Energy

Q| If I drop a bowling ball + a basket ball at the same time, which hits the ground first?

- ☐ Energy
- ☐ Conservation of Energy
- ☐ Kinetic Energy
- ☐ Potential Energy
- ☐ Energy lab
  - Setup Notebook
  - Collect Data
  - Excel
  - Form
- ☐ Journal
  - See back

Energy - Potential for change
or
Potential for work

Units - Joule, J, $N \cdot m$, $\frac{kg\ m^2}{s^2}$

Examples - heat - thermal
- movement - kinetic
- falling - potential
- mechanical
- ... electric, nuclear

Conservation of Energy.

- For a system, total energy is constant
- Energy is not created or destroyed
  Energy only changes form

Kinetic Energy (KE) - energy due to

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

- KE: Energy due to motion
- $\frac{1}{2}$: Random
- m: Amount of 'Stuff'
- v^2: How fast, Squared

Example: Going 5mph over in a school zone. Mass of a car is $\approx 1{,}000$ kg

$20 \text{ mph} \approx 9 \text{ m/s} \Rightarrow KE = \frac{1}{2}(1{,}000 \text{ kg})(9 \text{ m/s})^2$

$= 40{,}500 \text{ J}$

$25 \text{mph} \approx 11 \text{ m/s} \Rightarrow KE = \frac{1}{2}(1{,}000 \text{ kg})(11 \text{ m/s})^2$

$= 60{,}500 \text{ J}$

$40{,}500 \rightarrow 60{,}500$ is a 50% increase!

Potential Energy - Energy from how far you can fall.

Eqn: $PE = mgh$ → How far it can fall

- PE → Falling Energy
- m → Amount of 'stuff'
- g → How hard gravity pulls $\approx 10\ m/s^2$

Example: Pick up a car, 4m & 6m

$4m \Rightarrow PE = mgh = (1{,}000kg)(10\ m/s)(4m)$
$= 40{,}000\ J$

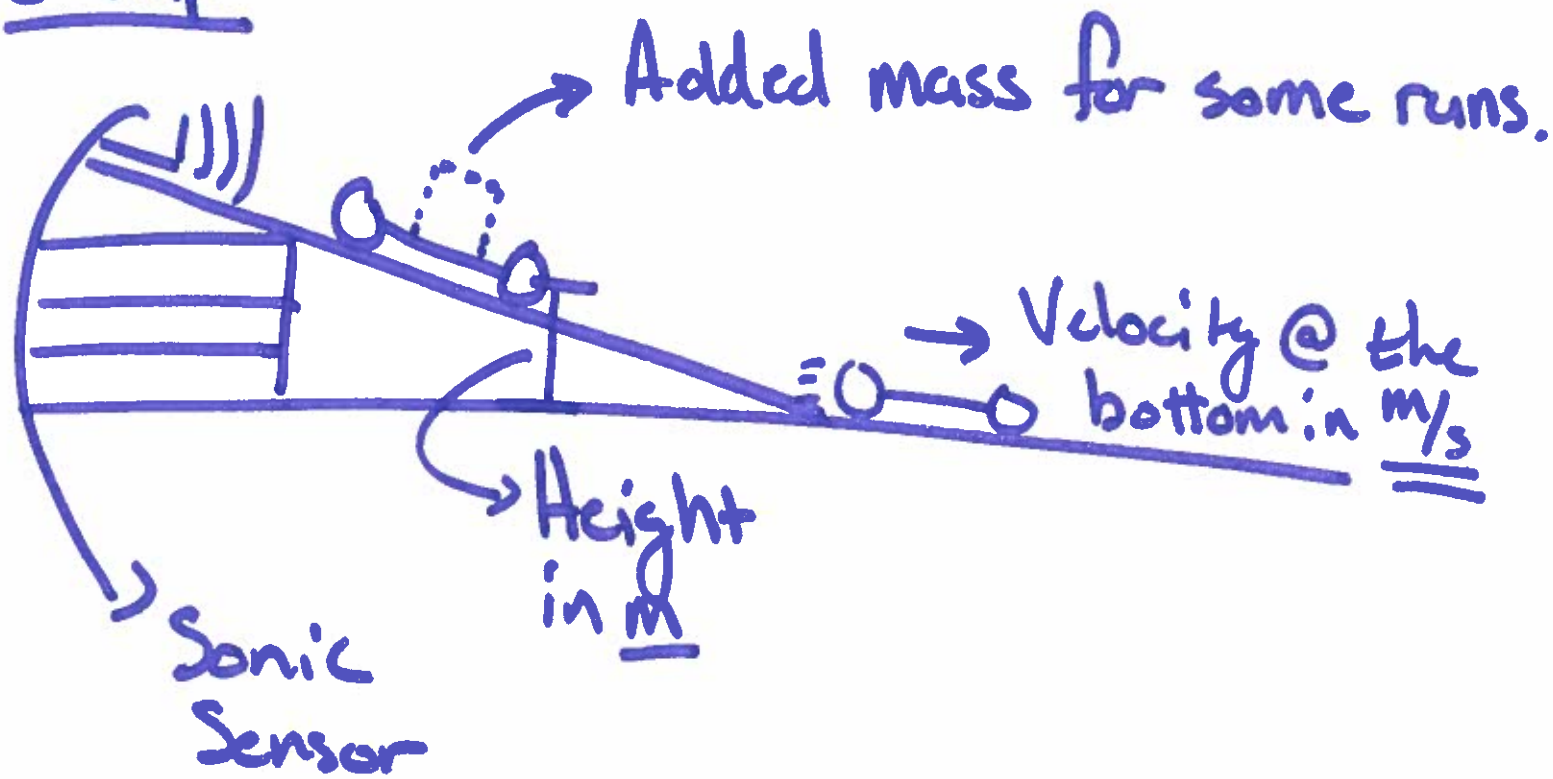
$6m \Rightarrow PE = mgh = (1{,}000kg)(10\ m/s)(6m)$
$= 60{,}000\ J$

Intentionally Blank

Energy Lab

Goal: Compare the initial **PE** with the final **KE**.

Setup:



- Choose & measure the starting height
- Choose & measure the car w/ any mass
- Release the car & record the velocity.

Data

	PE			KE				
				Velocity in m/s				$KE = \frac{1}{2}mv^2$
	H	m	PE	T1	T2	T3	Avg	
1								
2								
3								

↳ mass in (kg)

↳ height in (m)

Conclusion - Was the total energy conserved? What evidence do you have?