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What is Energy?

Energy:

The ability to cause change.

or

The ability to do work.

- **The SI unit of energy is Joules (J)**

Energy

Learning Objectives:

Give examples of different types of energy.

Starter:

Name a type of energy.



Types of Energy

1) Heat 

2) Light 

3) Sound 

4) Kinetic 

5) Electrical 

6) Gravitational potential 

7) Elastic potential 

8) Nuclear 

9) Chemical 

حرارة

ضوء

صوت

حركة

كهربائي

الجاذبية

المطوِّط

نووي

مادة كيميائية

Give the name of a type of energy, then name 2 examples of objects that use this energy.

Type of Energy	Example 1	Example 2

Kinetic Energy

KE is the energy an object has because of its motion.

KE is proportional to the mass of the object.

Mass	Kinetic Energy (KE)
doubled	
tripled	
Increases by factor of 4	
halved	
quartered	

Kinetic Energy

KE is the energy an object has because of its motion.

KE is proportional to the mass of the object.

Mass	Kinetic Energy (KE)
doubled	doubled
tripled	tripled
Increases by factor of 4	Increases by factor of 4
halved	halved
quartered	quartered

Kinetic Energy

KE grows with the square of the speed.

For example;

If the speed is **doubled** (2x),

The KE is $2^2 = 2 \times 2 = 4x$ (**quadrupled**)

If the speed is **tripled** (3x),

The KE is $3^2 = 3 \times 3 = 9x$ (**increased 9 times**)

Kinetic Energy

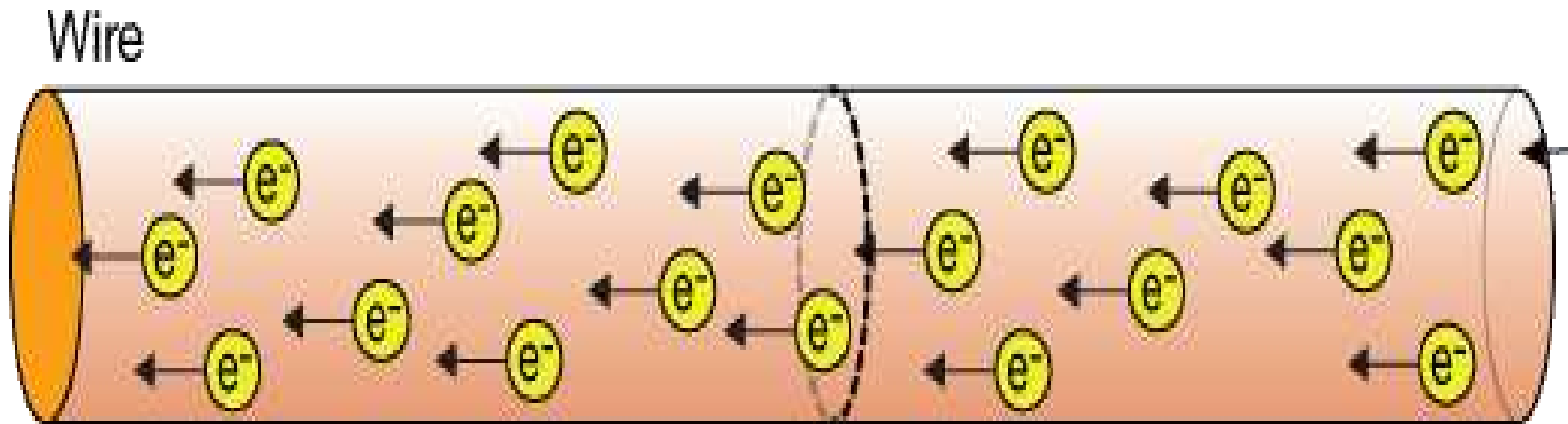
Speed	Kinetic Energy (KE)
Doubled	
Tripled	
Increases by factor of 4	
Halved	
Quartered	

Kinetic Energy

Speed	Kinetic Energy (KE)
Doubled	increases 4 times
Tripled	increases 9 times
Increases by factor of 4	increases 16 times
Halved	decreases quartered
Quartered	decreases $\frac{1}{16}$ times

Electric Energy

Electric Energy – A form of Kinetic Energy carried by electrons.



Potential Energy

PE is the stored energy that depends on the interaction of objects, particles or atoms.

