

Chapter # 1

Exercises

Concept Checkers

1. Water is a colourless and odourless liquid at room temperature.
a. True
b. False
2. With oxygen, cells would die and our bodies would stop working.
a. True
b. False
3. Water can be decomposed into hydrogen and oxygen gas, by electrolysis
a. True
b. False
4. In our body water helps digest and evolve food particles before being absorbed.
a. True
b. False
5. Petroleum industries make use of water as a coolant for their refining process.
a. True
b. False

Fill in the blanks

1. Water is made of two key elements, hydrogen and oxygen.
2. All living things must have water to survive.
3. Deficiency of water in our body is called dehydration.
4. In electrolysis, hydrogen gas released is twice the amount of oxygen, hence representing the water formula.
5. Water can dissolve various substances.

Match the suitable pair

- | | |
|---|--|
| 1. Our blood contains water, which carries (2) | can make you sick. |
| 2. A severe case of dehydration (1) | oxygen to all the cells of your body. |
| 3. In plants, minerals in the soil are dissolved (5) | to provide energy for the turbines. |
| 4. Water flown through a number of sand filters – (4) | Filtration. |
| 5. Power stations require water, (3) | in water before being absorbed by roots. |

Activity Quiz

1. Industrial water is used in certain industries. Suggest why industrial water is not suitable for use in homes, even if it is for flushing toilets only.

Ans1) Some industrial water has enough chemicals in it that it would corrode pipe line and can damage skin if come contact with it therefore it is not suitable to use industrial water even it is for flushing.

Question Bank

1. Why water is the best solvent?

Ans1) Water is capable of dissolving a variety of different substances, which is why it is such a good solvent. And, water is called the "universal solvent" because it dissolves more substances than any other liquid. Water can dissolve various substances. House hold items such as detergents, soaps, bleach, aerosol spray solutions and food substances can all dissolve in water effortlessly.

2. What is electrolysis? Describe water electrolysis.

Ans2) The chemical decomposition produced by passing an electric current through a liquid or solution containing ions is known as electrolysis. Water can be decomposed into hydrogen and oxygen gas, by electrolysis process, better known as water electrolysis.

3. Give the various stages of water purification as guided by WHO?

Ans3) The different stages of water treatment are;

Stage I – Coagulation

Unpurified water is flown in the mixing chamber, then aluminium sulphate (alum) and lime is added. Alum helps to coagulate clay particles present in the water to form a sticky precipitate. Function of the lime is to reduce the acidity, caused by the alum.

Stage II – Sedimentation

The coagulated solution is then flown into another tank, where the precipitate settles to the bottom of the tank. This enables the bacteria or other impurities to be entrapped in the precipitate.

Stage III – Filtration

Now the water is flown through a number of sand filters, which helps to clean the water from impurities left, if any.

Stage IV – Chlorination

Post-filtration process water is transported into another clean tank, where chlorine is added, to treat the water with any remaining bacteria. A small fractional amount of chlorine is required to treat a large reservoir of water. After keeping the water still for a day or two, lime is added to remove acidity from the water, if required.

4. Identify the main uses of water in homes and industries.

Ans5) Water is consumed by different sources for various purposes. Aside for the most common use of water, home use, it is also consumed by large industries and leisure purposes.

In homes

Major part of the consumption at home is used for washroom purposes (bathing, toilet, laundry), following for the kitchen purposes (cooking, drinking, washing). We can least imagine a house surviving without the use of water, with inhabitants living in it.

In Industries

In the industries, water is consumed for various uses, depending on the types of industries. In the food and beverage industry, water is used as a key ingredient. For petroleum industries make use of water as a coolant for their refining process.

Power stations require it to provide energy for the turbines. And other industries use water purely for cleaning purposes. The largest industrial consumer is the petroleum, paper and steel industries.

5. a) Why is there a need to conserve water?

b) Suggest ways of conserving water.

Ans 5a) Water is probably the most important substance for preserving life and the sources of fresh water are limited. These water sources are depleting day by day because our water consumption

5b) This is a process that should be practiced by everyone, at large. Since there is limited availability of clean water, we should conserve the water usage wherever possible.

- Turning off tap, when applying soap, while showering
- Washing dishes in the sink
- Ensure there are no leaks from taps or pipes
- Using minimal quantity in the washing machines

Chapter # 2

Exercises

Concept Checkers

1. Pollutants are harmful substances, which are a treat to the user or consumer.
 - a. True
 - b. False**
2. Disposing sewerage waste into the rivers is a win-win solution for all living things.
 - a. True
 - b. False**
3. Fertilisers and Pesticides are a threat to the aquatic life.
 - a. True**
 - b. False

Fill in the blanks

1. The foul smell at the beaches, are caused by the various pollutants that we dump into the water.
2. Fish farming is another source of major water pollution.
3. Littering can have deathly effects.

Match the suitable pair

- | | |
|--|--------------------------------------|
| 1. Oil spills in oceans and seas are a major problem (4) | prime source of polluting places. |
| 2. Sometimes deaths of aquatic life are caused by (3) | harmful for living things. |
| 3. Sewage is discharged into rivers, which could be (2) | consuming materials such as plastic. |
| 4. Street hawkers should be removed from the areas, (1) | in killing birds and fishes. |

Question Bank

1. Name the common sources of water pollution and state their harmful effects.

Ans1) Pollutants are harmful substances, which are a threat to the user or consumer.

