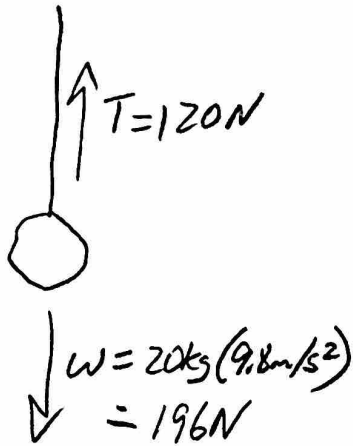


1.



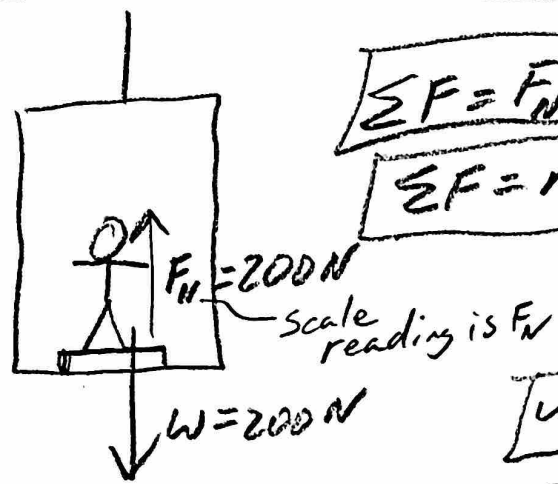
$$\Sigma F = 120\text{N} - 196\text{N} = -76\text{N}$$

$$\Sigma F = 20\text{kg}(a)$$

$$20\text{kg}(a) = -76\text{N}$$

$$a = -3.8\text{m/s}^2$$

2.



Motionless Elevator

$$\Sigma F = F_N - W$$

$$\Sigma F = m(0)$$

$$F_N - W = 0$$

$$F_N = W$$

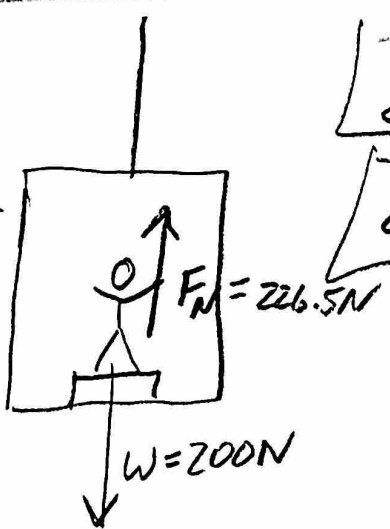
$$200\text{N} = W$$

$$W = 200\text{N} = mg$$

$$200\text{N} = m(9.8\text{m/s}^2)$$

$$m = 20.4\text{kg}$$

Elevator Acceleration = 1.3m/s^2 ↑



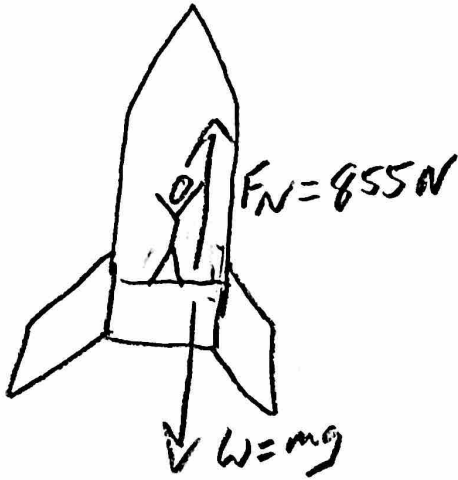
$$\Sigma F = 20.4\text{kg}(1.3\text{m/s}^2) = 26.5\text{N}$$

$$\Sigma F = F_N - 200\text{N}$$

$$F_N - 200\text{N} = 26.5\text{N}$$

$$F_N = 226.5\text{N}$$

3.