There are 3 types:

Gravitational Potential



Chemical Potential



Nuclear Potential

Gravitational Potential Energy

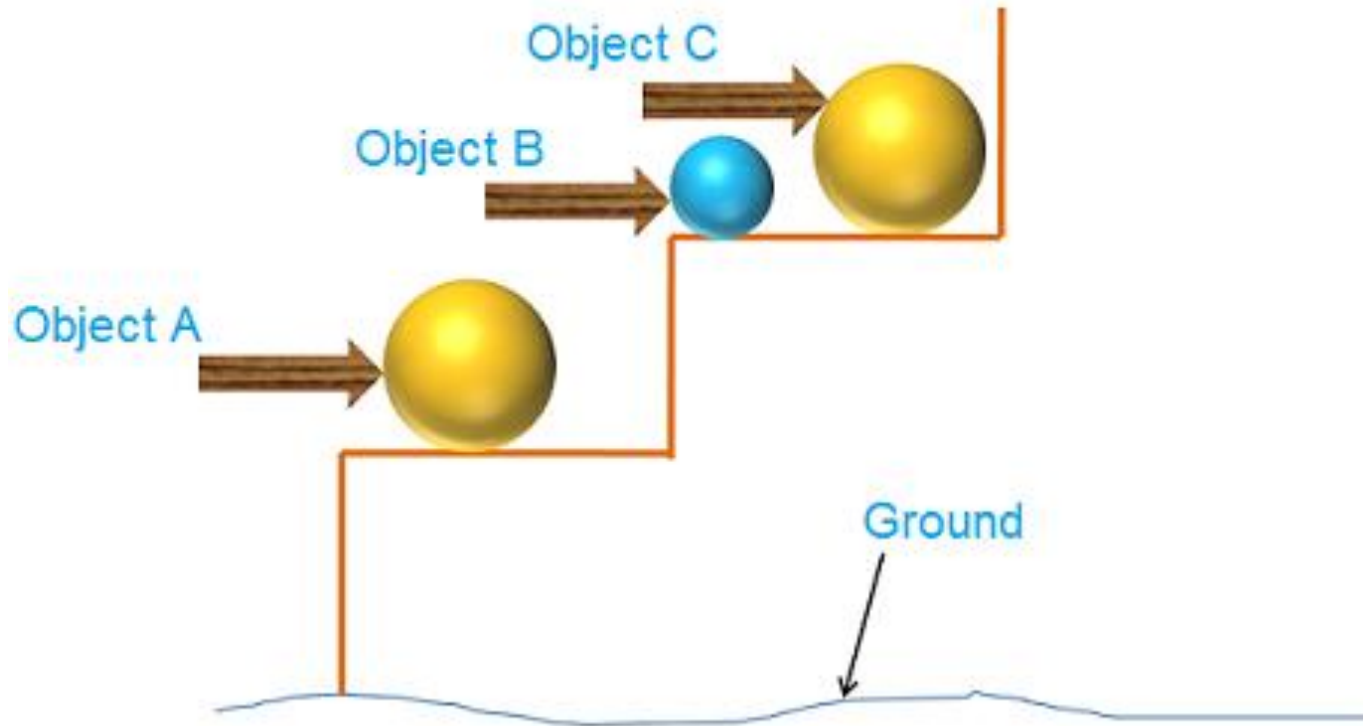
GPE is a type of potential energy stored due to its position above the Earth's surface.

GPE increases with both mass and height.

Mass  GPE 

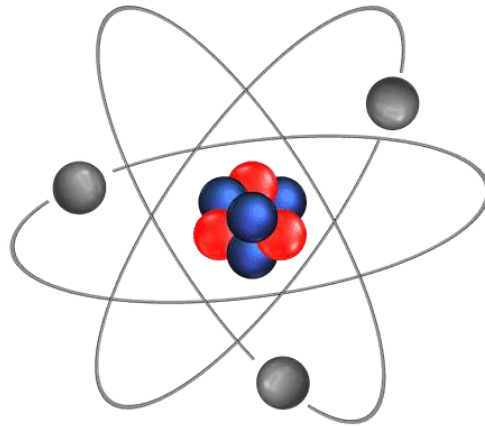
Height  GPE 

Gravitational Potential Energy



Chemical Energy

Chemical energy is the energy stored in and released from the bonds between atoms.



