# Potential & Kinetic Energy

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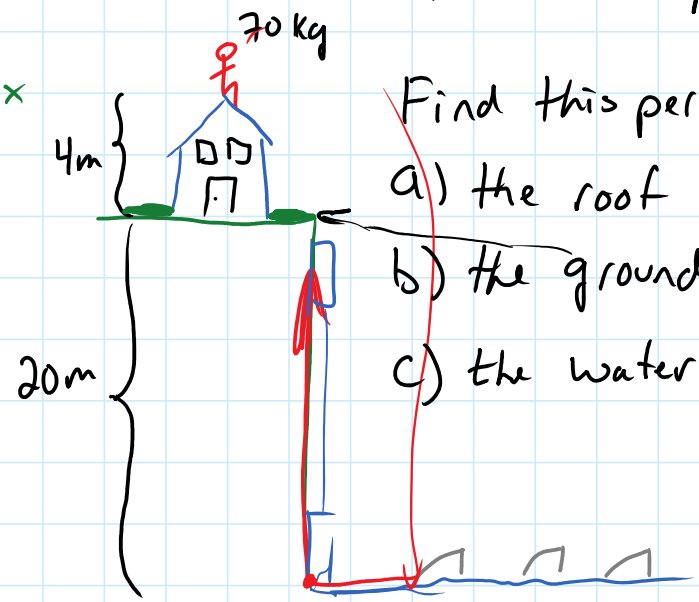
If work is done on an object then the energy of the object changes. ($W = \Delta E$)

1) Potential Energy, $E_p$, stored energy
2) Kinetic Energy, $E_k$, energy of motion
3) Heat Energy, $E_h$, thermal energy

## Gravitational Potential Energy ($E_p$)

- stored energy based on an objects height and mass.
- $E_p = mgh$ h is always measured relative to... a reference point.

Ex




Find this person's $E_p$ relative to...

a) the roof $E_p = mgh = 0$

b) the ground $E_p = (70kg)(9.8)(4m) = 2744J \approx 2740J$

c) the water $E_p = (70)(9.8)(24) = 16500J$

To use the $E_p$, work had to be done on the object

$W = \Delta E = \Delta E_p$

## Kinetic Energy ($E_k$)

# Kinetic Energy ($E_K$)

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

1) Determine the $E_K$ of a .050g bullet travelling at 200m/s

.050kg

$$E_K = \frac{1}{2}mv^2 = \frac{1}{2}(.050kg)(200)^2 = 1000\ J$$

2) A 2.0kg object has 100J of $E_K$. How fast is it moving

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

$$100J = \frac{1}{2}(2)v^2 \quad , v = 10m/s$$

3) Determine the work done to stop a 2000kg car moving at 20m/s.

$W = \not{F}\not{x}\not{d}$ or $\Delta E$

$W = \Delta E_K$ final minus initial

$= E_{K_f} - E_{K_0}$

$= 0 - \frac{1}{2}(2000)(20)^2$

$= -4.0 \times 10^5\ J$

slowing, loss of $E_K$