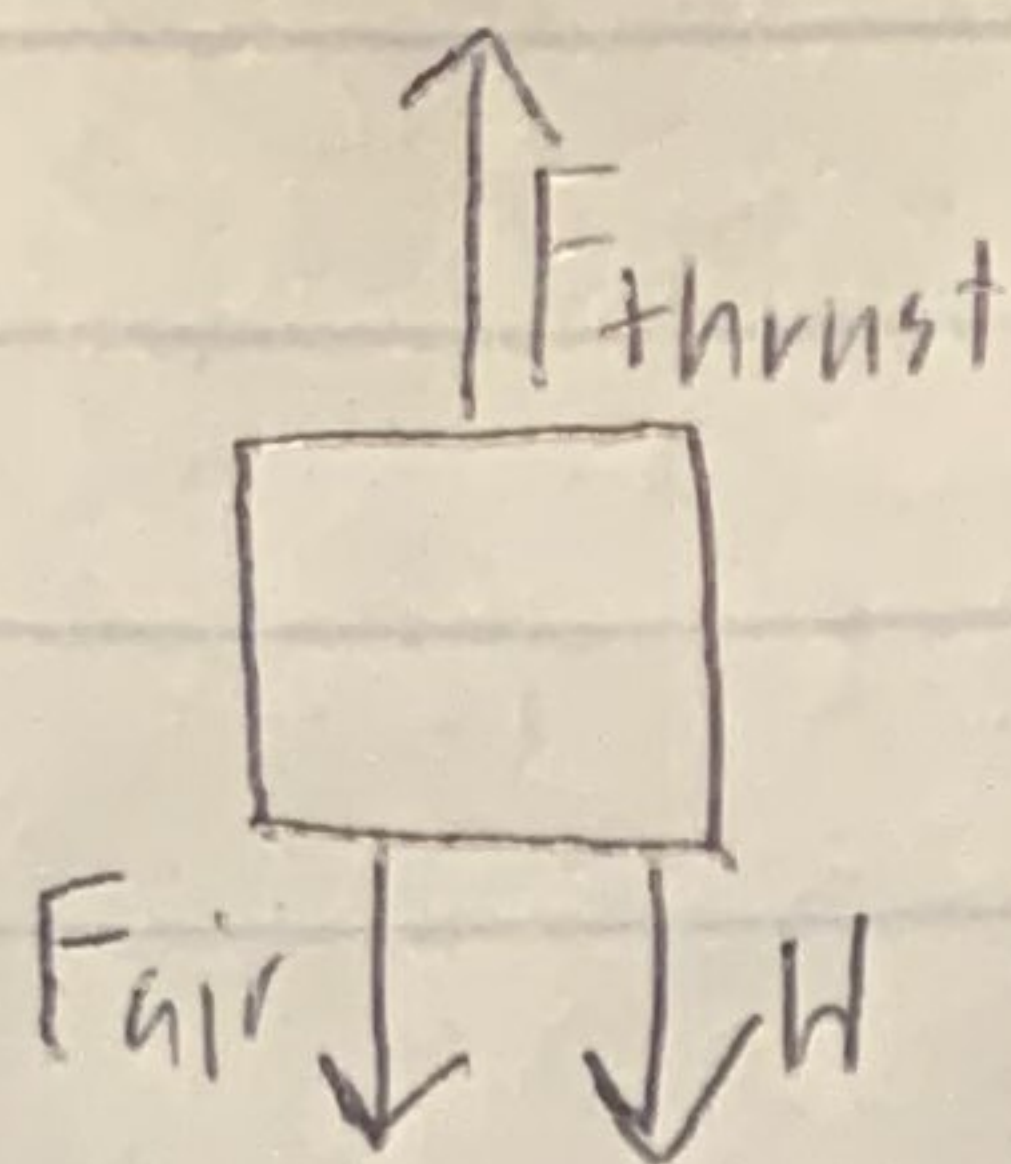


1) a)