$$\Sigma F = ma$$

$$\Sigma F = 855 N - m(9.8 \text{ m/s}^2)$$

$$m(a) = 855 N - m(9.8 \text{ m/s}^2)$$

$$m(4.44 \text{ m/s}^2) = 855 N - m(9.8 \text{ m/s}^2)$$

$$m(14.2 \text{ m/s}^2) = 855 N$$

$$M = 60 \text{ kg}$$

Kinematics:

$$\Delta y = 20 \text{ m}$$

$$v_{0y} = 0 \text{ m/s}$$

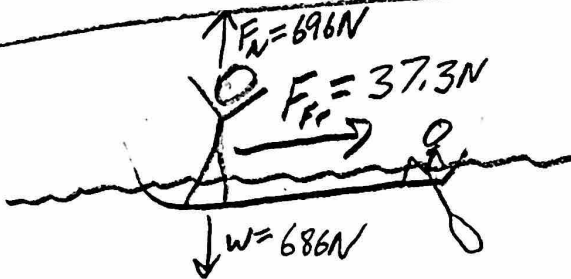
$$\Delta t = 3 \text{ s}$$

$$\Delta y = v_0 t + \frac{1}{2} a t^2$$

$$20 \text{ m} = \frac{1}{2} a (3 \text{ s})^2$$

$$a = 4.44 \text{ m/s}^2$$

4.



$$\Sigma F = F_{\text{friction}}$$

$$\Sigma F = 70 \text{ kg}(a)$$

$$70 \text{ kg}(a) = F_{\text{fr}}$$

$$70 \text{ kg}(0.53 \text{ m/s}^2) = F_{\text{fr}}$$

$$37.3 \text{ N} = F_{\text{fr}}$$

Kinematics

$$v_{0x} = -4 \text{ m/s}$$

$$v_x = 0 \text{ m/s}$$

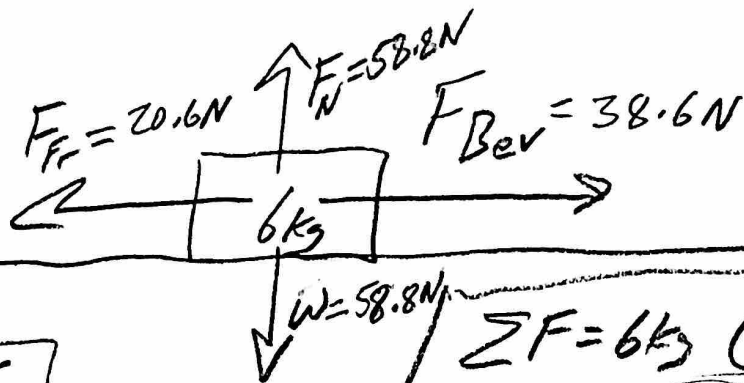
$$\Delta x = -15 \text{ m}$$

$$v^2 = v_0^2 + 2a \Delta x$$

$$0^2 = (-4 \text{ m/s})^2 + 2a(-15 \text{ m})$$

$$a = 0.53 \text{ m/s}^2$$

5.



$$F_{Fr} = \mu_k F_N$$

$$F_{Fr} = 0.35(58.8N)$$

$$F_{Fr} = 20.6N$$

$$\Sigma F = 6kg (3m/s^2) = 18N$$

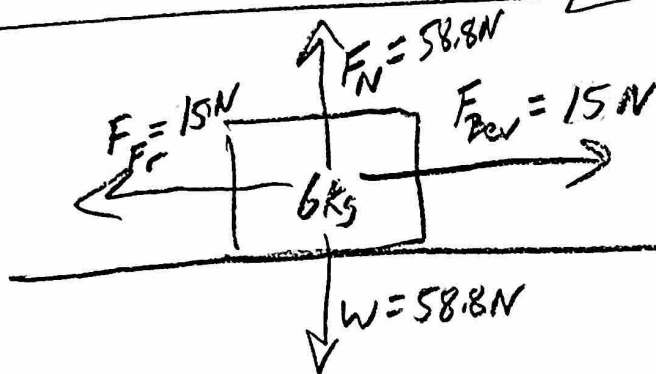
$$\Sigma F = F_{Bev} - F_{Fr}$$

$$F_{Bev} - F_{Fr} = 18N$$

$$F_{Bev} - 20.6N = 18N$$

$$F_{Bev} = 38.6N$$

6.



