A Quick Review

Work

$W = (F\cos\theta)\Delta x$

[J]

$W = \Delta KE$

Kinetic Energy

energy of motion

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

Potential Energy

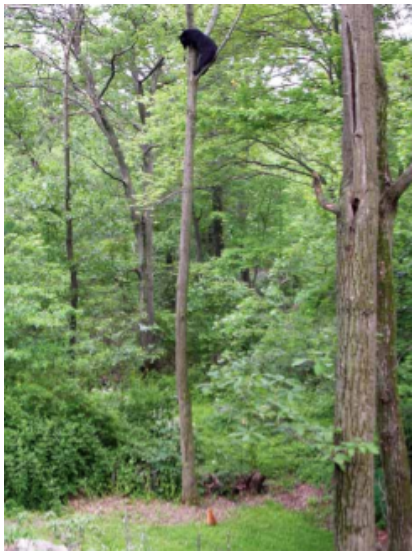
Potential Energy: Energy related to the positions of and forces between objects that make up a system

Types of PE

- Elastic
- Chemical
- GRAVITATIONAL

$PE = mgh$

PE is positive above Ground & negative below ground.



The cat has treed a bear that weighs 530N. The bear is 11 meters up in the air. What is the bear's potential energy?

$$PE = mgh$$

$$F_g = -530\,N = mg$$

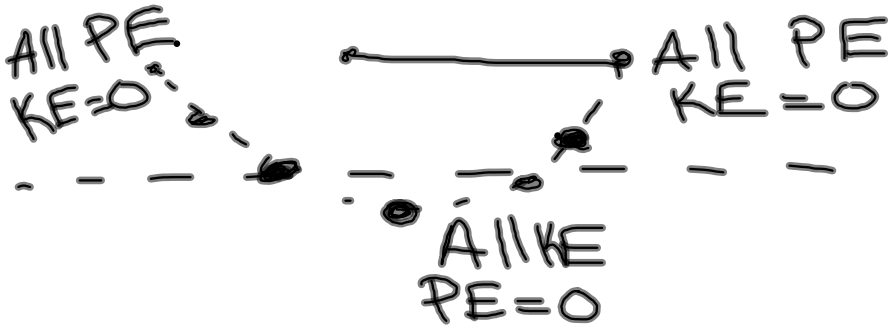
$$PE = (530N)(11m)$$

$$PE = 5830\,J$$

Energy Is Conserved!!

$$\text{Total Energy} = \sum \text{types of energy}$$

$$E = KE + PE$$



$$E_1 = E_2$$

$$KE_1 + PE_1 = KE_2 + PE_2$$

if at same height

$$PE_1 = PE_2$$

$$KE_1 = KE_2$$

Sam is at the peak of his jump. Calculate Sam's speed when he reaches the trampoline's surface.

At peak : $E_1 = PE_1 = mgh$

$E = m(9.8)(0.25) = 2.45\,m$

At trampoline $E_2 = KE_2 = \frac{1}{2}mv^2$

Energy is conserved so

$E_1 = E_2$

$\frac{2.45\,m}{m} = \frac{\frac{1}{2}mv^2}{m}$

$2(2.45) = \left(\frac{1}{2}v^2\right)2$

$4.9 = v^2$

$v = 2.213\ m/s$

he is going down so...

$\boxed{V = -2.21\ m/s}$

This can also be solved without Energy, by using our acceleration equations

$h = 0.25\,m \qquad \Delta y = -0.25\,m$

$V_i = 0$

$a = -9.8\ m/s^2$

$V_f^2 = V_0^2 + 2a\Delta x$

$V_f^2 = 2(-9.8)(-.25)$

$V_f^2 = 4.9$

$V_f = -2.2\ m/s$