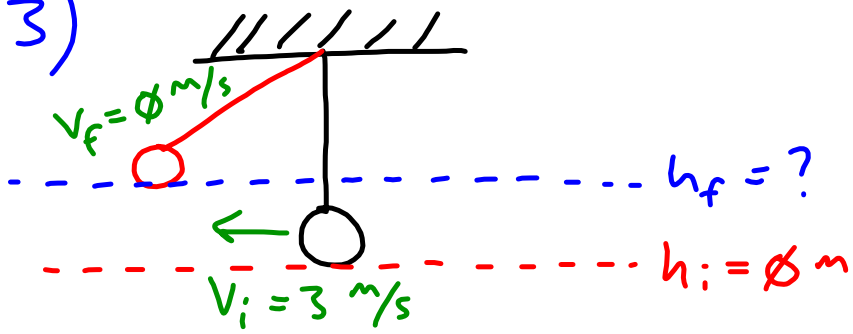
Practice - Energy and Work

CoE PS #1

3)



$$E_k = E_g$$

$$\frac{1}{2} m v_i^2 = m a_g h_f$$

$$h_f = \frac{v_i^2}{2 a_g}$$

$$= \frac{(3\ m/s)^2}{2(9.8\ m/s^2)}$$

$$= 0.46\ m$$

Work and KE PS

Ex)

Either W OR E_{th}, but not both!

$$E_{ki} = E_{kf} + E_{th}$$

$$[E_{ki} = W_{out} + E_{kf}]$$

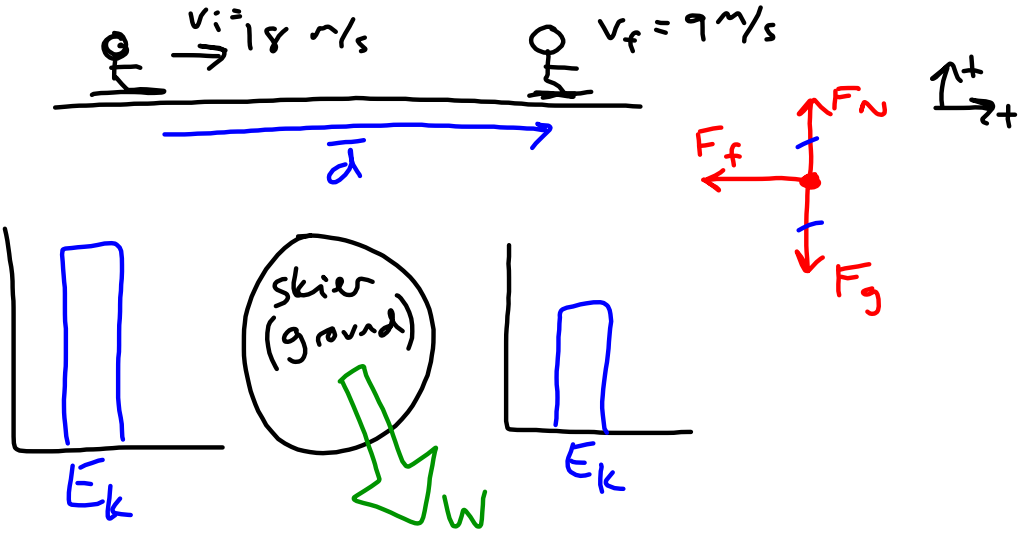
$$E_{th} = E_{ki} - E_{kf}$$

$$= \frac{1}{2}mv_i^2 - \frac{1}{2}mv_f^2$$

$$= \frac{1}{2}(450\text{ kg})(22\text{ m/s})^2 - \frac{1}{2}(450\text{ kg})(15\text{ m/s})^2$$

$$= 58275\text{ J}$$

4) use $F_f = 411.6\ N$ instead of coefficient of friction



$$E_{ki} = W_{out} + E_{kf}$$

$$W_{out} = E_{ki} - E_{kf}$$

$$F_f d \cos\theta = E_{ki} - E_{kf}$$

$$F_f d \cos\theta = \frac{1}{2}mv_i^2 - \frac{1}{2}mv_f^2$$

$$F_f d \cos\theta = \frac{1}{2}(60\ kg)(18\ m/s)^2 - \frac{1}{2}(60\ kg)(9\ m/s)^2$$

$$F_f d \cos\theta = 7290\ J$$

$$d = \frac{7290\ J}{F_f \cos(180°)}$$

$$= \frac{7290\ J}{(-411.6\ N)(-1)}$$

$$= 17.71\ m$$