Start with... Work/Kinetic Energy Theorem:

$W = \Delta KE$ (if KE is the energy storage)

$\therefore$ $W = \Delta$ energy storage

not true always

So... $W = \Delta KE + \Delta GPE + \Delta EPE$

$$\frac{1}{2}mv_0^2 + mgh_0 + \frac{1}{2}kx_0^2 + W_{NC} = \frac{1}{2}mv^2 + mgh + \frac{1}{2}kx^2$$

CLEE! = "crazy long energy equation"

negative

→ Work done to the object (positive) will increase energy storage

→ work done by the object (negative) will decrease energy storage

$W_{Fr} = F_{Fr} \cdot d$

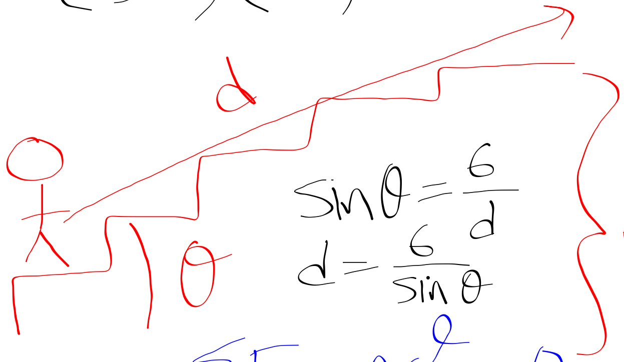
$W_{Fr} = \mu F_N \cdot d$

$\Sigma F_y = ma_y$

Friction (reduces kinetic energy)

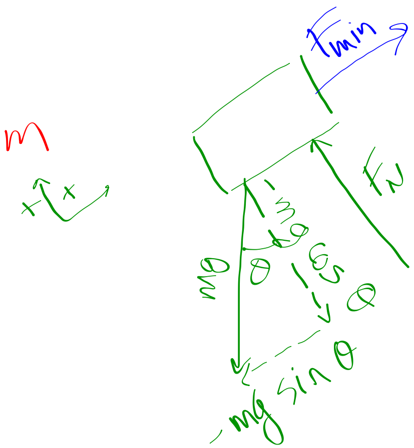
1. A 50-kg woman climbs a flight of stairs 6.0-m high. How much work is required?

$$(50)(6) = 300 \cdot 9.8 = 2940\ J$$



$$\sin\theta = \frac{6}{d}$$

$$d = \frac{6}{\sin\theta}$$



$$\Sigma F_x = m\cancel{a_x} = 0$$

$$F_{min} + -mg\sin\theta = 0$$

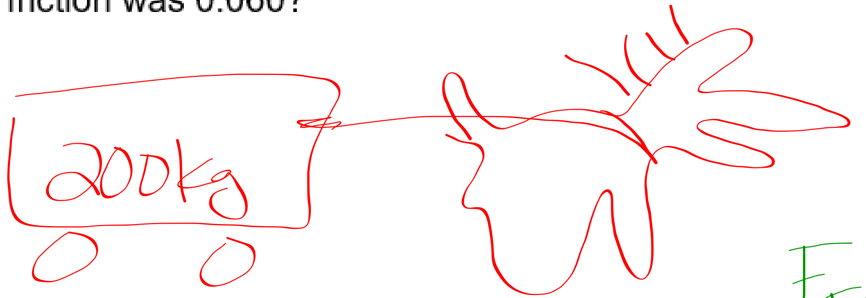
$$F_{min} = mg\sin\theta$$

$$W = F \cdot d$$

$$= mg\cancel{\sin\theta} \cdot \frac{6}{\cancel{\sin\theta}}$$

$$= mgd = 2940\ J$$

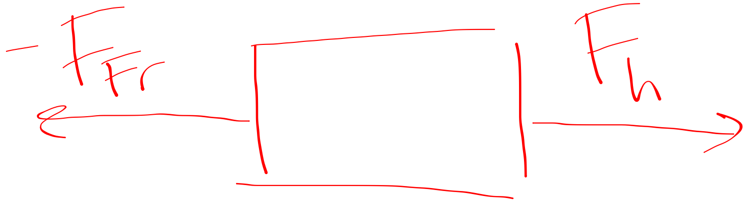
3. How much work did a horse do that pulled a 200-kg wagon 80 km without acceleration along a level road if the effective coefficient of friction was 0.060?



$F_{Fr} = F_h$

$\Sigma F = ma = 0$

$W = F \cdot d = 0$



$W_{Fr} = -F_{Fr} \cdot d$

$W_h = F_h \cdot d$

$W_h = \mu mg \cdot d$

$= (0.06)(200)(9.8)(80{,}000)$

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