The various pollutants that cause water pollution are;

- Factory wastage – various poisonous substances, such as chemicals and wastes are dumped at river or sea banks. These are primarily threat to the aquatic life, and then harm is transferred to humans.
- Fertilisers and pesticides – these are commonly used by farmers worldwide, for fast and better crops. These are washed down from farm lands into the close by rivers.
- Farm waste – these have become one of the areas of concern for water pollution, as various chemicals from he waste of these farms are dumped into seas or rivers close by.
- Oil spills – the risk of oil transportation is the oil spills, resulting from collision or leakages from oil tanks. This poses a substantial threat to the aquatic and human life.
- Litter – the most abundantly found, starting from homes to factories and industries.
- Sewage waste – this is highly toxic, a mix of food, toilet waste and other harmful substances. Sewage is usually discharged into rivers. This is a major concern, because of the toxic bacteria involved in this discharge.

2. What are the three main steps taken to control water pollution?

Ans2) Water pollution could be controlled substantially, with the exercise of caution and prevention when disposing wastes. Harmful industries and factories should be moved out of the main part of the city. And the industry wastes should be pre-treated before disposing off, to kill the bacteria or other harmful substances. And the water quality should be frequently tested, e.g pH and oxygen levels.

3. What must be done to domestic and industrial waste water before it can be discharged in the sea?

Ans3) The domestic and industrial waste should be pre-treated before being disposed off in the sea to kill the bacteria and other harmful substances.

4. Outline the steps taken to clean up rivers.

Ans4) Following steps should be taken to clean up river

- Directly throwing waste into rivers or stream should be abolished
- Industries should be assigned distinctive place for their operations.
- Street hawkers should be removed from the areas, as they are the prime source of polluting places. They directly litter, with food wastes, and spreading bacteria and germs in the society.
- Poultry farms, fruit and vegetables market should also be assigned a designated area for their business operation.

Chapter # 3

Exercises

Concept Checkers

1. All living things require oxygen and food for respiration and energy,
a. True
b. False
2. Multicellular organisms absorb and diffuse gases and food from and to the surroundings.
a. True
b. False
3. In the transportation system of the flowering plants, the two key distribution networks are xylem and phloem.
a. True
b. False
4. Minerals and water is passed to xylem, which in turn distributes throughout the plant.
a. True
b. False
5. Animals are naturally more active than plants.
a. True
b. False

Fill in the blanks

1. Plants need adequate amount of carbon dioxide and water, for the process of photosynthesis.
2. Food and oxygen is foremost for multicellular organisms.
3. Root hairs absorb the water from the soil.

Match the suitable pair

- | | |
|--|--------------------------------|
| 1. Animals require oxygen and food source (5) | through osmosis and diffusion. |
| 2. Roots of plants are the main source (6) | from the heart. |
| 3. Water and dissolved minerals move from roots to plant, (1) | is the heart. |
| 4. Phloem and xylem run along together, better known as (4) | vascular bundles. |
| 5. One of the most important organs in the body of the human (3) | to continue existence. |
| 6. Arteries are blood vessels that carry blood away (2) | through which water enters. |

Activity Quiz

1. Our heart beats 70 to 75 times per minute when we are at rest. Do our heartbeats increase or decrease when we exercise? Why?
2. Suggest why valves are not present in arteries.

Question Bank

1. Why is there a need for transport system in multicellular organisms?

Ans1) Multicellular organisms cannot absorb and diffuse gases and food source from the environment. Their internal structure is too complex, and the cells in their bodies are spread throughout their body structure. Food and oxygen is foremost for multicellular organism, and subsequently proper functioning of the transport system is essential for survival.

2. In flowering plants, name and give their function in transport of materials.

Ans2) In the transportation system of the flowering plants, the two key distribution networks are xylem and phloem. Each has distinct jobs to perform with in the internal system of a flowering plant.

Xylem

The xylem channels the water and dissolved minerals from the roots of the plant to the leaves.

Phloem

The phloem is required to channel the food produced in leaves to all other parts of the plant.

3. Briefly discuss the role of roots of plant as the main source for material transport from the soil.

Ans3) Roots of plants are the main source through which water enters. Each plant has thousands of minute root hairs, through which the water enters into the system of plants. This process is known as osmosis. Minerals such as; magnesium, calcium, nitrate and phosphate also enter the plant through root hairs. Therefore, root hairs play an instrumental role for the survival of the plant.

4. a) Name the human transport system.
- b) Name the main organ which makes up this system.
- c) State the functions of this organ.

Ans4 a) Human transport system is termed as circulatory system. This involves the blood pumping out from an organ, heart, connected to innumerable tubes, better known as blood vessels, throughout the body.

4 b) In the circulatory system heart plays an instrumental role.

4 c) A heart has a set of pumps, on either side. The right side of the heart, pumps blood to the lungs, where carbon dioxide is produced by respiration, is removed from the body and oxygen is then absorbed into the blood stream. The left side of the heart, pumps the oxygenated blood to the rest of the body. Each heart has four chambers; the two smaller upper chambers have thin walls and are called atria. Blood flows into the atria first, when they contract, blood is forced into the lower chambers called ventricles. Ventricles possess thick walls filled with cardiac muscles. When the cardiac muscles contract in the ventricles, they squeeze the blood inwards on the blood inside them. This helps to push the blood out of the heart. The right side of the ventricle pushed the blood to the lungs, closest to the heart. And the left side of the ventricle, more muscular in nature, pushes to the rest of the body.

