

Energy

Discussion Questions:

- 1) What is energy?
- 2) What are the different forms of energy?
- 3) What is the Law of Conservation of Energy?
- 4) How do the most common forms of energy work?
- 5) How does energy help us in our everyday lives?



Energy is the ability to do work.

Work is the transfer of energy.

Law of Conservation of Energy:

'Energy is never created or destroyed, it is only changed from one state to another.'

Energy takes two major forms:

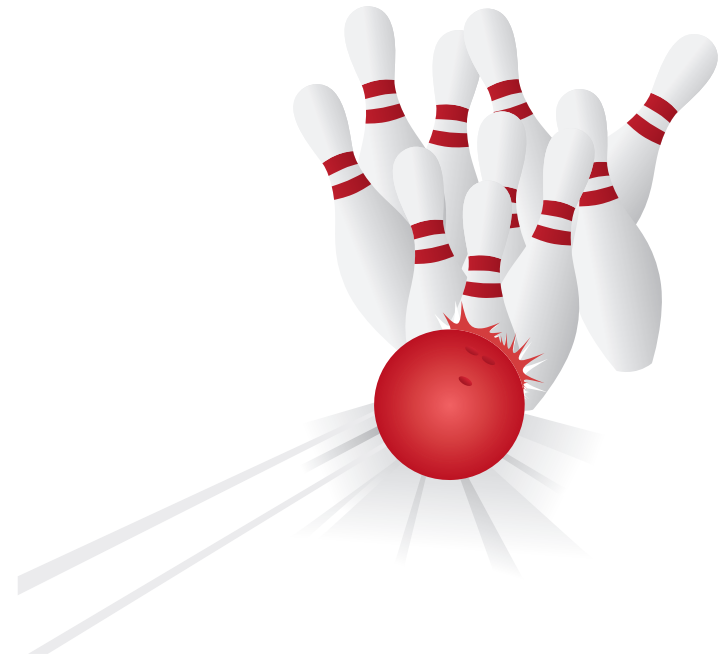
- **Potential Energy**

Stored energy that has potential to be used later



- **Kinetic Energy**

Energy of an object that is in motion

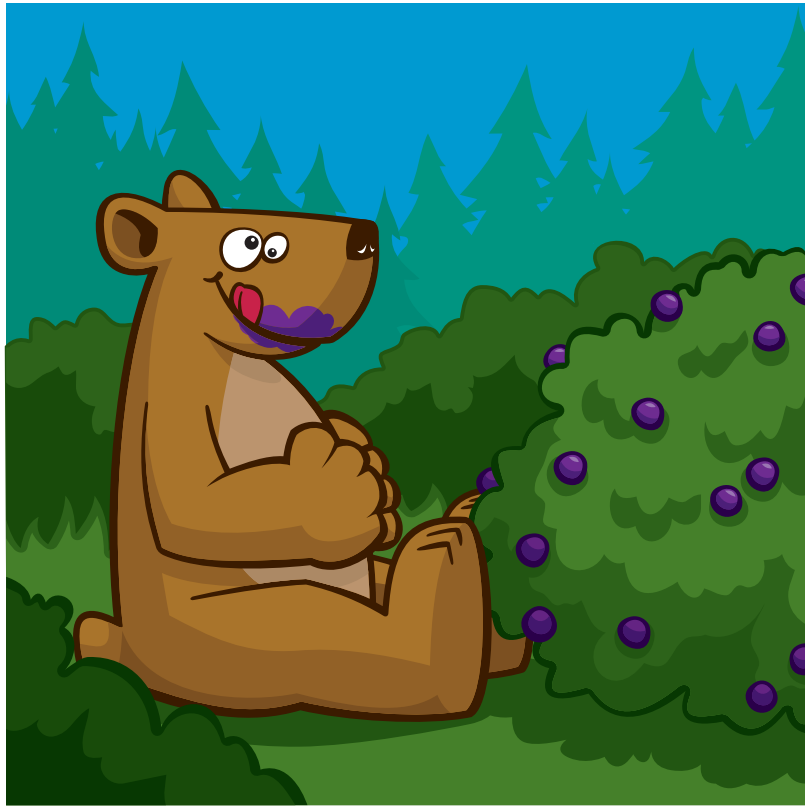


Kinetic Energy

The amount of kinetic energy a moving object has is affected by its speed and mass.



Compare a smaller mass with a larger mass- a raindrop and a hail stone for example.



Energy can be changed from one form to another.

Food produces chemical energy when it is digested and it can be stored in the body as potential energy.



This stored energy can be changed into kinetic energy, allowing us to move the muscles in the body.

