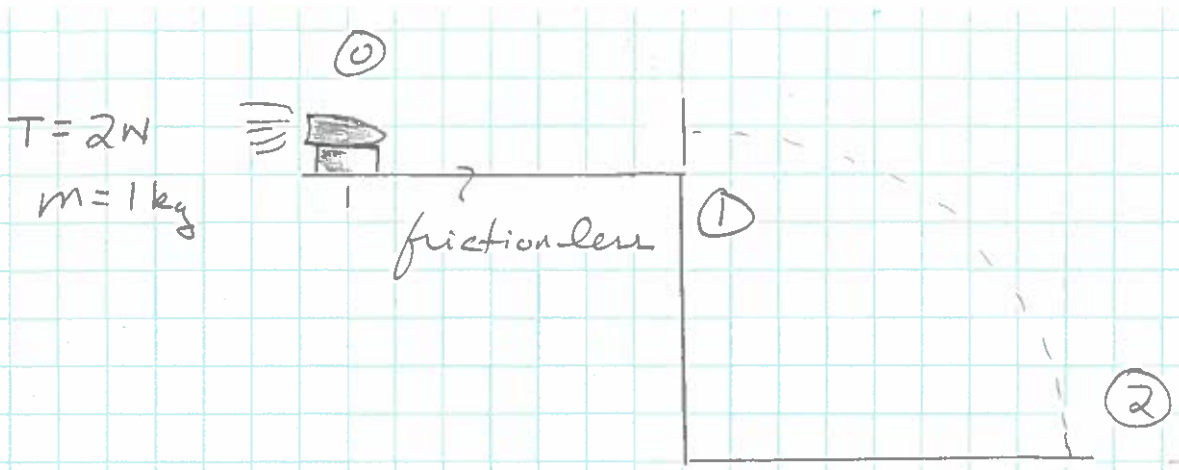
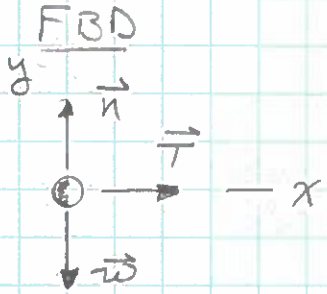



first, find $v_1$ from 0 → 1

1D:


FBD



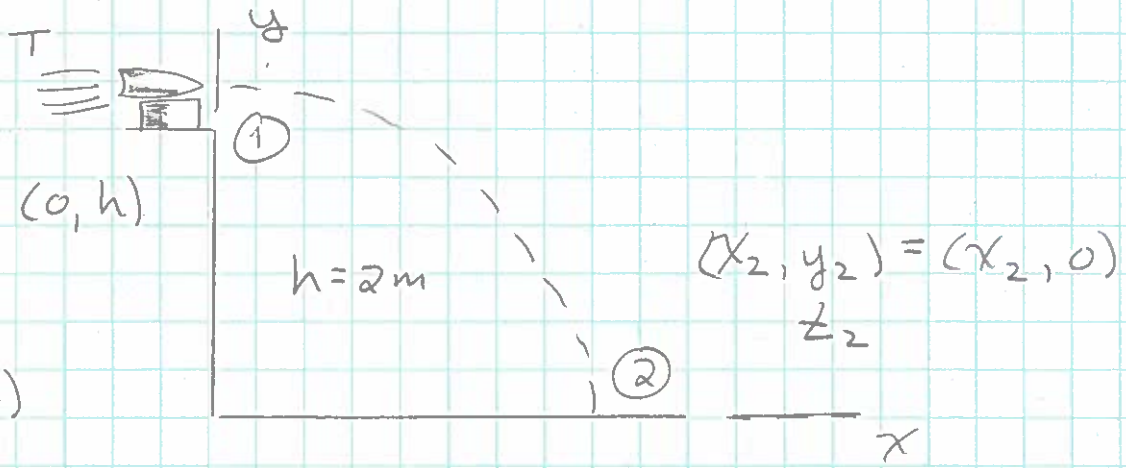

$$\Sigma F_x = T = ma_x \Rightarrow a_x = \frac{T}{m} = 2\ m/s^2$$

So

$$v_1^2 = v_0^2 + 2a_x \Delta x \qquad \Delta x = x_1 - x_0$$

$$v_1 = \sqrt{2 a_x x_1} = 4\ m/s$$

Now, 2D part 1 → 2:




$$a_x = 2\ m/s^2$$

$$a_y = -g$$

y-motion:

$$y_2 = y_1 + v_{y_1}\Delta t + \frac{1}{2}a_y \Delta t^2 \qquad \Delta t = t_2 - t_1$$

$$0 = h - \frac{1}{2} g t_2^2$$

$$\therefore \quad t_2 = \sqrt{\frac{2h}{g}} = 0.6389\,s$$

Now, x-motion:

$$x_2 = x_1 + v_{x_1}\Delta t + \frac{1}{2}a_x \Delta t^2 \qquad \Delta t = t_2 - t_1$$

$$= v_{x_1} t_2 + \frac{1}{2} a_x t_2^2$$

$$\underline{x_2 = 2.964\ m}$$

This assumes that the rocket stays level so that $a_x$ remains at $2\ m/s^2$