5. What is blood? Discuss how it plays its role in transport of material efficiently.

Ans5) Blood comprises of a mixture of red blood cells, white blood cells and platelets suspended in a yellow liquid, referred to as plasma. A human body at an average contains almost five litres of blood.

6. Differentiate between the following with respect to their structure and functions;
 - a) Arteries, capillaries, and veins
 - b) Xylem and phloem.

7. Briefly discuss the process of blood circulation in a living body.

Ans7) Animals are naturally more active than plants. Therefore a more dynamic supply system is required of food and oxygen. In humans, the transport system takes place through the blood circulatory system.

The heart pumps blood out from the right side along an artery to the lungs. The blood then collects the oxygen, from the inhaled air, and gives up its carbon dioxide. The blood flows back to the left side of heart via only vein which transfers oxygenized blood to the heart. Now the blood pumps out of the largest artery, on the left side, to the rest of the body parts.

Subsequently the largest artery splits up into a number of smaller artery branches, and reaching until the capillaries. Now the gases, digested food, minerals and waste products are exchanged between the blood and cells, via the thin capillary walls. The capillaries further join up to form veins, which carry blood with less oxygen and more carbon dioxide, back to the right side of the heart.

8. What do you mean by transpiration?

Ans8) This process of plants losing water due to evaporation from the leaves is known as transpiration.

9. Give the importance of stomata in the plant.

Ans9) Stomata plays a crucial role during transpiration, water and minerals move up from the roots towards the stem and leaves of a plant, by the aid of xylem. Water evaporates from the tiny holes present on the underside of the leaves, better known as stomata.

Chapter # 4

Exercise

Concept Checkers

1. Gas expands when heated and contract when cooled.

- a. **True**
- b. False

2. Molecules of a solid substance repel one another, when exposed to heat.

- a. **True**
- b. False

3. Gases expand much slower, compared to liquids and solids.

- a. True
- b. **False**

Fill in the blanks

1. The three states of matter increase or expand in all direction.
2. When exposed to cold, the molecules contract and bond closely to one another.
3. A bimetallic strip is made up of two different metals bound together.
4. Concrete blocks can crack, if gaps are not allowed between them.

Match the suitable pair

- | | |
|---|--------------------------------|
| 1. Substances expand or contract according (2) | the bimetallic strip is flat. |
| 2. At normal room temperature (1) | to temperature exposed to. |
| 3. Railway tracks have sliding joints that help (3) | to expand easily when required |
| 4. Glass that doesn't break when hot liquids are poured into –(5) | close to the bulb. |
| 5. A clinical thermometer has a constriction, (4) | Pyrex |

Question Bank

1. Why expansion or contraction takes place in matter?

Ans1) Matter expands when heated and contract when cooled. The increase or expansion occurs in all directions. However different substances expands or contract according to its own molecular arrangement and temperature exposed to.

2. With the help of a simple experiment explain thermal expansion and contraction taking place in gas.

Ans2)

3. Write down any four effects of expansion or contraction. How are these effects overcome?

Ans3) Following are the effects of expansion and contraction;
Concrete roads

Concrete blocks expand in summer. This is why there are always strategically placed gaps in the concrete blocks laying, allowing for the expansion in heat.

Railway tracks

Railways tracks are usually lengthy in size, since they are made of metal, they need room to expand. There are gaps in the metal after some distance. This is to allow for the expansion in summer time. Otherwise the tracks may curve

Bridges

Bridges involve concrete as well as metal. They are affixed with a sliding joint to overcome the heat problem in summer. And rollers are also added with the sliding joint at one end, and the other end remains normal. This makes room for expansion, as well as makes bridges stable.

Cables and lines

Power cables and telephone lines sag in the hot weather, and tighten in cold weather. When they are installed, allowance for the expansion and contraction is made

4. Why clinical thermometer is different from normal thermometer?

Ans4) Clinical thermometer is different from the normal thermometer. A clinical thermometer has a constriction, close to the bulb. When it is inserted in a hot substance and the mercury expands, when it is removed from the substance, the mercury level doesn't go back to the bulb, rather holds at the constriction making it easier to record level, even when removed from the hot substance. It only flows back to the bulb, with a slight shake.

5. What do you mean by ice point and steam point?

Ans5) The Celsius scale is named after Anders Celsius, a Swedish astronomer, is a temperature scale used frequently in laboratories. It has two extremes, the ice point and the steam point. The lower fixed point on the scale is the melting point for ice, which is 0 C. The other fixed point is the steam point, which is 100 C, at which the water starts to boil and steam appears. The temperature range between them is divided into equal 100 intervals.

6. List the different types of thermometers with their physical properties.

Ans6) There are many different types of thermometers. They are as follows;

Liquid-in-glass thermometer – the volume of a fixed mass of liquid changes steadily with the temperature change.

Constant volume glass thermometer – the pressure of a fixed mass of gas at constant volume varies uniformly with the changes in temperature.

Bimetallic thermometer – the uneven expansion and contraction of the bimetallic strip changes steadily with temperature.

Liquid crystal thermometer – the liquid crystals change to their different but distinctive colours at different temperatures.

Chapter # 5

Exercises

Concept Checkers

1. Light is a form of energy, it is non-visible and non-observable, as light travels from one place to another.
a. True
b. False
2. The speed of light travel changes in different mediums.
a. True
b. False
3. When light falls on an object, a shadow is formed behind an object.
a. True
b. False
4. Luminous objects emit light from their own, e.g. humans.
a. True
b. False
5. The shape and size of the shadow depends on the position and angle of the light that falls on the shadow.
a. True
b. False

Fill in the blanks

1. The sunlight that travels to earth takes approximately about **8** minutes to reach our planet.
2. The fastest rate of speed travel known to mankind, is 300 Million meter.
3. A beam of light can be parallel, divergent, and convergent depending on the travelling through different mediums.

