

BASIC SCIENCE

LIGHT ENERGY.

Light is an electromagnetic Wave or is also a form of energy. This energy causes sensation of vision that enables us to see.

Sources of light are sun, candle, lamp, fluorescent light, fire flies. Light can travel through a vacuum and material medium such as liquid (water), gas (air), or solid (glass).

Common Terms in Light

- a. **Luminous objects**- These are objects that produce light by themselves. It may be natural e.g. sun and stars or artificial e.g. candle and fluorescent bulb.
- b. **Non-luminous object**- They are objects or bodies that depends on natural or artificial sources of light to illuminate them e.g. traffic sign, moon, etc.
- c. **Transparent objects**- They allow light to pass through them without diffusing e.g. windscreen, glass, etc.
- d. **Translucent objects** - These are objects that allow light to pass through them but diffuses the light after passing through. They have dark surfaces e.g. tinted glass, louvres, etc.
- e. **Opaque objects**- These objects do not allow light to pass through them e.g wood, stone, plastic, etc.
- f. **Ray of light**- A ray of light is the path taken by light waves.
- g. **Beam of light**- It is collection of rays of light.

Types of Beam

There are three types of beam:

- a. Parallel beam- A parallel beam is the collection of light rays that can never meet.
- b. Convergent beam- It is the collection of rays that can meet at a point if they are prolonged.
- c. Divergent beam- It is the collection of ray's that emerge from a point and spreads out from the source.

PROPERTIES OF LIGHT

- b. Reflection
- c. Refraction
- d. Diffraction
- e. Interference
- f. Polarization

Reflection

Reflection is the change in the direction of light after incidence on a surface in the same medium. Non-luminous objects are seen when illuminated by a luminous object. Example- A plane mirror reflects rays of light.

The ray of light that falls on the plane mirror is called the incident ray. The rays that returns after hitting the mirror is called the reflected ray.

Laws of Reflection.

- a. Angle of incident is equal to the angle of reflection.
- b. The incident ray, the refracted ray and the normal at the point of incident, all lies on the same plane.

Refraction

Refraction is the change in the direction of light as it crosses the boundary between two media of different densities.

Laws of Refraction

- a. The incident ray, the refracted ray and the normal at the point of incidence, all lies on the same plane.
- b. The ratio of the sine of the angle of incidence to the sine of the angle of refraction is constant for a given pair of media.

APPARENT DEPTH OF WATER AND ITS DANGERS TO SWIMMERS

The apparent depth of water is a process whereby the depth of a clear river or swimming pool appears shallow than its real depth. This is because light travelling from air to water, making the direction of the light to change.

Amateur (beginners) swimmers think that the bottom of the water is nearer but get drowned easily because they are deceived by the apparent depth.

SOUND ENERGY.

Sound energy is a form of energy that is associated with vibrations of matter.

It is a type of mechanical energy or wave that requires a medium to travel through. This medium includes air, water, metal.

Sounds originates from the vibrations that result after an object applies a force on another object. Sound wave travels at a speed of 330metres per second (330 m/s) in the air.

PRODUCTION OF SOUND.

Sound waves are created by the vibrations of an object, which causes the air surrounding it to vibrate. The vibrating air then causes the human eardrum to vibrate, which the brain interprets as sound.

Any sound of regular frequency is called a Tone (musical tone), but when the vibrations of the sources is with irregular frequencies, it is called a Noise.

Sound can be produced in various ways:

- a. By beating objects e.g. gong, drum and xylophone.
- b. By blowing objects e.g. whistle, flute, trumpet, etc.
- c. By clapping.
- d. By singing, etc.

Sound energy can travel through different materials, that is, through solids, liquids and gases.

Sound energy cannot travel through a vacuum.

Transmission of Sound

Transmission or passage of sound requires a medium. There are three basic requirements for transmission of sound:

- a. The source
- b. The medium
- c. The receiver.

Explanation.

- a. The source of sound includes automobile, markets, animals, musical instruments, etc
- b. The medium for sound transmission may be solid, liquid or gas, e.g wall, water, rubber, etc. They are materials through which sound can travel.
- c. The receiver or sound detector is the person or body that receives or detect sound energy respectively e.g. human being, animal, etc.