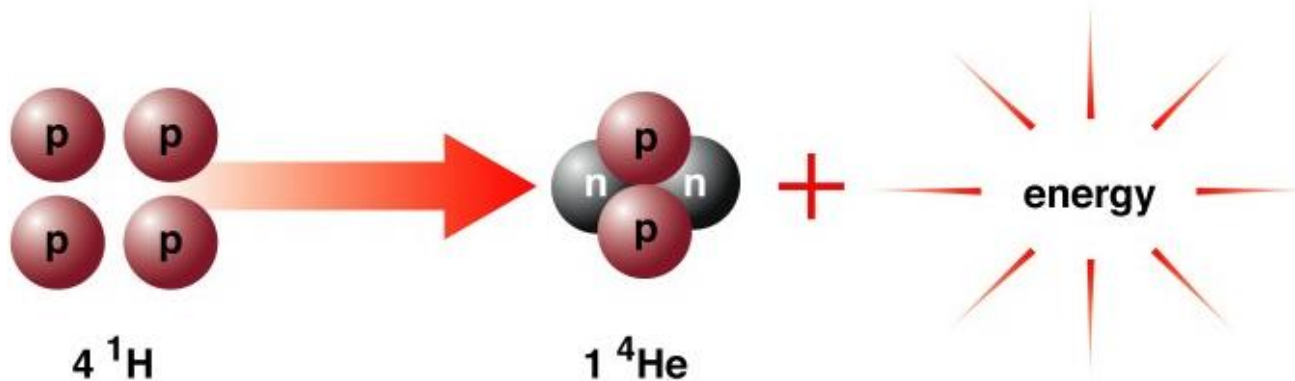
Other examples of Chemical Energy



The Sun

Most of the Energy on Earth comes from the Sun.

In the Sun, Nuclear Fusion is taking place.



The nuclei of atoms join and produce a lot of energy.

1

The sun is a gigantic ball of hydrogen

Hydrogen**Hydrogen****2**

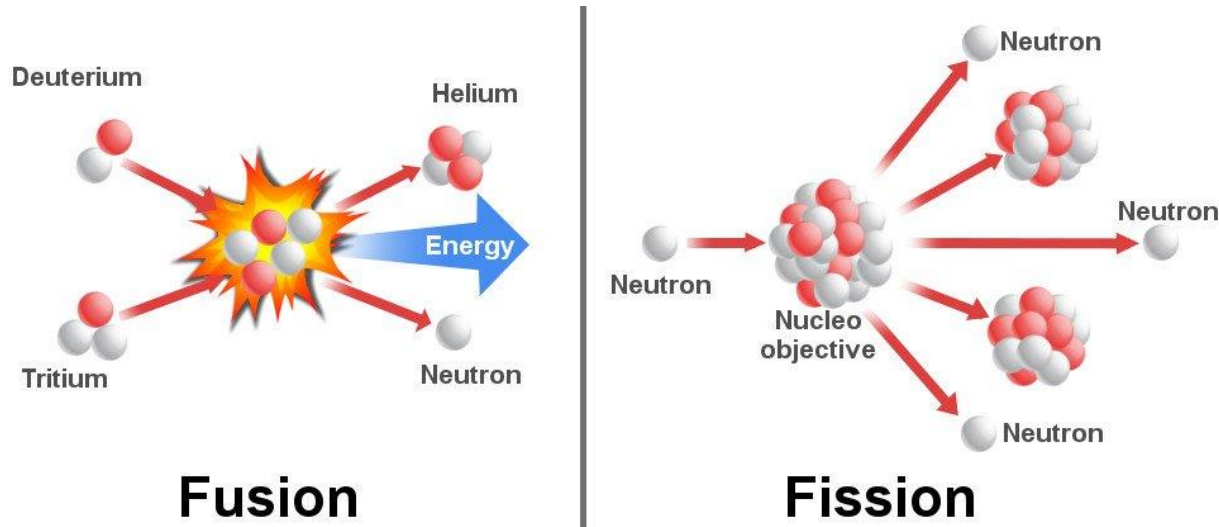
Inside the sun, the hydrogen atoms are heated so much they turn into a 'plasma' state, where electrons no longer orbit the protons in the atoms' nuclei. The 'freed' nuclei then fuse to form helium atoms and neutrons. This fusion process unleashes vast bursts of energy.