Match the suitable pair

- | | |
|--|---|
| 1. Light always travels in a straight line, (3) | is better known as a ray of light. |
| 2. The size of the shadow varies on the (5) | translucent objects. |
| 3. The path along which light travels (1) | when travelling in the same medium. |
| 4. Some deep-sea fishes emit light, (4) | due to the internal chemical reactions. |
| 5. If the light doesn't pass completely through, (2) | angle and the source of light. |

Activity

1. What will happen to the image of a pinhole camera if;
 - a) the size of the pinhole is increased
 - b) the object distance is increased
 - c) the object distance is decreased
 - d) the object distance is equal to the image distance
 - e) the screen is moved nearer to the pinhole.

2. a) Based on observations around you, how can you know that light can travel through vacuum?
 b) Light can travel millions of kilometers through outer space, but the deep ocean with a depth of 2,000 m is often pitch black. Suggest why.

3. There are more than 1,000 species of fish which produce light of their own, most of which live in the deep sea. Angler fish and lantern fish are two examples of luminous deep-sea fish. Suggest the need and purposes to produce light.

Question Bank

1. With the help of a simple experiment prove that light travels in straight line always.

Ans1) Materials Needed: Three small index cards; modeling clay; flashlight; several books; hole puncher or sharp pencil; plastic coffee stirrer or thin straw.

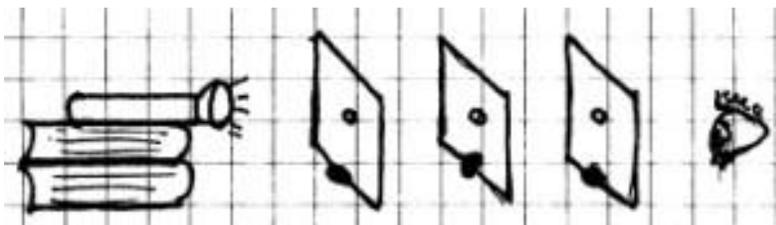
Procedure: Place the three cards together and punch a hole in the middle of each card at exactly the same spot using the pencil point or the hole punch. Use three small balls of modeling clay to make the three cards stand up as shown.

Turn on the flashlight, and place it in front of one of the cards. The bulb should be even with the hole in the card. If it isn't use one or more books to raise the flashlight. Once it is in place, you can secure it with modeling clay if needed.

Now place the second card about 15 cm (6 in) in front of the first card so that you can see the light through both holes. Do the same thing with the third card.

When you can see the light through all three holes, run the stirrer or straw through the holes.

What Happened: When the cards were lined up so that you could see the light, the holes were in a straight line, and the stirrer or broom straw fit easily through all three holes. When light moves away from an object, it moves in a straight line unless something acts on it to bend it.



2. Define the following with examples;

- a) Luminous object
- b) Non-luminous object
- c) Opaque object
- d) Transparent object
- e) Translucent object

Ans2) **Luminous Object:** Luminous objects emit light from their own, e.g. sun and bulbs.

Non-Luminous Object: Non-luminous objects are the ones who do not emit light of their own, but are visible only when other light source falls on them. Books, humans, animals are examples of non-luminous objects.

Opaque: Opaque objects or materials are ones through which light does not pass. When rays of light are shown or fall on them, they don't get through; hence a shadow is formed behind them. Common examples of opaque materials and objects are wood, steel and certain types of plastics.

Translucent: Translucent materials and objects are ones through which the light doesn't pass completely. Some rays travel through, while others are scattered. Common examples of translucent are tinted windows, certain types of fabric and plastic materials. Some times faint shadows are visible behind them.

Transparent:

Transparent materials or objects are the ones through which almost all light passes completely. No shadows are visible behind them when light is shone at them. Common examples of transparent are clear glass and water. None or very little traces of shadows are formed behind them

3. What do you mean by shadow? How is it formed?

Ans3) Shadows form when light doesn't completely travel through an opaque or translucent objects or material. A shadow is formed behind an object. This happens because of the fact that light travels in a straight line, therefore when the light cannot travel through an object; it creates a shadow behind it. The size of the shadow varies on the angle and the source of light.

4. What type of shadows do the following produce;

- a) a point source of light
- b) an extended source of light

Ans4a) A point source of light form a simple complete shadow called as Umbra.

4b) An extended or non point source of light produces incomplete and diffuse shadow at certain points.

5. How is solar eclipse different from lunar eclipse?

Ans5) A solar eclipse takes place when the sun, moon and earth are all in a straight line. What happens is that the sun casts shadow of the moon on the earth. As sunlight falls on the moon, it casts a shadow on the earth, the umbra region would be dark on the earth, and therefore no observation of the light would be possible for the period of the eclipse. Whereas the penumbra shadow of the moon on the earth would be brighter than the umbra and some light source of the sun would be visible. But clear visibility of the sun wouldn't be possible

In the lunar eclipse, the sun casts a shadow of the earth on the moon; therefore the sun, earth and moon are all in straight line. Since the sun rays shine on the earth, the moon falls under the umbra, no observation of moon light is visible on the part of earth facing the moon, for the period of the eclipse. Only when the moon moves away from the straight line, the penumbra region occurs, some or partial light is observed. Refer to the diagram below.

