AP Physics:
Conservation of Energy

Mechanical Energy

Mechanical Energy is defined as the combination of Kinetic and Potential Energy in a system

$$ME = K + Ug$$

ME = Mechanical Energy (Joules)

K = Kinetic Energy (Joules)

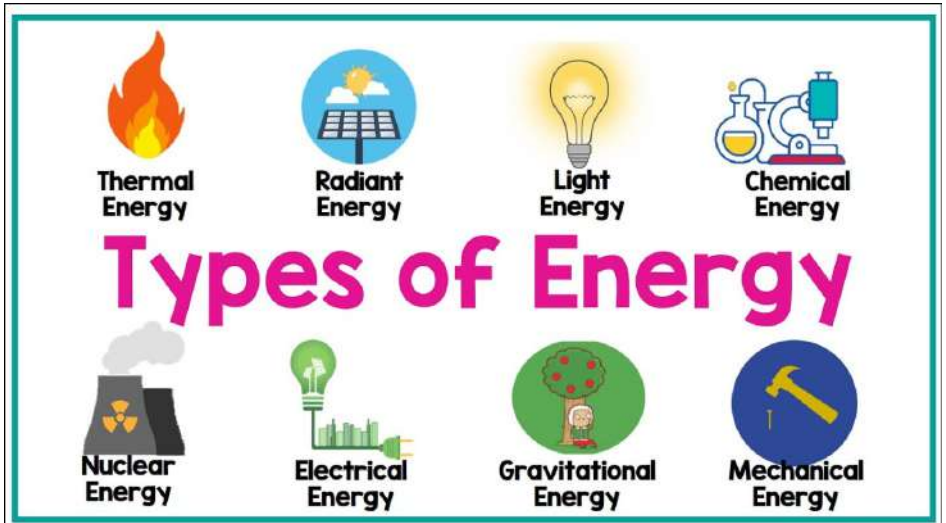
Ug = Gravitational Potential Energy (Joules)

Mechanical Energy Practice

A volleyball player spikes a 0.25kg ball from a height of 2 m downward. If the ball is moving at 22 m/s after it is spiked, what is the total mechanical energy?

The Law of Conservation of Energy

The law of conservation of energy states that in a closed, isolated system, energy can neither be created nor destroyed. It can only change form



Conservation of Mechanical Energy

When Mechanical Energy is conserved, the sum of the system's kinetic and potential energy before an event is equal to the sum of the kinetic and potential energy after the event

$$ME_i = ME_f$$

Initial mechanical energy = final mechanical energy
(in the absence of friction)

$$PE_i + KE_i = PE_f + KE_f$$

$$mgh_i + \tfrac{1}{2}\, mv_i^2 = mgh_f + \tfrac{1}{2}\, mv_f^2$$

Conservation of Mechanical Energy Practice

A 22.0kg tree limb is 13.3 m about the ground. During a hurricane, it falls on a roof that is 6.0m above the ground.

a) Find the kinetic energy of the limb when it reaches the roof. Assume the air does no work on the limb

a) What is the limb's speed when it reaches the roof?

Conservation of Mechanical Energy Practice

A bike rider approaches a hill at a speed of 8.5 m/s. The combined mass of the biker and their bike is 85 kg. Find the initial kinetic energy of the system. Assuming the biker coasts up the hill, at what point will they come to rest? (Assume friction is negligible)

Energy Bar Graphs