Reflection of Sound (Echo).

The reflection of sound is called echo. Echoes are produced by reflecting sound from a hard surface such as wall, cliff (hill) or mountains. Whenever we are in a room that is empty, any sound we make will be reflected back to us after few seconds. Also, if we are near a hill or mountain and we shout across, we shall hear whatever we have said after some seconds.

MAGNETISM

Meaning of a magnet

A magnet is a material or object that produces a magnetic field. This magnetic field is invisible but is responsible for the noticeable property of a magnet. Materials that can be magnetized, which are also the ones that are strongly attracted to a magnet are called ferromagnetic. Examples are iron, nickel, cobalt, etc.

Lodestone

A lodestone is a naturally magnetized piece of the mineral called magnetite. They are naturally occurring magnets which can attract iron. The property of magnetism was first discovered through lodestone. Lodestone is one of only two minerals that are found naturally magnetized, the other is Pyrrhotite.

Laws of Magnetism

Law of magnetism states that;

- a. Like poles of a magnet repel, unlike poles of a magnet attract.
- b. If a magnet repels an object, that object is a magnet.
- c. If a magnet attracts an object, the object might be a magnet or a magnetic material.

MAGNETIC POLE AND MAGNETIC FIELD.

Magnetic pole:

Magnetic pole is the two ends of a magnet with strongest magnetic capability. They are North and South poles. Like poles repel while unlike poles attract.

Magnetic field:

Magnets do create fields. These fields are called magnetic fields. A magnetic field is a region around a magnet in which magnetic forces are felt. In this region, all magnetic substances are attracted by magnets.

Types of magnet

- a. Bar magnet
- b. Cylindrical magnet
- c. Horse shoe magnet
- d. Button magnet
- e. Ring magnet.
- f. U- shaped magnet

Care for Magnets

- a. Do not expose to heat or high temperature to avoid losing its magnetic properties.
- b. Magnetic poles should not be placed in the same direction.
- c. Magnets are to be stored in a magnet keeper.
- d. Magnets are to be handled with care to avoid cracking or damage.

Common uses of Magnets.

Magnets have lots of application in daily life:

- a. They are used to construct electrical motors and the generators which convert the electrical energy into mechanical energy and vice versa.
- b. They are also used in the speakers which can convert the electrical energy into sound energy.
- c. They are used in electrical bells.
- d. They are used to sort out magnetic and non-magnetic substance from scrap.
- e. They are used in television screen, telephone and in tape recorders.
- f. They are used in refrigerator to keep the doors closed.
- g. They are used in magnetic compass which is used to find geographical location.

ELECTRICAL ENERGY

This is the energy produced as a result of the flow of electron. Electrical energy is transmitted through thin metals or wire called cables. Cables enable passage of current and movement of electrons.

Flow of Electrons

Electron flow is the movement of electrons within a circuit. Electric current is the rate of flow of electrical charges along an electric conductor. The electric current is denoted by "I" and it

is measured in Ampere. Electric current can be measured with Galvanometer or Ammeter. Galvanometer measures very small quantity of current while Ammeter measures bigger quantity of current. The Galvanometer can be converted to Ammeter by a process called

SHUNT.

Electric Circuit

An electric circuit is the complete path provided for the flow of electric current. The circuit consists of electric component connected together.

Components of a Circuit.

- a. Cell- It is a source of electrical energy.
- b. Ammeter- Is an electrical device uses to measure the flow of current in a circuit.
- c. Voltmeter- Is an electrical device used to measure the amount of voltage or potential difference between two points in a circuit.
- d. Switch or key- It is used to open or close a current flow in a circuit.
- e. Galvanometer- It is uses to measure current in a circuit.
- f. Resistor- They are loads connected to a circuit. It is designed to provide a known amount of resistance in a circuit.
- g. Capacitor- It is used to store electrical energy. The symbol is "C".
- h. Bulb- It is an indicator that shows a complete circuit.