6. How is a pin-hole camera made?

Ans6) Take a box with a translucent screen or photographic film on one side of the box. Opposite to the screen, make a small pinhole. Now light a bulb outside the box, as the light of rays enter the pinhole, it creates same object image on the screen or the photographic film inverted. The image observed would be sharp, but not too bright.

7. Give the characteristics of an image formed by a pin-hole camera.

Some of the characteristics are;

- 1) The image size and object size are equal, if the image distance and object distance are equal.
- 2) Image is smaller than the object if the image distance is smaller than the object distance.
- 3) Image is bigger than the object if the image distance is greater than the object distance.

Chapter # 6

Exercises

Concept Checkers

1. Reflection occurs when a parallel beam of light comes in contact with an uneven surface, it reflects of as a parallel beam.

- a. True
- b. False**

2. Reflections from the mirrors, is better known as regular deflection.

- a. True
- b. False**

3. Objects are visible, when light falls on them and reflected to our eyes.

- a. True**
- b. False

Fill in the blanks

1. A nonparallel beam of light that comes in contact with a smooth surface is likely to produce divergent or convergent reflection.

2. Objects are visible only when light from them is reflects to our eyes.

3. A concave mirror has a reflecting surface that curves inwards.

Match the suitable pair

- 1. Divergent or convergent reflection (3)
- 2. Diffuses or scatters the light rays, (4)
- 3. Images on mirrors are upright and laterally inverted, (1)
- 4. An instrument with mirrors attached inclined to one another, (5)
- 5. These mirrors help to magnify the image, (2)

- inverted from left to right.
- convex mirrors.
- produces a sharp image.
- unlevelled surface.
- a kaleidoscope.

Question Bank

1. What is reflection of light? Give its types.

Ans1) Reflection occurs when a beam of light bounce back without being absorbed. Reflection has two common types

1. When a parallel beam of light reflected as parallel beam, it takes place in regular and smooth surface and termed as regular reflection
2. When a parallel beam of light reflected in different directions, it takes place in irregular and rough surface

2. List the characteristics of images formed by a plain mirror.

Ans2) **Characteristics of image formed by the plain mirror.**

Images formed by mirrors are upright and laterally inverted, inverted from left to right. The size of the image is equal in size of the object, when viewed in a plain mirror, as well as far behind as the object to the mirror.

3. Give three uses for reflection.

Ans3) Reflection plays a vital role in our daily life some of those uses are;

- It is used on the cars and other locomotives for visual needs at different angles.
- Reflection plays an important role in microscopes and telescopes.
- The most common uses of reflection are the mirrors on the walls.
- Dentist examines teeth with the help of reflection.

4. What is a kaleidoscope?

Ans4) A kaleidoscope is an interesting instrument; two or more mirrors are attached inclined to one another. And small coloured objects are placed between the mirrors. As you turn or rotate the instrument you visualize changing patterns.

5. How is curved surfaces reflection different from flat surfaces?

Ans5) Flat surfaces reflects the complete image which produce divergent or convergent reflection which produces a sharp image whereas curved surfaces did not reflects the complete image hence the image of curved surfaces are either blur or diffused.

6. Give some uses of concave and convex surfaces in our daily life.

Ans6) A concave mirror has a reflecting surface that curves inwards. Where as a convex mirror has a reflecting surface that curves outwards. Convex mirrors are used in cars, security mirrors in shops and situated on roads for blind corners. These mirrors help to magnify the image, if the object is close to the mirror. Car headlights have concave reflectors to produce parallel beam of reflected light from a single bulb.

7. What is refraction of light? What causes it?

Ans7) If a beam of light travels from one transparent or translucent medium to another, it either travels faster, or slows down. This happens due to the fact that the rays of light either bend or change direction while it strikes the surface at an angle to the normal. This change in direction or bending of rays is known as refraction.

8. Give some effects of refraction of light.

Ans8) Effects of refraction of light are;

- Straw in the clear glass of water appear to be bent or magnified.
- Apparent position of fish in a pond is different than of real position.
- Coin inside a glass filled with water looks at closer distance.
- Passing a beam of light through a prism will make a spectrum of light.

Chapter # 7

Exercises

Concept Checkers

1. Sunlight is made up of different colours arranged in together to form white light.

- a. **True**
- b. False

2. In a prism, different colours bend and refract at different angles, causing the splitting of the white light.

- a. **True**
- b. False

3. The primary colour of light is red, blue and violet.

- a. True
- b. **False**

4. Green plants reflect green light and absorb the other colours in darkness.

- a. True
- b. **False**

5. Images are formed at the point where converging rays come together.

- a. **True**
- b. False

Fill in the blanks

1. Colours of a rainbow are red, orange, yellow, green, blue, indigo and violet, in its order respectively.

2. prism, is a triangular formation of glass piece, used to see the beam of light refracted in to different coloured rays of light.

3. Secondary colours of light are; magenta, yellow and cyan.

4. A principal axis is the point in the centre of the lens and perpendicular to its curved surface.

5. Nature has provided humans with converging eye lenses.

Match the suitable pair

- | | |
|---|--|
| 1. The mixing of the rainbow colour together (3) | is the focal length. |
| 2. Splitting of the white light into different colour of light (5) | by the aid of thickening the eye lens. |
| 3. Distance between the focal point and the centre of the lens, (1) | to form white light is a spectrum. |
| 4. Human eye focuses on objects at various differences, (2) | is known as dispersion of light. |

Question Bank

- 1.a) What is dispersion of white light?
- b) What causes dispersion?