$$b) F_{net} = 1.25 \cdot 10^7 - (4.5 \cdot 10^6 + (6.2 \cdot 10^5 \cdot 9.8))$$

$$F_{net} = 3.1 \cdot 10^6$$

$$3.1 \cdot 10^6 = 5 \cdot 10^5 \cdot a$$

$$a = 6.2 \text{ m/s}^2$$

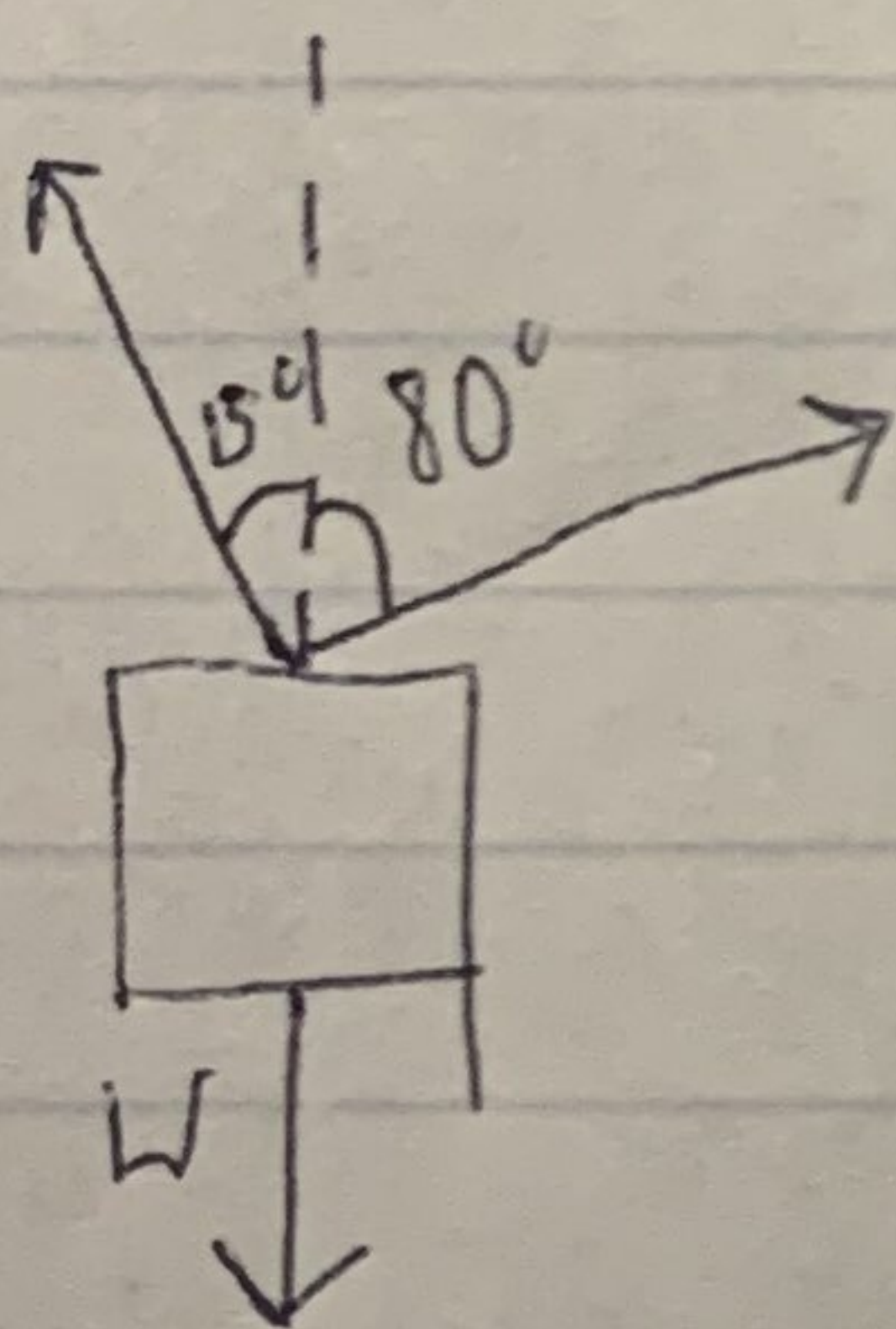
2) a) $\vec{F}_{AB} = -\vec{F}_{BA}$

$$\vec{F}_{BA} = -700 \text{ N}$$

3) $\vec{F} = ma \rightarrow 2000(-200) = -400000 \text{ N}$
 $-400000 = -2000 \cdot x$

$$x = -399000 \text{ N}$$

4) a)



b) $\vec{F}_{net,x} = -T_1 \cos(75) + T_2 \cos(10)$

c) $\vec{F}_{net,y} = T_1 \sin(75) + T_2 \sin(10) - 745$

d) $T_2 \cos(75) - T_1 \cos(75) = 0$

$$T_1 \sin(75) + T_2 \sin(10) - 745 = 0$$

$$T_1 = \frac{T_2 \cos(10)}{\cos(75)} \cdot \sin(75) + T_2 \sin(10) - 745 = 0$$

$$T_2 = 194 \text{ N} \quad T_1 = 738 \text{ N}$$

Well done!

$$1) a) N = -W = mg = 1180 \text{ N}$$

$$F_s \leq 0.5(1180)$$

$$\boxed{F_s \leq 590 \text{ N}}$$

$$b) f_k = 0.3 \cdot 1180$$

$$f_k = \cancel{354} 354 \text{ N}$$

$$590 - 354 = 120 \cdot a$$

$$\boxed{a = 1.97 \text{ m/s}^2}$$

$$2) W_x = W \sin(25)$$

$$W_y = -W \cos(25)$$

$$F_x = 0.1(W \cos(25))$$

$$W \sin(25) - 0.1(W \cos(25)) = ma_x$$

