Physics: Energy Calculations

Key word	Definition
Gravitational Potential Energy	A falling object loses energy in its gravitational store. An object being raised gains energy in its gravitational store.
Kinetic Energy	Kinetic energy is the amount of energy an object has because of its motion, i.e. how quickly it is moving
Elastic Potential Energy	The energy stored when something is stretched.
Extension	How far something has been stretched.
Spring Constant	The force required to stretch a spring 1m.
Velocity	The speed and direction an object is moving
Mass	How much matter there is in an object
Gravitational Field Strength	The amount of gravitational force applied to an object per kilogram.

Kinetic Energy Worked Example

A toy car has a mass of 2kg and is traveling at 20m/s. Calculate the amount of energy in this kinetic store.

C	Mass = 2 kg Velocity = 20 m/s
E	Kinetic Energy = 0.5 x mass x (velocity)^2
M	Kinetic Energy = 0.5 x 2 x (20 x 20)
U	**400 J**

Gravitations Potential Energy Worked Example

A 5kg pineapple hangs 3m from a tree. The gravitational field strength of Earth is 10 N/kg. Calculate the gravitational potential energy of the pineapple.

C	Mass = 5 kg Gravity = 10 N/kg Height = 3 m
E	Gravitational Energy = mass x gravity x height
M	Gravitational Energy = 5 x 10 x 3
U	**150 J**

Energy Equations

Kinetic Energy	=	0.5	x	Mass	x	(Velocity)^2
Gravitational Potential Energy	=	Mass	x	Gravitational Field Strength	x	Height
Elastic Potential Energy	=	0.5	x	Spring constant	x	Extension

Energy Units

Kinetic Energy	**J**	Mass	**kg**	Height	m
Gravitational Potential Energy	**J**	Gravitational Field Strength	**N/kg**	Extension	m
Elastic Potential Energy	**J**	Spring Constant	**N/m**		

Elastic Potential Energy Worked Example

A bungee jumper is attached to a bungee rope which has a spring constant of 124 N/m and is stretched 3m. Calculate the amount of energy in this elastic store.

C	Spring constant = 124 N/m Extension = 3 m
E	Elastic Energy = 0.5 x spring constant x (extension)^2
M	Elastic Energy = 0.5 x 124 x (3 x 3)
U	**558 J**