Ans1a) Dispersion is the splitting up of white light into seven colors on passing through a transparent medium like a glass prism.

1b) When light enters in a transparent like prism or water it get refracted, this refraction causes the dispersion of light for example: In a rainy day, when the light enters each rain drop, it gets refracted, dispersed and reflected before leaving the rain drop. This refraction enables the different colours seen in the band of rainbow. Rainbow is a natural way of observing the dispersion of the white light.

2. With the help of Newton's disc name the colours in the spectrum of white light.

Ans2) Newton's disc is a way of asserting the white colour is made up of the rainbow colours by taking a wheel or a disk and equally shading it with the colours of the rainbow. If you churn the wheel at a rapid speed, you would witness the disc to be white in colour. These rainbow colours are; red, orange, yellow, green, blue, indigo and violet.

3. What are primary and secondary colours of light?

Ans3) The primary colours of light are red, blue, and green these three colours combine to form white colour whereas the combination of any two of the three primary colours gives the secondary colour of light.

4. What is a beam of light? How is divergent and convergent beam formed?

Ans4) Beam of light is a directional projection of light energy radiating from a light source light could possibly travel as a parallel, divergent or convergent beam of light.

A divergent beam of light is made up collectively of a number of light rays that spread out as they travel. For example the rays of sunlight are divergent. They start from a source and spread throughout on the face of the earth. The further away the light source travels from the object, the greater the divergence of rays, but on the other hand the brightness of the rays would decrease.

A convergent beam of light is the inverse of the divergent. The different rays of light all collect at a point, passing through a common point. These are notable in curved (concave or convex) mirrors and lenses. The area of a convergent beam gets smaller but brighter as the rays of the convergent beam converge to a point. Images are formed at the point where converging rays come together. Eyes act in the similar manner; converging rays enter the cornea, and forms an image on our retinas. Different spot lights focusing on a single point, is another example of converging light to a single object.

5. Define the following;

- a) principal axis
- b) focal point
- c) focal length

Ans5) **Principal Axis:** A principal axis is the point in the centre of the lens and perpendicular to its curved surface.

Focal point: Focal point, is a point on the principal axis where rays of light close to and parallel to the principal axis converge after passing through the convex lens.

Focal Length: focal length of a lens is the distance between the focal point and the centre of the lens.

6. Briefly discuss how lens in the eye is used to see objects.

Ans6) Nature has provided humans with converging eye lenses. They are well capable of forming images that are real, inverted and diminished. When converging light rays enter the cornea of an eye, they refract on to the eye lens and create sharp image on the retina.

A human eye focuses on objects at various differences, by the aid of thickening the eye lens. The eye lenses have the ability to become thinner and thicker, to help focus on objects that are close and far. Ciliary muscles in the eyes help make the eye lens become thinner, to focus on objects that are far. Enabling them to increase focal length of the eye lens and bend the light rays passing through it to a lesser extent.

The ciliary muscles in the eyes contract, enabling the eye lens to become thicker, to focus on closer objects. This decrease in the focal length of the eye lens and bends light rays passing through more.

7. Describe the following defects of vision.

- a) short-sightedness
- b) long-sightedness

What causes these defects?

Ans7) If an individual can see objects clearly from a close range, but far away objects look blur, then that person is known as short-sighted. This problem usually develops at a younger age, primarily people who read or watch TV from a close range. If the eye lens is too thick or an eyeball is too long, it can cause a person to be short-sighted.

Similarly some people are able to see clearly far away objects, but closer objects appear blurry. This is caused by the failure of the eye lens to thicker when required to. It is a common symptom in older age people. The eye lens becomes too thin or the eye ball is too short, causing long-sightedness.

Chapter # 8

Exercises

Concept Checkers

1. Only audible sounds of objects and people can be heard all around us.

- a. **True**
- b. False

2. Sound travels in wave pattern, spreading in all directions.

- a. **True**
- b. False

3. Scientific studies conducted have proven that sound travels best through gases, e.g. air.

- a. True
- b. **False**

Fill in the blanks

1. When a drum is struck with a drum stick, the drum vibrates vibrates.
2. When a sound is created, it spreads and starts to die off after travelling some distance.
3. The speed of light is almost a million times faster compared to speed of sound.

Match the suitable pair

- | | |
|--|--|
| 1. Vibration of the drum skin happens both, (2) | on in a vacuum. |
| 2. The vibration of sound cannot pass (1) | upwards and downwards. |
| 3. The speed of light is (5) | sound waves in air into electrical signals |
| 4. The speed of sound is (6) | with fluid and tiny hairs. |
| 5. Nature has given the ears ability to covert (3) | $300 \text{ million ms}^{-1}$ |
| 6. Cochlea is a membrane, a coiled tube filled (4) | 330 ms^{-1} |

Question Bank

1. How are sounds produced?

Ans1) Sound is produced when something vibrates. The vibrating body causes the medium around it to vibrate. Vibrations in air are called traveling longitudinal waves, which we can hear. For example when a drum is struck with a drum stick, the drum skin vibrates. The vibration of the drum skin happens both ways, upwards and downwards this vibration produces sound.

2. How sound is detected by the ear?

Ans2) Ears has ability to covert the sound waves in air into electrical signals, which are distinctly read by the brain. Every time we hear a familiar sound, we recognize it. What happens is that, every sound we hear is then matched in our memory instantaneously for recognition.

