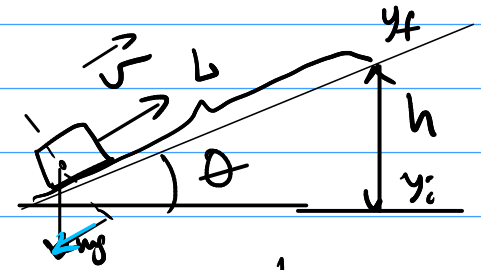
$v = 70\ mi/h \approx 31\ m/s$

$\Rightarrow 9000 W$

$\Rightarrow 9000/746\ W/hp \simeq 11\ hp$

$P = \vec{F} \cdot \vec{v}$



$W_{n.c.f} = \cancel{K} + \Delta U \quad (0 \Leftrightarrow v = const)$

$= mg(y_f - y_i) =$

$= mgh$

$T = \frac{L}{v} = \frac{h}{\sin\theta \cdot v}$

$\frac{W}{T} = P = \frac{mgh}{h(\sin\theta v)} = mg\sin\theta \cdot v$

$m = 1\ T = 1000 kg$, $v = 70\ mi/h = 31\ m/s$

$\theta = 30°$

$P = 1000 \cdot 10 \cdot \sin(30°) \cdot 31 = 15 \cdot 10^4 = W$

$P = \frac{15 \cdot 10^4 W}{746\ W/hp} = \frac{1500 \cdot 10^2}{746} = 2 \cdot 10^2 = 200\ hp$

Energy sources

=> Food cal = 4.2 J

kcal = Cal

$2000\,kcal = 2\cdot10^3 \cdot 4.2\cdot10^3 = 8.4\,MJ = {}_sE$

$v=0 \Leftrightarrow K=0$

$\Delta K + \Delta U = mgh = {}_sE$

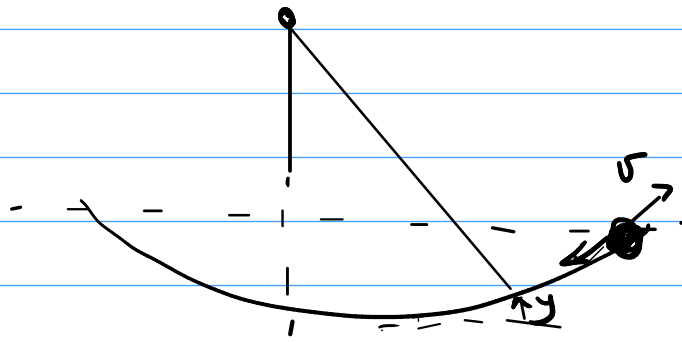
$100kg \cdot 10\frac{m}{s^2} \cdot h = 8.4\cdot10^6 J$

$h = \frac{8.4\cdot10^6}{100\cdot10} = 8.4\cdot1000m$

$= 8.4\,km = 5\,mi$

$kw\cdot h = 1000W \cdot 3600\,s = 3.6\,MJ$

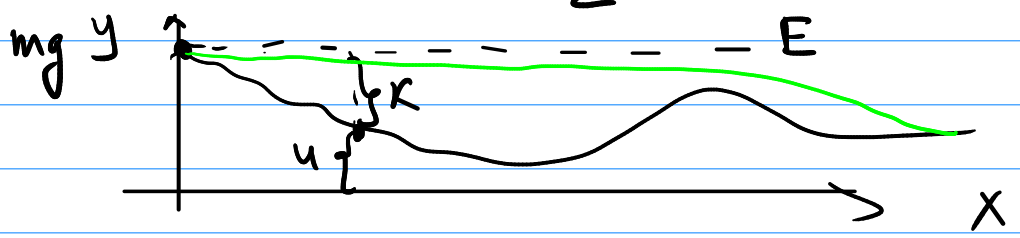
$$K + U = \text{const} = E$$



$U = mgy$

$$E + \frac{mv^2}{2} = K + U$$

$$E_t = K + U = \frac{mv^2}{2} + U \Rightarrow v = \sqrt{\frac{2}{m}(E-U)}$$



Equilibrium