**Helium****Energy**

Nuclear Energy

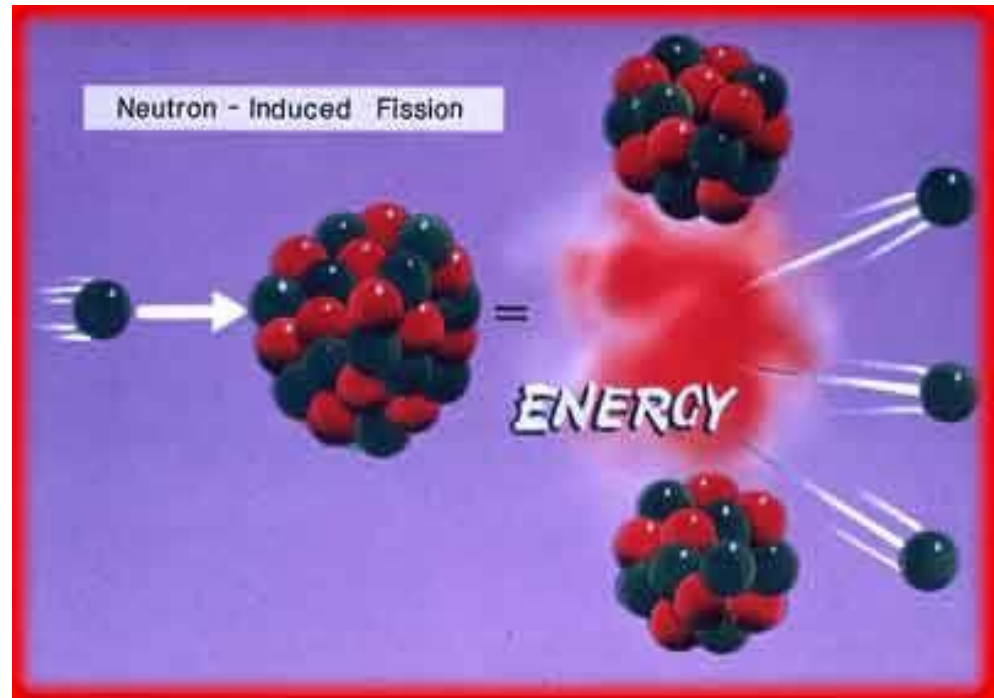
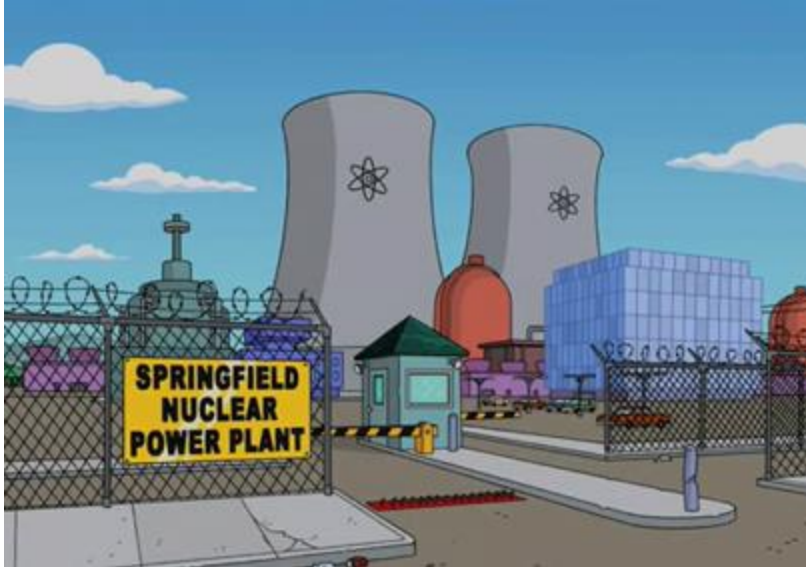
Nuclear Energy is the energy stored in and released from the nucleus of an atom.

There are two types of nuclear reaction:



Nuclear Fission

Nuclear power plants break a part of the nuclei of certain atoms to produce energy.



Nuclear Fission

Advantages

- Lots of energy from a small amount of fuel.
- No global warming.

Disadvantages

- Produces radioactive waste that is difficult to dispose of safely.