Hearing a sound and recognizing it may happen instantaneously, but the process goes through many channels. The first set of sound waves is channeled into the ear through Pinna, the outer ear. This sound when enters the ears, reaches the ear drum first.

An ear drum consists of a thin sheet of skin taut across the ear canal. The ear drum is highly sensitive, and one can loose the ability to hear if impaired. As the air molecules of sound waves vibrate on the ear drum, it sends vibrations to three tiny bones situated in the middle of the ear. The three bones are; anvil, hammer, and stirrup. These bones are arranged in a manner though which vibrations in the stirrup are greater than those in the ear drum.

The stirrup vibrates on the outside of the inner ear called cochlea. Cochlea is a membrane, a coiled tube filled with fluid and tiny hairs. When the membrane vibrates, it in turn makes the filled liquid to vibrate and this moves the hairs too. These tiny vibrating hairs produce electrical signals which are sent along the auditory nerves to the brain. Brain has the ability to interpret these electrical signals as sounds.

3. Differentiate between noise and music sounds? Give three examples of each in our daily life.

Music	Noise
Definition	
Musical sound is periodical and somewhat regular they pleasing to our ears	Noise is an unpleasant sound and irregular they annoying to our ears
Examples	
Sound created by musical instruments like guitar and violin	Sound created by traffic horns

Chapter # 9
Exercises

Concept Checkers

1. Two electrical charges required to produce the electrical current are a positive charge and a negative charge.

- a. True
- b. False

2. The series circuit is the simple type of circuit, where all electrical components are attached in symmetry.

- a. True
- b. False

3. An electric cell enables to stop the electric charges between each unit of the circuit.

- a. True
- b. False

4. The reduction in the current flow in a substance is known as resistance.

- a. True
- b. False

5. Electroplating, is a means of coating required objects with a thin a layer of metal.

- a. True
- b. False

Fill in the blanks

1. Amperes can be measured by the aid of an instrument called ammeter.

2. Parallel circuit splits in to a number of branches with electrical components attached.

3. The amount of electrical energy transferred to each unit is called the voltage.

4. Resistor, their function is to reduce the flow of the current flowing through a circuit.

5. In an ordinary bulb, the coil is made of tungsten.

Match the suitable pair

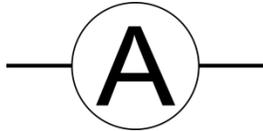
- | | |
|--|-------------------------------|
| 1. The symbol of SI unit for measuring the electrical current is (3) | (Ω). |
| 2. The symbol of SI unit for the voltage is (4) | resistance is added. |
| 3. The symbol of SI unit of resistance is (1) | (A). |
| 4. The more the resistors are connected additional (2) | (V). |
| 5. Electroplating - is coating required objects (5) | with a thin a layer of metal. |

Activity Quiz

1. Draw the symbols for the following components.

- a) ammeter
- b) voltmeter
- c) switch (open)
- d) fixed resistor
- e) cell
- f) bulb

Ans (a) Symbol of ammeter:



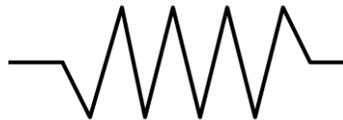
(b) Symbol of voltmeter



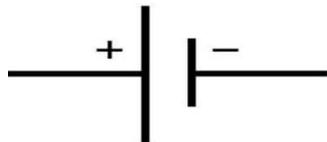
(c) Symbol of switch open



(d) Symbol of fixed resistor



(e) Symbol of cell



(f) Symbol of bulb



Question Bank

1. a) What do you mean by the following

- i) electric current
- ii) voltage
- iii) resistance

b) State their SI units.

c) What instruments are used to measure them and how can they be connected in electrical circuit?

Ans1 (a) **Electric Current:** Electric current is produced when electrical charges flow from one point to another. Primarily there are two electrical charges required to produce the electrical current; a positive charge and a negative charge. The SI unit for measuring the electrical current is the ampere (A). Amperes can be measured by the aid of an instrument called ammeters.

Voltage: The amount of electrical energy transferred to each unit is called the voltage. The SI unit for the voltage is the volt (V). A voltmeter is a device used to measure the voltage. The voltmeter should be connected between the two points of the electrical component.

Resistance: The reduction in the current flow in a substance is known as resistance. Every conductor has a certain amount of resistance. The SI unit of resistance is ohm (Ω).

2. a) Define electrical circuit.

b) Describe their types and draw diagram of each.

Ans2 (a) **Electrical Circuits**

This is a specialized means of transporting electrical charge via connecting wires to various electrical components attached.

(b) Commonly there are two kinds of circuits; series circuit, and parallel circuit. The series circuit is the simple type of circuit, where all electrical components are attached in symmetry. In this particular circuit the electrical charge flows from one-end to another as a single loop. However, if there is a problem in one of the electrical components or the flow of electric charge, it would stop the transfer of electric current.

Illustration of a series circuit given in the book.

On the other hand the parallel circuit splits in to a number of branches with electrical components attached. The current flows from each branch of the circuit may vary according to the need. However, it remains less than the current flowing out from the source. Its advantage over the series circuit is that if one of the branch breaks, rest of the electrical components are not affected.

Illustration of a parallel circuit is given in the book.

3. Give the three effects of electric current.

Ans3) Effects of electrical current.

- i) Passing an electric current through a liquid causes chemical changes in a process called electrolysis.
- ii) Electric current passing through a wire generates magnetic field around the wire.
- iii) The heating effect of electric current is used in many everyday devices.