$$F_{Fr} = \mu_k (F_N)$$

$$15N = \mu_k (58.8N)$$

$$\mu_k = 0.26$$

$$\Sigma F = 6kg (0) = 0N$$

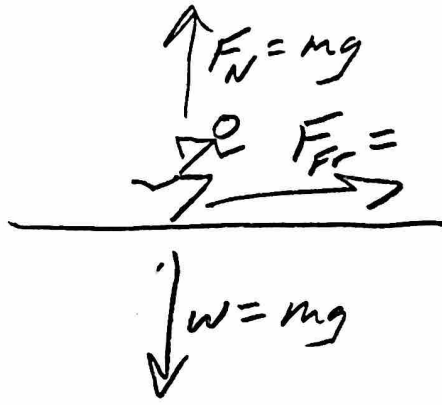
no acceleration

$$\Sigma F = 15N - F_{Fr}$$

$$15N - F_{Fr} = 0N$$

$$F_{Fr} = 15N$$

7.



$$\Sigma F = ma$$

$$\Sigma F = F_{fr}$$

$$F_{fr} = ma$$

$$F_{fr} = \mu_s F_N = \mu_s mg$$

$$\mu_s ma = \mu_s mg$$

$$a = \mu_s g$$

$$a = 0.015 (9.8 \text{ m/s}^2)$$

$$a = 0.147 \text{ m/s}^2$$

Kinematics

$$V_0 = 0 \text{ m/s}$$

$$a = 0.147 \text{ m/s}^2$$

$$\Delta x = 10 \text{ m}$$

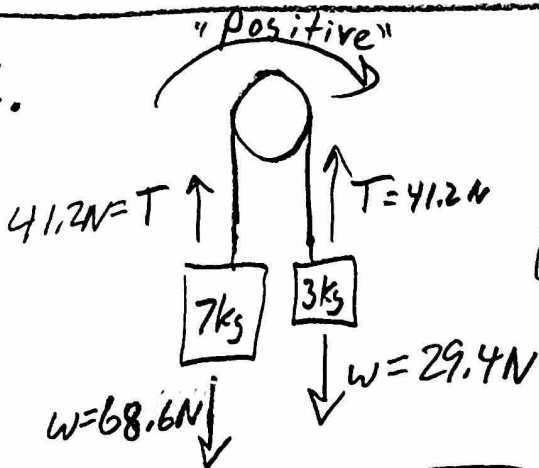
$$\Delta t = ?$$

$$\Delta x = V_0 t + \frac{1}{2} a t^2$$

$$10 \text{ m} = 0 t + \frac{1}{2} (0.147 \text{ m/s}^2) t^2$$

$$t = 11.7 \text{ s}$$

8.



