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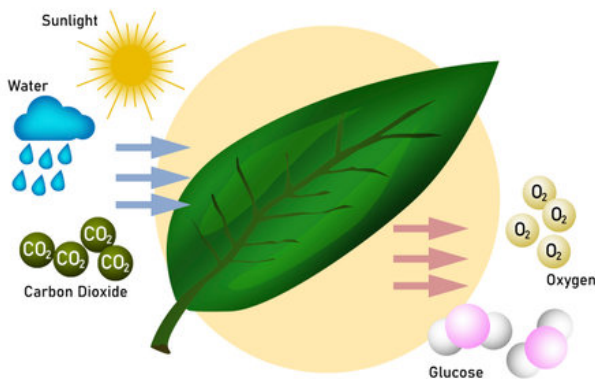
ENERGY & THE SUN



Animals and plants respire both during the day and at night.

- All Living things need energy to carry out life processes,
- Plants are important in food webs because animals get their energy source (food) directly or indirectly from plants, which gets their energy from the Sun.
- Plants photosynthesis as long as light is present. Regardless of time of day or under artificial light source.

PHOTOSYNTHESIS:



Carbon dioxide + Water (sunlight & chlorophyll) → Glucose + Oxygen

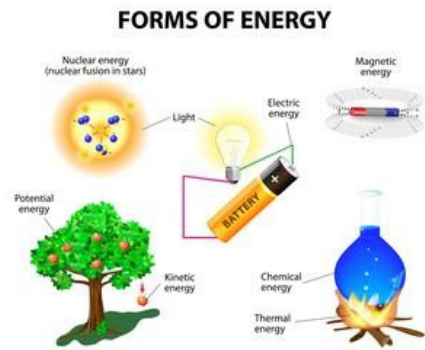
Materials Needed for Photosynthesis:

- Sunlight - source of energy
- Water - absorbed from soil by the roots
- Carbon dioxide - taken in through the stomata of the underside of leaves
- Chlorophyll - traps sunlight

TYPES OF ENERGY & CONVERSION

There are 6 main forms of energy:

- Potential Energy
 - Gravitational Potential Energy
 - Chemical Potential Energy
 - Elastic Potential Energy
- Kinetic Energy
- Light Energy
- Heat energy
- Electrical Energy
- Sound energy



Energy cannot be created or destroyed. It can only convert to one form to another.

The sun is our main source of heat and light energy
Non-Living things need energy to carry out life processes
Non-living things need energy to do work

1. **POTENTIAL ENERGY**

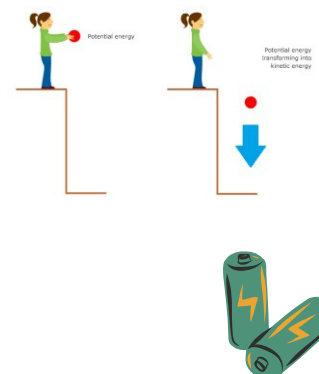
- Gravitational Potential Energy (GPE)

Energy an object has, depending on its position and height.

- Higher/Heavier object = More GPE
- Chemical Potential Energy

Stored energy in: Sun, Food, Wood, Oil, Coal. Batteries

- Elastic Potential Energy
 - The more stretched/compressed the object = More EPE

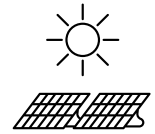
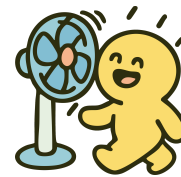
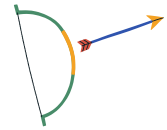


2. **KINETIC ENERGY**

Depends on its mass and how fast the object moves.

Energy is lost as heat energy (due to friction) and sound energy

- Faster objects = more kinetic energy
- Closer to the ground = more kinetic energy



3. **LIGHT ENERGY**

Ability to make light visible to human eyes.

Plants need light energy. It is absorbed by the plant to be used for photosynthesis

E.g. Lamps, light bulb, sunlight

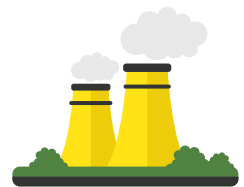
4. **HEAT ENERGY**

-To keep us warm, to cook food

-Objects giving out heat produces heat energy.

Eg. Oven, hair dryer

Temperature is used to measure how hot or cold something is.



5. **ELECTRICAL ENERGY**

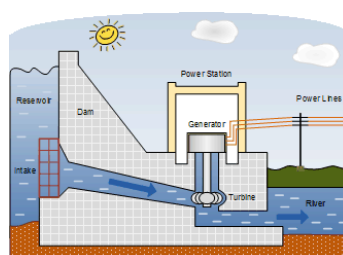
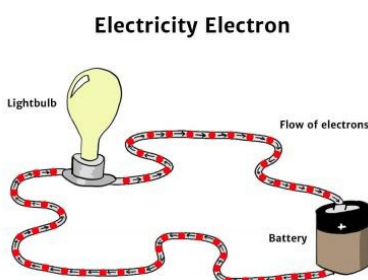
-Electrical charged particles in wires, electrical appliances etc.

-Allows us to turn on lights, charge and power industrial machinery.

