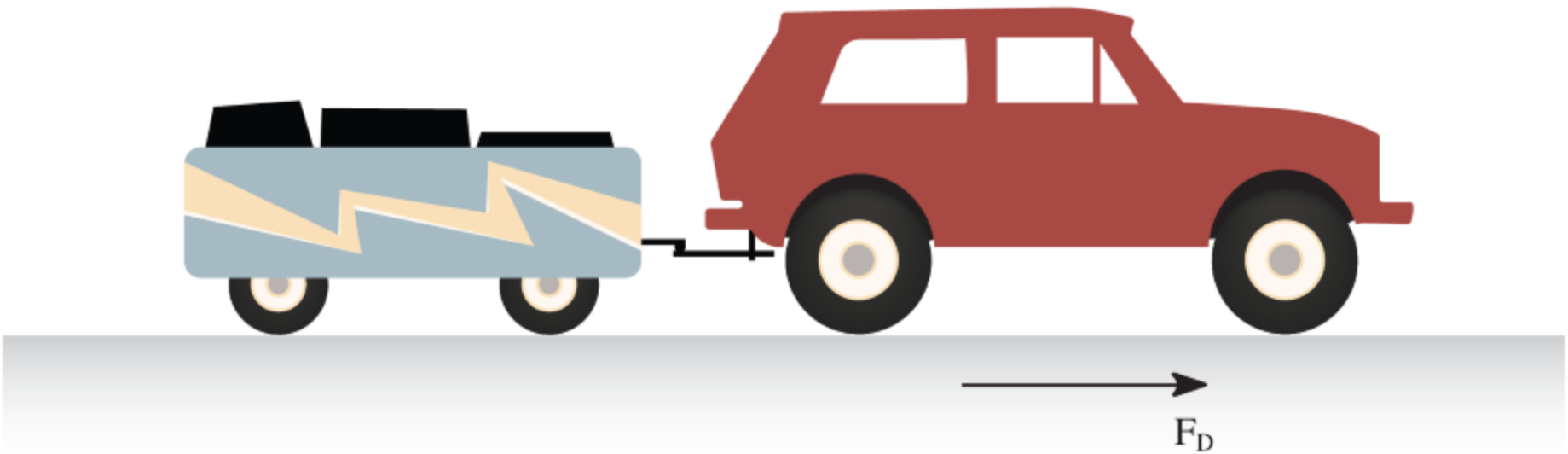
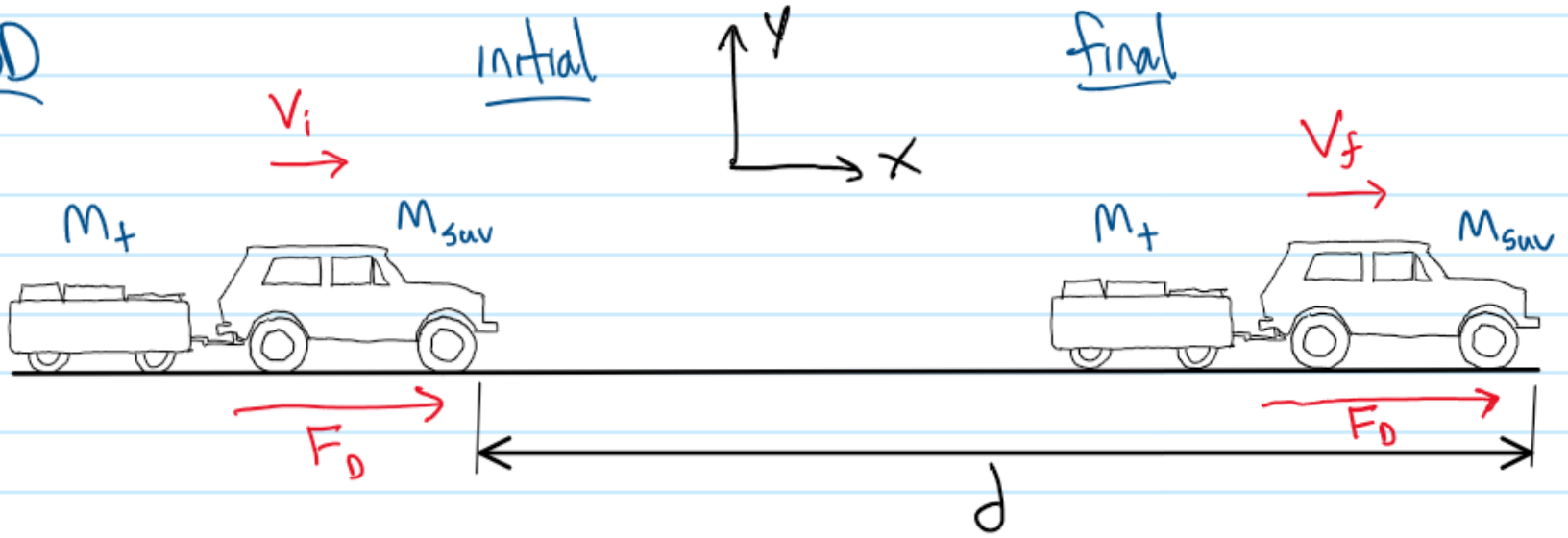
21-P-WE-GD-005



A m_{SUV} = red SUV is towing a m_t = trailer. The SUV is initially moving at v_i = m/s, when the driver steps on the gas, a constant driving force F_D = N is applied.

After the SUV moves d = m, what is the final velocity v_f?

FBD



given

$M_t, M_{suv}, V_i, F_D, d$

find

V_f

→ sum the masses

$m = M_t + M_{suv}$

Work-Energy

$T_1 + \Sigma U_{1\to2} = T_2$ $\quad T = \frac{1}{2}mv^2$

$\frac{1}{2}mv_i^2 + F_D d = \frac{1}{2}mv_f^2$

$$v_f = \sqrt{\frac{\frac{1}{2}mv_i^2 + F_D d}{\frac{1}{2}m}} = \sqrt{v_i^2 + \frac{2F_D d}{m}}$$