Solutions to Practice Quiz 2

Problem 1. S = Silva C = Carlos

a) $S = 5C$, $S = C + 948$; target → $\frac{S}{S+C}$

$5C = C + 948 \Rightarrow C = \frac{948}{4} = 237$

$S = 237 \times 5 = 1185$

$$\boxed{\frac{S}{S+C} = \frac{5}{6}}$$

b) L_0 = Local initial F_0 = Foreign Initial F_1 = Foreign Final

$\frac{L_0}{F_0} = \frac{3}{4}$

$\frac{L_0}{F_1} = \frac{9}{8}$

$F_1 = F_0 - 28$

target → F_0

$\frac{8}{9} L_0 = F_0 - 28$

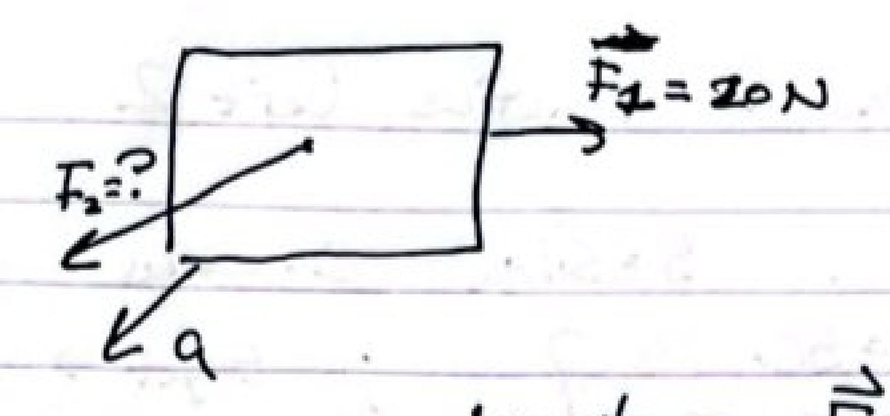
$\frac{L_0}{F_0} = \frac{3}{4}$

$\left(\frac{8}{9}\right)\left(\frac{3}{4}\right) F_0 = F_0 - 28$

$F_0\left[\left(\frac{8}{9}\right)\left(\frac{3}{4}\right) - 1\right] = -28 \Rightarrow \boxed{F_0 = \frac{28}{1 - \frac{8}{9}\left(\frac{3}{4}\right)} = 84}$

Problem 2.

$\vec{F}_1 + \vec{F}_2 = m\vec{a}$



target → $\vec{F}_2$

$F_{1x} + F_{2x} = ma_x$

$F_{1y} + F_{2y} = ma_y$

$a_x = \frac{F_{1x} + F_{2x}}{m} \Rightarrow F_{2x} = ma_x - F_{1x} = -2(6.5) - 20$

$a_x = 13 \times \cos(60) = 6.5$ m/s

$\boxed{F_{2x} = } = -33N$

$\cancel{F_{1y}}^{0} + F_{2y} = ma_y \Rightarrow F_{2y} = ma_y$

$F_{2y} = -2 \times 13 \frac{\sqrt{3}}{2} = -22N$

$|\vec{F}_2| = \sqrt{F_{2x}^2 + F_{2y}^2} = \sqrt{33^2 + 22^2} = 39.7 N$

~~atan(22/7) ... + 180° → we make the angle wrt the + x axis~~

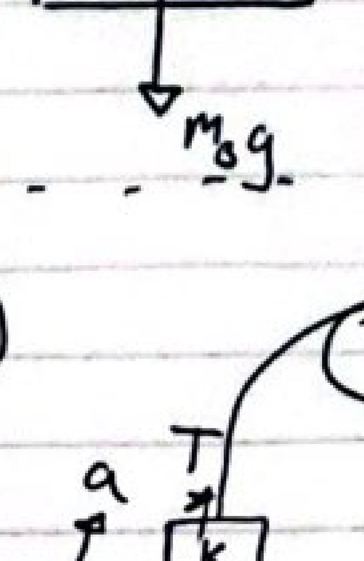
$$\boxed{\theta = \text{atan}\left(\frac{22}{33}\right) = 33.7^\circ + 180^\circ}$$

Problem 3.

