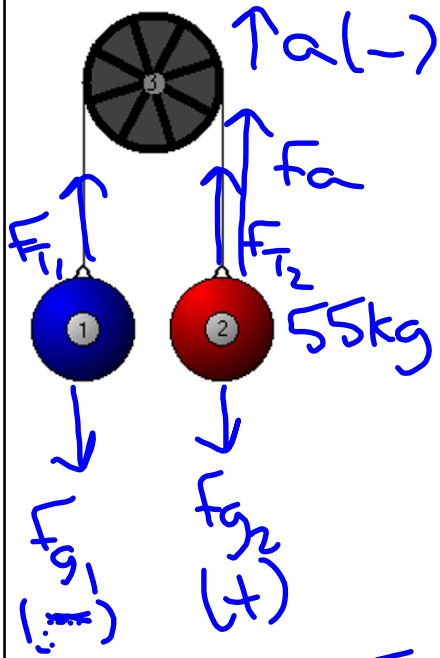
Aug 8-1:15 PM

Suppose the maximum mass a person can lift is 324 N. A counterbalance is set up to help that person lift other objects. Calculate the mass of the counter weight for the person to lift 55 kg with an acceleration magnitude of 1.5 m/s^2 (M = 36 kg)

$F_a = 324\,N\,(-324)$

$a = -1.5\,m/s^2$

$m_2 = 55\,kg$



$$\Sigma F = \Sigma m a$$

$$F_{g_1} + F_{g_2} + F_a = (m_1 + m_2)a$$

$$m(-9.81) + (55)(9.81) + (-324) = (m + 55)(-1.5)$$

$$-9.81m_1 + 540 + (-324) = -1.5m - 82.5$$

$$+9.81m_1 \qquad +9.81m_1$$

$$-9.81m_1 + 216 = -1.5m_1 - 82.5$$

$$+82.5 \qquad +82.5$$

$$216 = 8.31m_1 - 82.5$$

$$\frac{298.5}{8.31} = \frac{8.31m_1}{8.31}$$

$$36\,kg = m_1$$

Aug 8-1:33 PM

complete Questions #22,23

Practice Problems WS

Dec 6-2:15 PM