Physics Honors: Kinetic and Potential Energy



Energy is defined as the ability to do work.

If you remember the Work/Energy Theorem, when work is done on a system, it results in a change in energy

W = E

Kinetic Energy

Kinetic Energy (KE) is the energy that an object has due to its motion.

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

KE = Kinetic Energy (Joules)

M = Mass (kg)

V = Velocity (m/s)

Kinetic Energy Practice Problem

A high school pitcher throws a baseball, which weighs 0.15kg, at a speed of 40 m/s. What is the ball's kinetic energy?

A little league pitcher throws the same baseball at 20 m/s. What is the ball's kinetic energy for this throw?

Potential Energy

Potential Energy is the energy that is stored due to the interactions of objects in a system.

There are several types of potential energy:

- Gravitational Potential Energy
- Spring Potential Energy
- Elastic Potential Energy

Gravitational Potential Energy

Gravitational Potential Energy is the energy stored due to gravity.

GPE = m*g*h

GPE = Gravitational Potential Energy (joules)

m = mass (kg)

 $g = gravity (m/s^2)$

h = height(m)

Reference Point

A reference point is the point at which the GPE is determined to be zero.

In general, you can assume that the ground is the reference point unless the problem tells you to use something else



Gravitational Potential Energy Practice

You lift a 7.3 kg bowling ball from the storage rack and hold it up at your shoulder level. The storage rack is 0.61 m above the ground, and your shoulder is 1.2 m above the ground.

How much GPE is there at each height?

How much work did you do on the ball when you lifted it?

Gravitational Potential Energy Practice

If you hold a 20kg bag of rice 1.5 meters above the ground, how much GPE does it have?

You stand on the roof of a building. You hold out a 1kg ball at shoulder height 1.5 meters above the roof. What is the GPE of the ball? Now, you move to the edge of the roof and hold it over the edge. The building is 60m tall. What is it's GPE now?