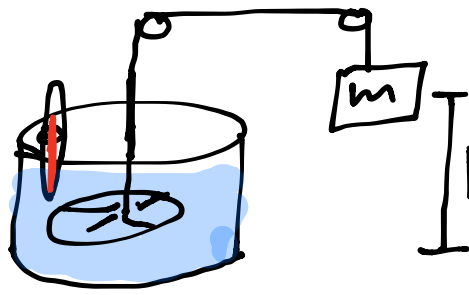


Conservation of Energy Notes

Joule's Experiment



Falling mass
converts PE
into KE.
KE is transferred
to the water

After the water
settle they find
the temp has $\uparrow$.

The increase in thermal $E =$ the
decrease in PE.

Shows that energy can transform
from one type to another.

Energy can be transferred
between objects.

Conservation of Energy -
the total energy of a closed
system remains constant.

Mechanical Energy - the sum of an object's potential + kinetic energy.

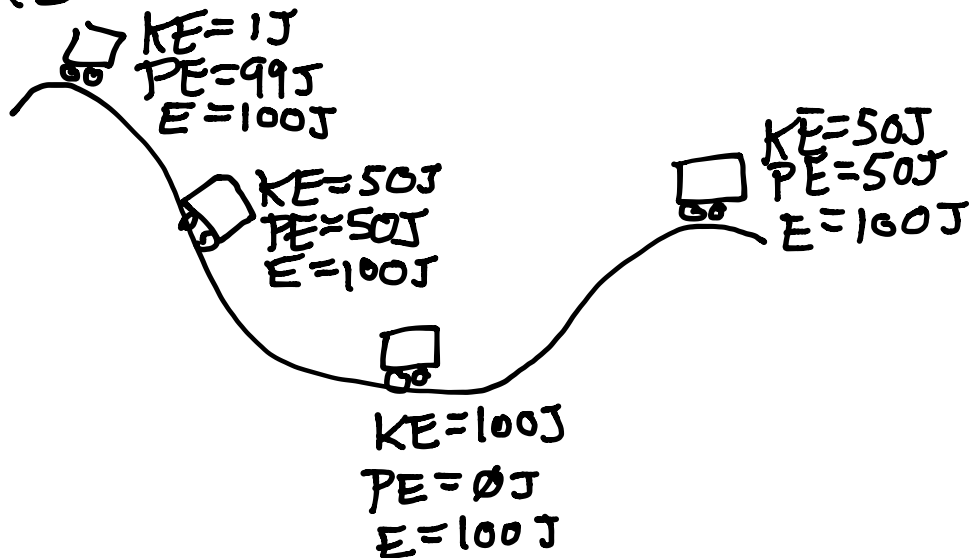
- symbol = E $E = KE + PE_G + PE_s$

Conservation of Energy formula

$$E = E_0$$

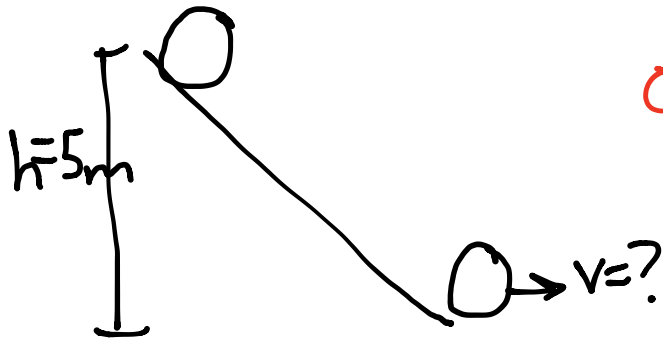
rewrite as:

$$KE + PE_G + PE_s = KE_0 + PE_{G0} + PE_{s0}$$



$KE = 0J$ $\Rightarrow$ $PE_s = 0J$ $\rightarrow$ $KE = 10J$
 $PE_s = 10J$

We can use Co. E to find the v or h of an object.



$$\cancel{PE} + \cancel{KE} = \cancel{PE}_0 + \cancel{KE}_0$$

↓ final $h = 0m$ ↓ initial $v = 0m/s$

$$KE = PE_0$$

substitute $KE = \frac{1}{2}mv^2$
 $PE = mgh$

$$\frac{1}{2}mv^2 = mgh_0$$

Solve for v

$$\frac{1}{2}v^2 = gh_0$$

$$v^2 = 2gh_0$$

$$v = \sqrt{2gh_0}$$

$$v = \sqrt{2 \cdot 9.8 \cdot 5}$$

$$v = 9.9m/s$$

Here's the formulas on eqn sheet

$$PE_G = mgh \quad KE = \frac{1}{2}mv^2 \quad PE_s = \frac{1}{2}kx^2$$

A cowboy fires a bullet straight up at a speed of 300 m/s . The bullet leaves the gun at $h = 2 \text{ m}$.

What is the max height of the bullet?



$$\cancel{KE} + PE = \cancel{KE}_0 + PE_0$$

$$mgh = \frac{1}{2}mv_0^2 + mgh_0$$

$$h = \frac{v_0^2}{2g} + h_0$$

$$h = \frac{300^2}{19.6} + 2 \Rightarrow$$

$$h = 4594 \text{ m}$$