Forms of Energy

Chemical Energy

The interaction of atoms and molecules

Gravitational Energy

Interaction of the force of gravity

Mechanical Energy

The combined effect of potential energy and kinetic energy on an object

Nuclear Energy

Energy released by splitting of atoms

Radiant Energy

Energy from electromagnetic waves

Thermal Energy

Interaction of molecules of different temperatures

Chemical Energy

Chemical energy is the potential energy that is stored in the molecules of a substance.

When this energy is released heat, light and sound may be produced.

Once the energy is released the substance changes to another form.

In the case of a campfire, stored energy lies in the molecules of the wood and the air around them. Combustion (burning) creates heat and light. During combustion, the wood changes form, becoming ashes.





Gravitational Energy

Gravitational Energy refers to the energy of an object due to its position within a gravitational field.

For example gravitational (stored) energy is changed to kinetic (movement) energy when the roller coaster car begins its descent down the hill.

The car loses speed as it approaches the next hill but builds up potential energy again due to the height. This energy will be released when the car begins the next descent.

Mechanical Energy

Mechanical energy refers to the sum of the potential energy and kinetic energy of an object as it moves to do work.

The axe has potential energy due to its mass and this is increased when it is raised. The person has potential energy in his body due to food digestion.

When the axe is moved the kinetic energy combines with the potential energy in the axe and the person to cut the wood.

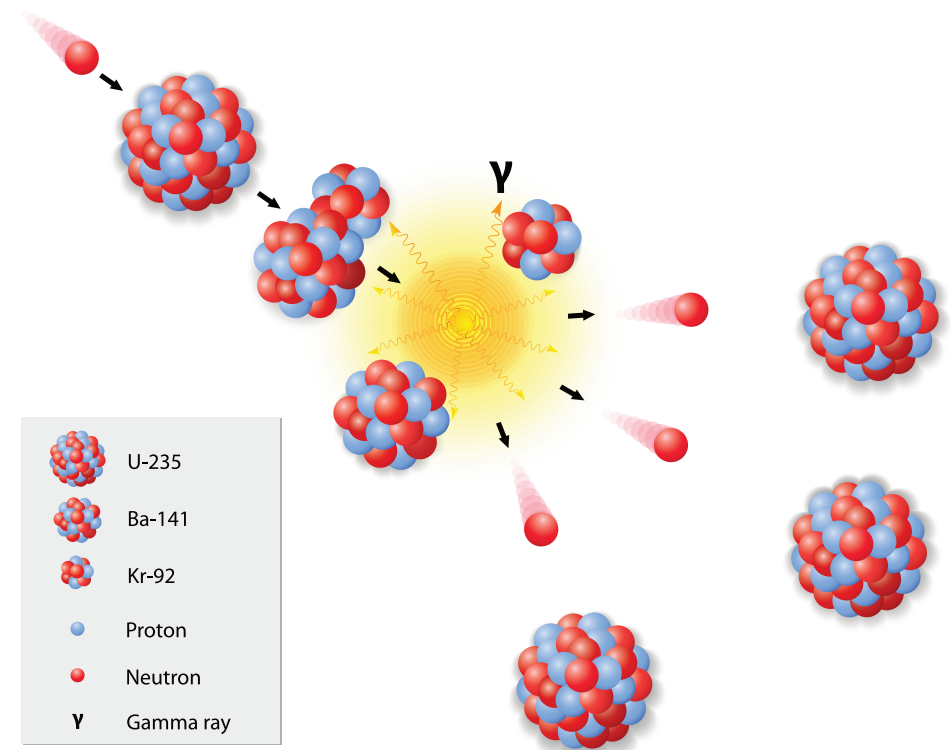


Nuclear Energy

Nuclear Energy is energy that is stored within the nucleus (centre) of an atom. When an atom is split this energy is released as heat.

Atoms can be split by firing neutrons into them. Energy is released along with gamma rays and some radioactive particles.

Splitting atoms into smaller parts is called fission. A small amount of uranium is used in this process. Some power plants use nuclear fission to generate electricity.



Grohnde Nuclear Power Station, Germany

Radiant Energy

There are various forms of radiant energy, produced by electromagnetic waves. When radiant energy comes into contact with matter it changes the matter.

Some examples of radiant energy include x-rays, microwaves, infra-red, visible light, ultra-violet light and radio waves.

A microwave oven works by emitting microwaves. When these microwaves come into contact with food the water molecules inside the food become charged and move extremely quickly. This produces heat which cooks the food.



Thermal Energy

Thermal energy refers to the energy that is produced by heat. When a substance is heated its molecules move faster and heat is produced. The higher the temperature, the more energy.

When you make a hot cup of tea, there is a high amount of thermal energy in the tea. However, if you add cold milk the milk absorbs some heat from the hot tea, lowering the temperature. The thermal energy from the hot tea is transferred.