Eg. Electromagnet in an electrical circuit, hydroelectric dam

6. **SOUND ENERGY**

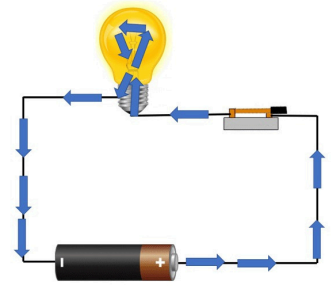
- Vibrations through something that can be heard.



ENERGY CONVERSION

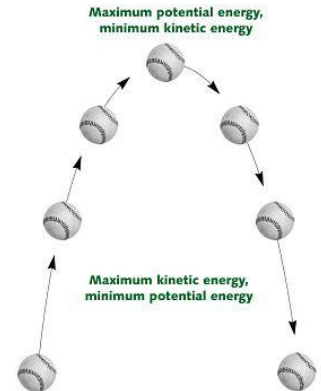
- Torch

Chemical Potential Energy (Batteries) → Electrical Energy (Wires) → Light Energy (Torch)

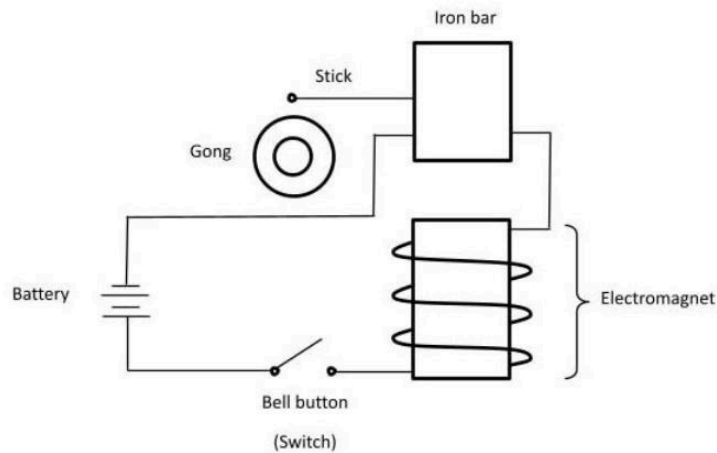


- Falling Ball

Gravitational Potential Energy (Ball) → Kinetic Energy (Ball) → Heat Energy + Sound Energy (Ball)



- Electrical Bell



Potential energy → electrical energy → kinetic energy → sound energy + heat energy

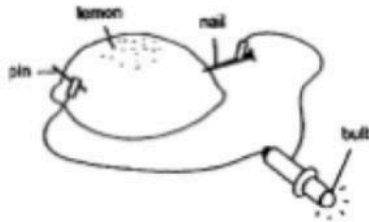
EXPLANATION:

When the switch is closed, the circuit is connected. The chemical energy stored in the battery will be converted to electrical energy. This magnetises the electromagnet which attracts the iron bar. In the process, the stick will move and strike the gong, producing sound and heat. Thus, electrical energy is converted to kinetic energy which is then converted to sound energy and heat energy.

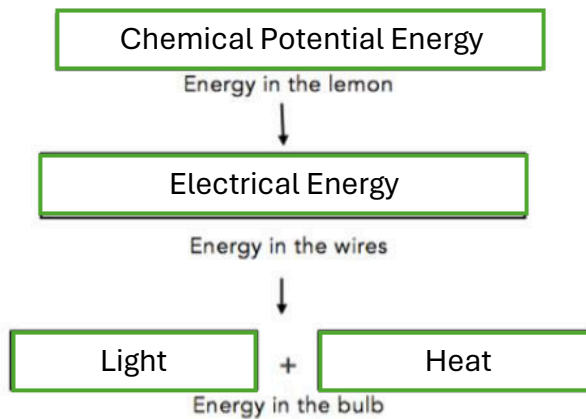
COMMON QUESTIONS ON ENERGY

HPPS/2014/P6/SA2/Q42

Q16 Oliver set up a circuit as shown below using a lemon, a nail, a pin, a light bulb and some wires. The bulb lighted up .



(a) State the energy conversion of the above set-up by filling in the boxes [2]
below.



Source: Henry Park Primary School – 2014 P6 Science Preliminary Examination
Paper [Q42]

Note: The function of the bulb is to produce light. Hence light energy must be written before heat energy.

- We use the “+” symbol when the two types of energy are occurring at the same time. On
- the other hand, we use the “→” symbol when one type of energy is converted to another type of energy or transferred to another object.

TELEVISION SET

Electrical Energy (Electrical Mains) → Electrical Energy (Wires) → Light Energy + Sound Energy (TV)

ENERGY CONVERSION FOR MOVING OBJECT (KINETIC ENERGY)

David's car is petrol-driven. In the morning, he starts his car from rest and his car slowly increases to a uniform speed as it travels along a straight level road.

- (a) State the energy changes that take place in the car. [1]
Chemical Potential Energy → Kinetic Energy

- (b) The car now climbs a slope with no change in speed as shown in the diagram below.



- (bi) What happens to the petrol consumption of the car as compare to it travelling on a straight level road? [1]

The petrol consumption of the car increases.

- (bii) Explain your answer in (i). [1]

When the car travels up a slope, more chemical potential energy from the petrol is required to be converted to more kinetic energy to travel the same distance. This is because some of the kinetic energy of the car is converted to gravitational potential energy as the car moves up the slope unlike travelling on a straight road. Hence, more petrol is needed to drive up a slope as compared to moving on a straight road.