

$$H = L \sin \theta = 6.84 \text{ m}$$

$$KE_i + GPE_i = KE_f + GPE_f + W(\text{friction})$$

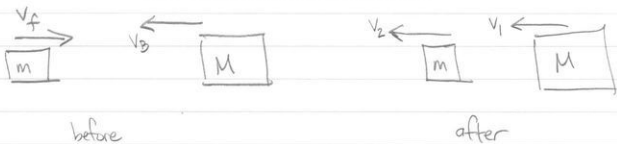
$$0 + mgH = \frac{1}{2}mv_f^2 + 0 + mgL \cos \theta \mu$$

$$0 + 134 \text{ J} = \frac{1}{2}mv_f^2 + 36.8 \text{ J}$$

$$\frac{1}{2}mv_f^2 = 97.2 \text{ J}$$

$$v_f = 9.86 \text{ m/s}$$

speed at bottom
of hill



momentum
energy

$$mv_f - Mv_B = -mv_2 - Mv_1$$

$$\frac{1}{2}mv_f^2 + \frac{1}{2}Mv_B^2 = \frac{1}{2}mv_2^2 + \frac{1}{2}Mv_1^2$$

$$\rightarrow v_1 = \frac{-mv_f + Mv_B - mv_2}{M} = v_B - \left(\frac{m}{M}\right)v_f - \left(\frac{m}{M}\right)v_2$$