$$\Sigma F_{10} = 10 \text{ kg}(a)$$

$$\Sigma F = 29.4 \text{ N} - 68.6 \text{ N} = -39.2 \text{ N}$$

$$10 \text{ kg}(a) = -39.2 \text{ kg/s}^2$$

$$a = -3.92 \text{ m/s}^2$$

$$a = 3.92 \text{ m/s}^2 \text{ Counter-clockwise}$$

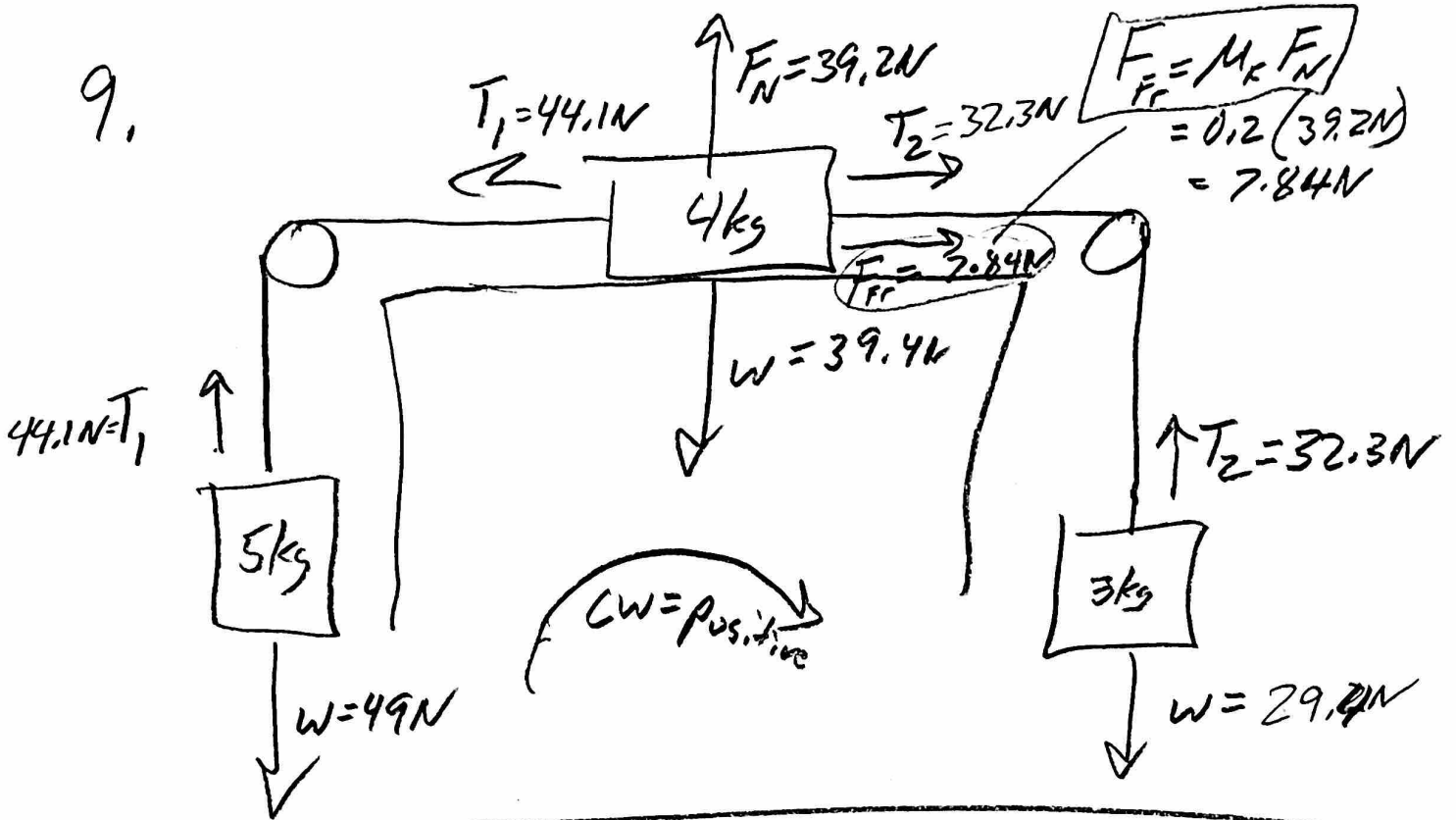
$$\Sigma F_7 = T - 29.4 \text{ N}$$

$$\Sigma F_3 = 3 \text{ kg} (3.92 \text{ m/s}^2) = 11.76 \text{ N}$$

$$T - 29.4 \text{ N} = 11.76 \text{ N}$$

$$T = 41.2 \text{ N}$$

9.



$$\Sigma F_{12} = 12\text{kg}(a)$$

$$\Sigma F_{12} = 29.4\text{N} - 49\text{N} + 7.84 = -11.76\text{N}$$

$$12\text{kg}(a) = -11.76\text{N}$$

$$a = -0.98\text{m/s}^2$$

$$a = 0.98\text{m/s}^2 \text{ Counter-clockwise}$$

$$\Sigma F_5 = 5\text{kg}(-0.98\text{m/s}^2) = -4.9\text{N}$$

$$\Sigma F_5 = T_1 - 49\text{N}$$

$$T_1 - 49\text{N} = -4.9\text{N}$$

$$T_1 = 44.1\text{N}$$

$$\Sigma F_3 = 3\text{kg}(0.98\text{m/s}^2) = 2.94\text{N}$$

$$\Sigma F_3 = T_2 - 29.4\text{N}$$

$$2.94\text{N} = T_2 - 29.4\text{N}$$

$$T_2 = 32.3\text{N}$$