$$W \sin(25) - 0.1(W \cos(25)) = W a_x$$

$$g(\sin(25)) - 0.1(\cos(25)) = a_x$$

$$\boxed{a_x = 3.25 \text{ m/s}^2}$$

$$3) F_D = \frac{1}{2} \rho A v^2$$

$$F_D = \frac{1}{2} \cdot 0.75 \cdot 1.225 \cdot 0.75 \cdot 46^2$$

$$\boxed{F_D = 551.25 \text{ N}}$$

$$4) F/A = \eta (\Delta x/L)$$

$$\frac{22540}{0.005} = \eta \left(\frac{0.003}{16} \right)$$

$$\boxed{\eta = 1502666666.66}$$

Great work

$$1) v = v_w$$

$$40 = 0.5w$$

$$w = 80 \text{ m/s}$$

$$\boxed{w = 80 \text{ m/s}}$$

$$2) \tan \theta = v^2 / v_g$$

$$\tan \theta = \frac{33.3^2}{9.8 \cdot 900} = 0.126$$

$$\boxed{\theta = 7.18^\circ}$$

$$3) a) \text{ path 2} \quad b) V_{T1} = 400 \text{ m/s}$$

$$V_{T2} = 800 \text{ m/s}$$

$$4) a) a_c = \frac{Gm}{r^2}$$

$$a_c = \frac{6.673 \cdot 10^{-11} \cdot 1.4 \cdot 10^{22}}{(4.5 \cdot 10^{12})^2} = \boxed{4.61 \cdot 10^{-14} \text{ m/s}^2}$$

$$b) a_c = \frac{6.673 \cdot 10^{-11} \cdot 8.62 \cdot 10^{25}}{(2.5 \cdot 10^{22})^2} = \boxed{9.2 \cdot 10^{-10} \text{ m/s}^2}$$

$$\frac{9.2 \cdot 10^{-10}}{4.61 \cdot 10^{-14}} = 20000$$

(+2) Bonus!