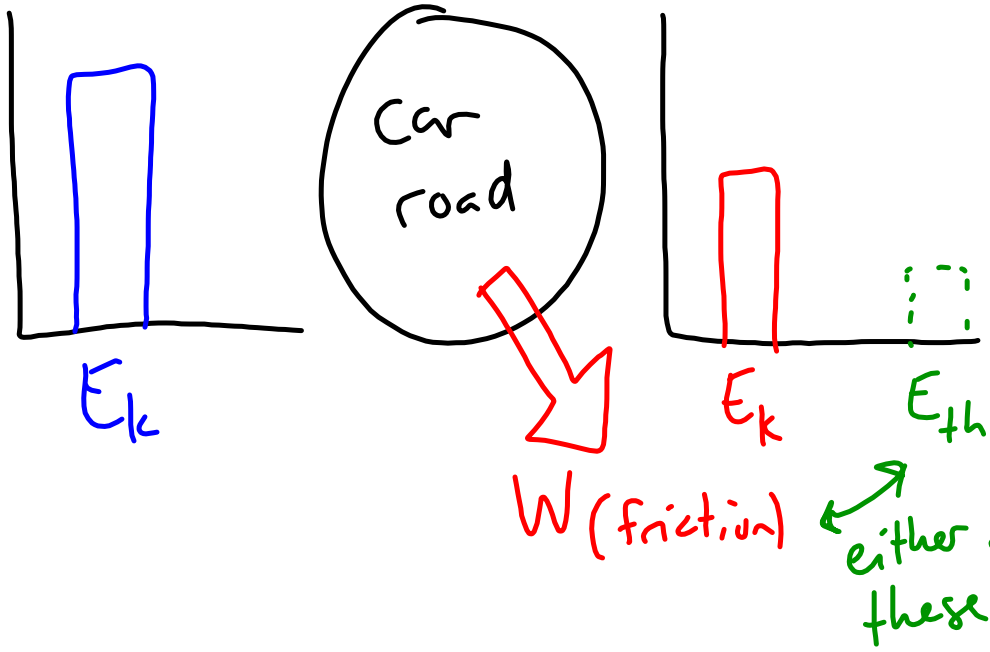
Work and Kinetic Energy PS

Ex)



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

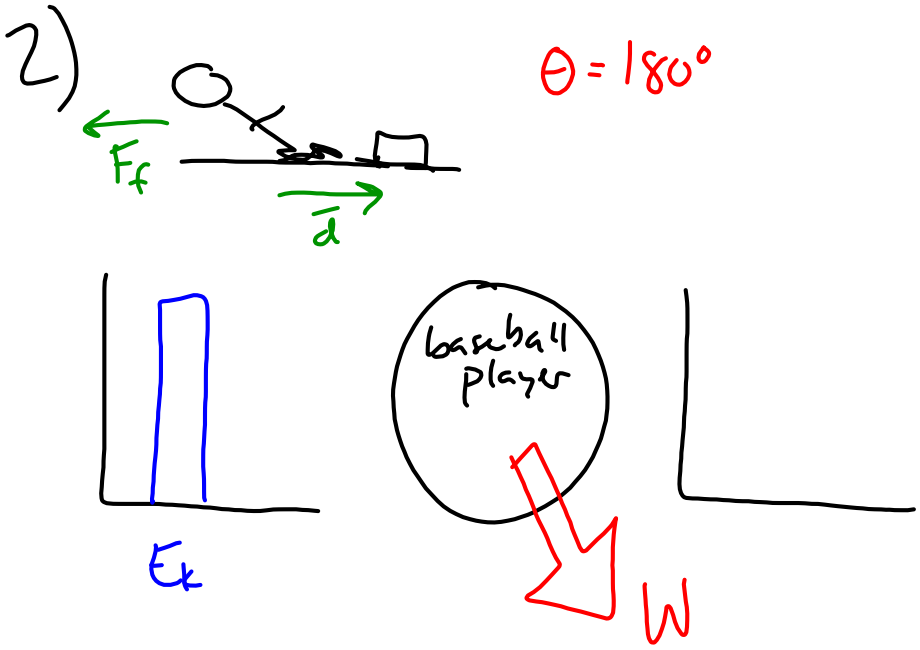
$$W = E_{ki} - E_{kf}$$

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

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

$$= 58275\ J$$

2)