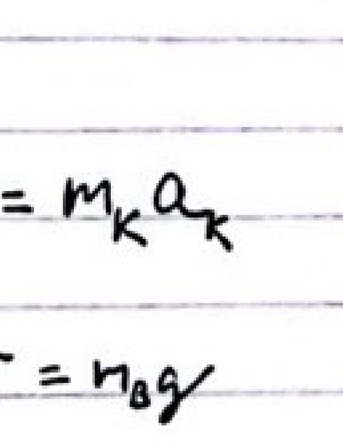
a) When you lift the box, the tension balances the weight of the box.

target → a_K = acceleration of monkey.

$m_B g = T$



Now we look at the monkey



$T - m_K g = m_K a_K$

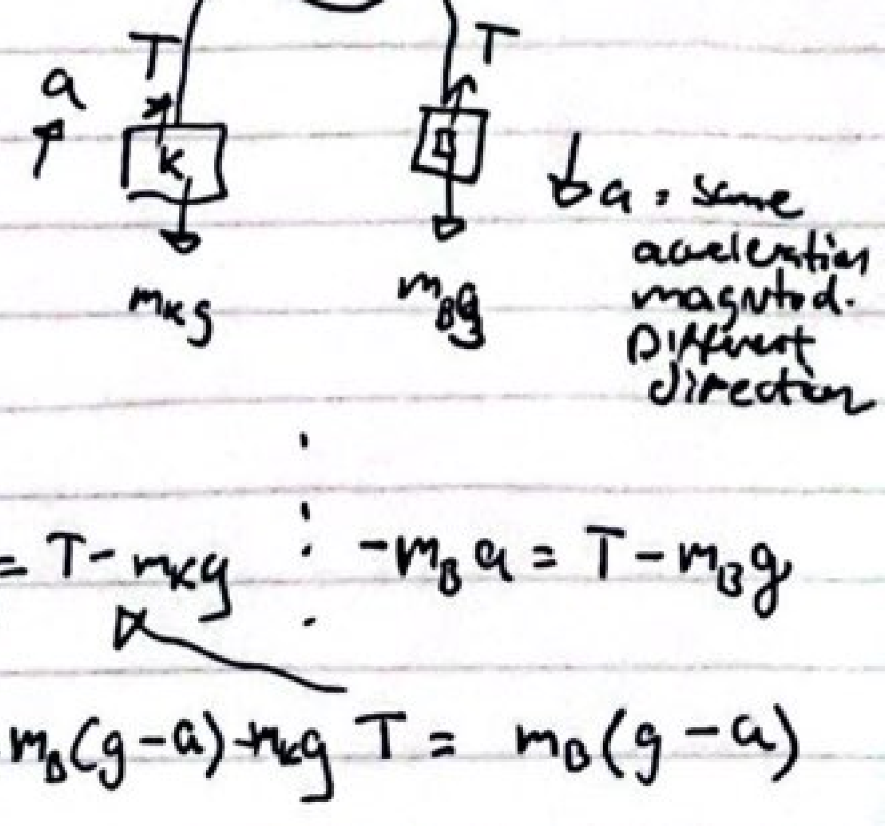
we replace $T = m_B g$

$m_B g - m_K g = m_K a_K$

$a_K = \frac{(m_B - m_K) g}{m_K}$

$a_K = \frac{5}{10}(9.82) = 4.9$ m/s²

b)



$m_K a = T - m_K g$; $-m_B a = T - m_B g$

$m_K a_K = m_B(g - a) - m_K g$ $T = m_B(g - a)$

$a(m_K + m_B) = (m_B - m_K) g$

$a = \left(\frac{m_B - m_K}{m_K + m_B}\right) g$

$= 1.96$ m/s²

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