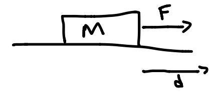
Energy (work)

Joule (J)

Work

$W = F \cdot d$

$W = Fd\cos\theta$



$A \cdot B = |A||B|\cos\theta$

Conservation Laws

Conservation of Energy

" Momentum

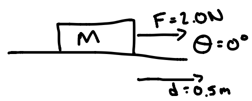
" Angular

" Momentum

Mechanical Energy
Electrical Energy

"1800-1850"

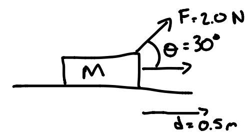
Post Newtonian
Concept



$W = Fd\cos\theta$

$= (2)(.5)(1)$

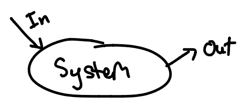
$W = 1\,J$

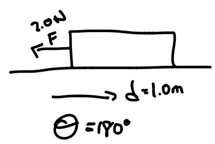


$W = Fd\cos\theta$

$= (2)(.5)\cos 30°$

$= 0.87\,J$

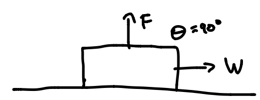




$W = Fd\cos\theta$

$= (2)(1)\cos 180$

$= -2\,J$ (Energy comes out of system)



$F \cdot d = 0$

$W = 0\,J$

Kinetic Energy

$KE = \frac{1}{2} \cdot m \cdot v^2$

$v = 2.0\,m/s$

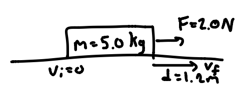
$m = 5\,kg$ $\quad KE = \frac{1}{2}(5)(2)^2$

$= 10\,J$

Work Energy Theorem

$W_{Net} = \Delta KE$

Given



Find a) W_{Net} b) v_f

Solve

a) $W_{Net} = F \cdot d \cdot \cos\theta$

$= (2)(1.2)(1)$

$W_{Net} = 2.4\,J$

b) $W_{NET} = \Delta KE$

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

$2.4 = \left(\frac{5}{2}\right)(v_f)^2 - \left(\frac{5}{2}\right)(0)^2$

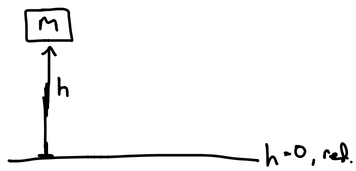
$\frac{4.8}{5} = v_f^2$

$v_f = 0.98\,m/s$

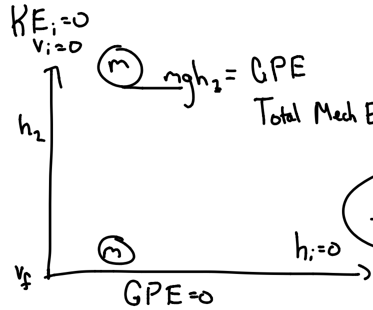
Gravitational P.G.

g is constant

v = constant



$GPE = mgh$



Total Mech Energy → GPE + KE + EPE

GPE → KE

$KE = \frac{1}{2}mv_f^2$

$E_i = E_f$

$KE_i + GPE_i = KE_f + GPE_f$

$\frac{1}{2}mv_i^2 + mgh_i = \frac{1}{2}mv_f^2 + mgh_2$

$0 + mgh_i = \frac{1}{2}mv_f^2 + 0$

$v_f^2 = 2gh$

$= (2)(9.8)(.5)$

$= \sqrt{9.8}$

$v_f = 3.1\ m/s$