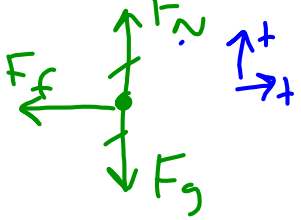


$$E_k = W$$

$$W = \frac{1}{2}mv^2$$

$$= \frac{1}{2}(70\,kg)(4\,m/s)^2$$

$$= 560\,J$$



$$W = F_f d \cos\theta$$

$$d = \frac{W}{F_f \cos\theta}$$

$$= \frac{560\,J}{(-480.2\,N)\cos(180°)}$$

$$= 1.16\,m$$

$$-F_f = \mu F_N$$

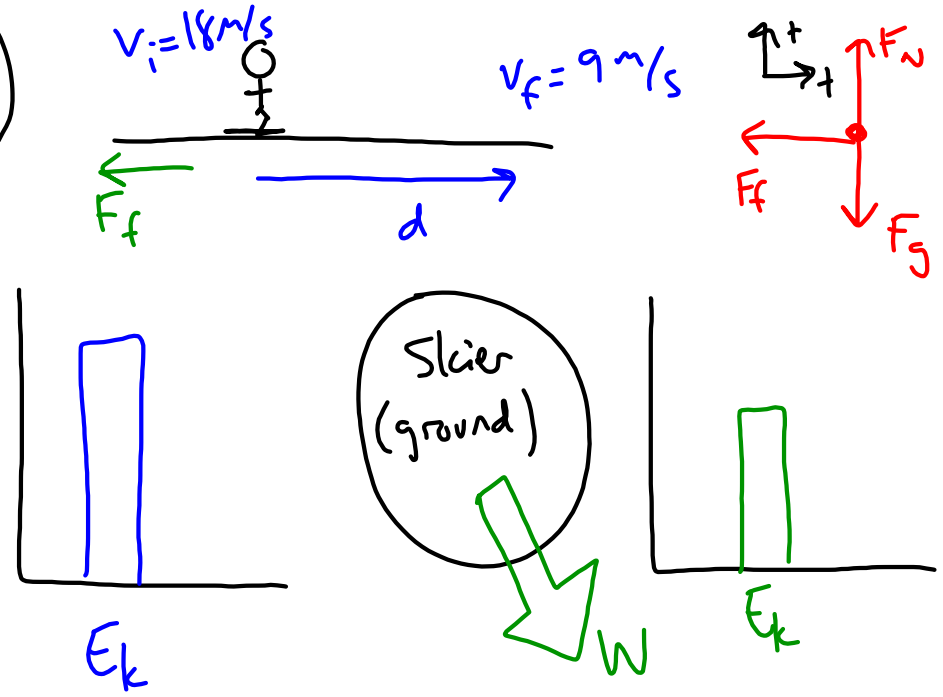
$$= \mu F_g$$

$$= \mu m a_g$$

$$= (0.7)(70\,kg)(9.8\,m/s^2)$$

$$= -480.2\,N$$

4)



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

$$\frac{1}{2}mv_i^2 = -F_f d\cos(180^\circ) + \frac{1}{2}mv_f^2$$

$$-F_f d\cos(180^\circ) = \frac{1}{2}mv_i^2 - \frac{1}{2}mv_f^2$$

$$d = \frac{\frac{1}{2}mv_i^2 - \frac{1}{2}mv_f^2}{-F_f\cos(180^\circ)}$$

$F_f = \mu F_N$

$= \mu m a_g$

$= (0.7)(60kg)(9.8 m/s^2)$

$= 411.6 N$

$$= \frac{\frac{1}{2}(60kg)(18 m/s)^2 - \frac{1}{2}(60kg)(9 m/s^2)}{-(411.6N)(-1)}$$

$$= \frac{9720 J - 2430 J}{411.6 N}$$

$$= 17.7 m$$