

Energy: Energy is the capacity of a body to do work.

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The SI unit of energy is Joule(J)

Some forms of energy

∴ **Chemical Energy**

∴ **Light Energy**

∴ **Sound Energy**

∴ **Heat Energy**

∴ **Electrical Energy**

∴ **Nuclear Energy**

∴ **Mechanical Energy**

Units of Energy

Joule (J) is the SI unit of energy

calorie (cal) is the amount of energy needed to raise one gram of water by 1° C

Please, note:

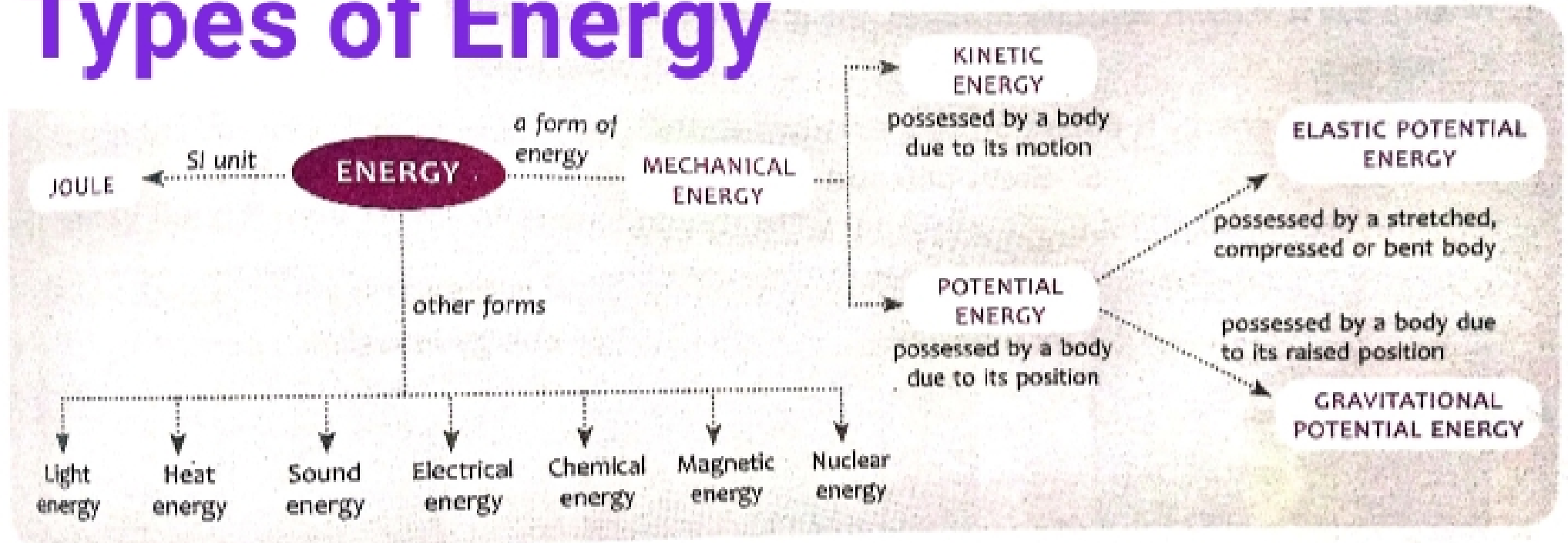
kcal = energy needed to raise **1000 g** of water 1° C

food Calories = kcals

Energy Conversion Factors

1 calorie (cal)	=	4.184 joules (J) (exact)
1 Calorie (Cal)	=	1000 calories (cal)
1 kilowatt-hour (kWh)	=	3.60×10^6 joules (J)

Types of Energy



What is mechanical energy?

Mechanical energy is the **energy** that is possessed by an object due to its motion or due to its position. **Mechanical energy** can be either kinetic **energy** (**energy** of motion) or potential **energy** (stored **energy** of position).

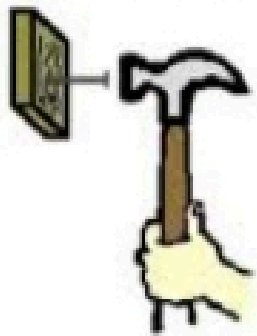
Which is the best example of mechanical energy?

Objects have **mechanical energy** if they are in motion and/or if they are at some position relative to a zero potential **energy** position (for **example**, a brick held at a vertical position above the ground or zero height position). A moving car possesses **mechanical energy** due to its motion (kinetic **energy**).

Mechanical Energy

- Mechanical Energy is the combination of kinetic and potential energy in an object.

Example: Swinging a hammer to hit an object such as a nail.





Kinetic Energy

- The energy of motion that is released from stored energy.
- Examples:



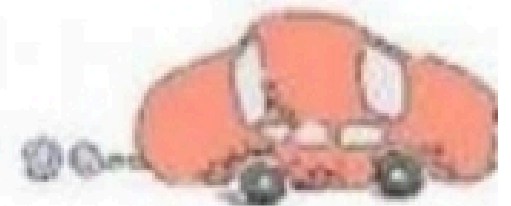
An arrow released from the bow, flying through the air.



An object rolling down a hill.



Muscles moving.



A car moving.

Kinetic Energy

Kinetic energy is the energy that objects possess due to their motion.

$$KE = \frac{1}{2}mv^2$$

m = mass (kg)

v = velocity (m/s)

KE = Kinetic energy (J)

Potential Energy

Potential energy is that energy which an object has because of its position. It is called *potential* energy because it has the potential to be converted into other forms of energy, such as kinetic energy.

Definition: **Potential energy is energy that is stored in a system because of its position or chemistry.**

Gravitational Potential Energy

Gravitational potential energy is the energy stored in an object due to its position above the Earth's surface.

$$E_p = mgh$$

m = mass (kg)

g = gravitational field strength (N/kg)

h = height (m)

E_p = gravitational potential energy (J)

Other examples of items with gravitational potential energy include:

- A raised weight.
- Water that is behind a dam.
- A car that is parked at the top of a hill.
- A snow pack (potential avalanche)
- A yoyo before it is released.
- River water at the top of a waterfall.
- A book on a table before it falls.
- A child at the top of a slide.

Elastic Potential Energy

Elastic potential energy is the energy stored as a result of deformation of an elastic object, for example the stretching of a spring.

$$E_e = \frac{1}{2}ke^2$$

k = spring constant (N/m)

e = extension (m)

E_e = elastic potential energy (J)

Difference Between Kinetic Energy And Potential Energy

Kinetic energy	Potential energy
Energy due to motion is called kinetic energy .	Energy due to the position is called potential energy .
KE can be transferred between objects.	PE cannot be transferred between objects.
It is measured from the place itself.	It is measured from the bottom.
KE is relative to the environment of the object.	PE is no relative to the environment of an object.
Formula: $k.E = \frac{1}{2}mv^2$	formula: $P.E = mgh$

Home Work

A. Tick the most appropriate answer.

1. The amount of energy required to raise the temperature of 1 g of water by 1 °C is called
 - a. 1 joule
 - b. 1 newton
 - c. 1 calorie
 - d. 1 watt
 2. A child riding a bicycle possesses
 - a. potential energy.
 - b. heat energy.
 - c. kinetic energy.
 - d. sound energy.
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3. When a ball is thrown vertically upwards, the gravitational potential energy of the ball
- a. increases.
 - b. decreases.
 - c. remains same.
 - d. none of these
4. Which form of energy is possessed by a stretched spring?
- a. chemical
 - b. elastic potential
 - c. muscular
 - d. heat
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1. What do you understand by the term energy?
 2. Define kinetic energy and give an example of a body possessing kinetic energy.
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