

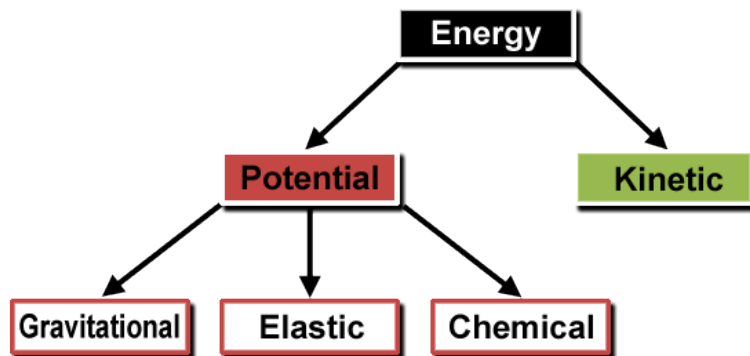
## STUDY NOTES : CHAPTER 3: ENERGY AND ENERGY TRANSFORMATION.

**ENERGY:** Ability to cause change or ability to do work.

Example: 1 Plants use energy from the sun to make food and grow.

2 Fireworks releases energy when they explode.

3 The motion (movement) of a hammer involves energy.



**KINETIC ENERGY:** Energy due to **motion**. Kinetic Energy depends upon **Speed and Mass** of the object.

More speed = more kinetic energy. More mass = more kinetic energy.

Example: A car with a speed of 25m/s will have more speed than a car with a speed of 15m/s.

**POTENTIAL ENERGY:** Stored energy due to interactions between objects and particles.

### Types/Forms of Potential Energy:

1 **GRAVITATIONAL POTENTIAL ENERGY:** Energy an object has due to **its position above the Earth**. More height and more mass means it has more Gravitational Potential Energy.

Example: A stone falling from a height of 5m has more Gravitational Potential Energy than a feather falling from a height of 3m.

2 **ELASTIC POTENTIAL ENERGY:** Energy stored in objects that are **compressed or stretched**.

Example: rubber bands, springs.

3 **CHEMICAL POTENTIAL ENERGY:** Energy stored in **chemicals bonds inside the object**.

Example: food, gasoline, plants, batteries all have chemical potential energy inside them.

**WORK:** Transfer of energy when a force makes an object move in the direction of force.

**Question:** How is energy related to work?

**Answer:** Energy is the ability to do work.

## OTHER FORMS OF ENERGY:

FORMS OF ENERGY	MEANING	EXAMPLES
MECHANICAL ENERGY	Sum of potential and kinetic energy in a system of objects/Energy in motion.	A moving basketball, moving bicycle has mechanical energy
SOUND ENERGY	Energy carried by sound	All kinds of vibrating objects.
THERMAL ENERGY	Sum of kinetic and potential energy of particles inside an object. Thermal energy moves from warm to cold place in form of heat.	Sun's thermal energy heats our atmosphere. Burning woods transfers thermal energy during winter.
ELECTRIC ENERGY	Energy carried by electric current.	Electronic systems like TV, computer, mobile phones, fans, AC all change electric energy to other forms of energy.
RADIANT/LIGHT ENERGY	Energy carried by electromagnetic waves. Also called as LIGHT energy.	Solar energy, microwaves, radio waves.
NUCLEAR ENERGY	Energy stored and released in the nucleus of an atom.	In nuclear power plant nuclear energy is released when nuclei of Uranium atoms are split apart.

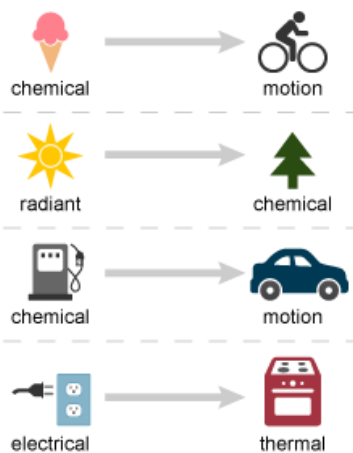
## CHANGES BETWEEN FORMS OF ENERGY:

**LAW OF CONSERVATION OF ENERGY: Energy can be transformed from one form to another but cannot be created or destroyed.**

Example:

Microwave oven -Electric energy changes to radiant energy to thermal energy.

### Energy transformations



#### Changing forms of energy



An automobile engine changes chemical energy to mechanical and heat energy.



A tree changes radiant energy to chemical energy.



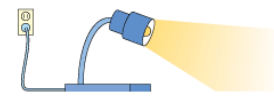
Hammering a nail changes mechanical energy to deformation and heat energy.



A thermonuclear reaction changes nuclear energy to radiant and heat energy.



An electric mixer changes electrical energy to mechanical and heat energy.



A lamp changes electrical energy to radiant and heat energy.

**Toaster**-Electric to thermal energy.

**Gas stove**- chemical energy of the natural gas to thermal energy.

**Television set**- Electric energy changes to sound and radiant energy.

**Battery**- chemical to electrical and light energy.

**Plants**- During PHOTOSYNTHESIS, radiant energy from the sun is converted to chemical energy.

**When an object moves upward** – kinetic energy decreases and potential energy increases. At maximum height, gravitational potential energy is at its greatest and Kinetic energy lowest. So **kinetic energy changes to potential energy at maximum height.**

**When an object moves downwards**- Kinetic energy increases and potential energy decreases. When a ball falls down to the ground, it has maximum kinetic energy and minimum potential energy. So the **potential energy changes to kinetic energy at minimum height.**

Question: How can you increase gravitational potential energy between yourself and Earth?

Answer: By increasing our distance/ height above the Earth.

**FRICTION:** A force that resists the sliding of two surfaces that are touching.

**Friction changes the mechanical energy of the bicycle to thermal energy** when we **apply brake.**

**Math Skills:**

**Unit use to measure electric energy is kilowatt-hours (kWh)**

**To calculate, use formula kWh = (watts÷1000)× hours.**

**Example:** A hair dryer is rated at 1200W. If you use the dryer for 0.25 h, how much electric energy do you use?

**Answer:** Electrical energy used in kWh= (1200÷1000)× 0.25 = 0.3 kWh