4. Write down two applications of each effects of electric current

Ans4) **Application of Electrical Current**

Heating: heating effects of electrical current is used in electrical kettles and other cooking materials like toaster.

Chemical: chemical effect of electrical current is used in electroplating and in also helps to accelerates chemical reaction.

Magnetic: magnetic effect of electrical current is used in electric motors and electromagnets.

5. Differentiate between electrolysis and electromagnetism.

Ans5) Chemical decomposition produced by passing an electric current through a liquid or solution containing ions termed as electrolysis whereas the electromagnetism means the phenomenon of the interaction of electric currents or fields and magnetic fields.

Chapter # 10

Exercises

Concept Checkers

1. Electrical appliances and devices, can be hazardous.

a. True

b. False

2. If an insulation wire is damaged, or exposed bare wires, is likely to create a short circuit.

a. True

b. False

3. A human body reacts slower to electricity with presence of water, compared to dry body contact.

a. True

b. False

Fill in the blanks

1. Primary hazards of electrical appliances in the house are electric shock and electric fire.

2. Short circuit is when two bare wires come in contact with one another.

3. Each fuse comes with a capacity or limit of amperes that it would allow to flow.

Match the suitable pair

1. Plugging too many appliances to a single outlet –(2)

greater amount of electricity to flow.

2. Short circuit causes very low resistance and (1)

Overloading.

3. Fuses connected to wires, avoid overheating, and (4)

ELCB.

4. Turns off supply while leakage through earth wire – (3)

prevent damage to appliances.

Question Bank

1. What are electrical hazards?

Ans1) As electricity is commonly used in households in various appliances and devices, there are hazards associated with electricity. The hazards of electric shocks and electric fire are primary. Humans are highly sensitive to electric current, therefore resistance of electric shocks are non-existent naturally. Some of those hazards are;

- Damage wires
- Overloading
- Dampness

2. Give some electrical hazards with their causes.

Ans2) Some electrical hazards and their causes are;

Damaged wire

If an insulation wire is damaged, or exposed bare wires, is likely to create a short circuit. Short circuit is when two bare wires come in contact with one another, this creates very low resistance and a greater amount of electricity flows through them.

Overloading

Caution should be exercised not to plug too many appliances into one power outlet. This is likely to overheat the plug and cause fire or to burn out device due to overheating

Dampness

Water conducts electricity; therefore caution should be taken to not come into contact with live electrical appliances. A human body reacts faster to electricity with presence of water, compared to dry body contact.

3. Write down 5 precautionary measures to ensure safe use of electricity in home.

Ans3) Electrical Safety

Every household has a consumer unit, the primary unit that distributes electricity through out the house. It has many important components in it such as main switch, fuses, circuit breakers, earth wires, and other types of circuit breakers; earth leakage circuit breaker (ELCB).

Main Switch

It is the first link to the live wire from the electric supplier. If it is switched on, it connects the apparatuses and appliances with steady flow of electricity. Likewise if switched off, ceases electricity to pass into the house.

Fuses

Fuses are connected to the wires, to avoid overheating, preventing any damage to the appliances or lives.

It is a short wire, and when heated up beyond a temperature it melts. This enables to break the link of electricity to pass on further. Each fuse comes with a capacity or limit of amperes that it would allow to flow. Once the level of heat rises, it melts, enabling breaking the flow of electricity and preventing harm.

Circuit breakers

Circuit breakers operate just like fuses, but more efficient. They don't blow up or melt, rather switch off, when heated beyond its capacity. Therefore a circuit breaker can trip a number of times, and still be reused by switching it on. It has a much longer life compared to fuses.

Earth wires

An earth wire connects an appliance directly to the earth. Therefore, if there is a fault in the appliance, and a person was to touch the metal casing, current would not pass through him. The current passes through the metal casing to the earth. The current would then blow the fuse, and cease the current flow.

ELCB

An earth leakage circuit breaker contains an electromagnetic switch which helps to turn off the power when the leakage of current flowing through the earth wire exceeds a stated limit. It also cuts off the current supply if the appliance is faulty.

4. Define power and state its SI unit and formula.

Power is the rate of converting energy from one form to another. The SI unit for power is watt (W) or joule per second (J/s).

$$\text{Power (W)} = \frac{\text{Work done (J)}}{\text{Time (s)}}$$

When charge flows through an electric circuit, the electrical energy carried is converted into other forms of energy. And the rate at which electrical energy is used or converted into other forms of energy is called electric power.

When electricity is provided from the electric company, main electric lines pass through the electric meter. The meter records the amount of electricity consumed by each consumer. The unit used for the electrical energy in the home is the kilowatt/hour.

Chapter # 11

Exercises

Concept Checkers

1. All living organisms need to live in a place where there is food, shelter, safety, and patience.
a. True
b. False
2. An habitat is a place where you develop habit of being there.
a. True
b. False
3. The environment can be categorized as physical or abiotic environment, and the biotic environment.
a. True
b. False

Fill in the blanks

1. Ecology is the study of living organisms and their environment.
2. Light plays a vital role for the existence of green plants.
3. Aquatic beings intake oxygen from the dissolved oxygen in water.
4. Camouflage is a technique of disguising oneself in the environment, to be temporarily unseen.

Match the suitable pair

- | | |
|---|---|
| 1. The physical environment is physical aspects (4) | Carnivorous. |
| 2. Deep-sea habitants do not require light, (6) | Mutualism. |
| 3. Animals that feed on plants – (5) | Omnivorous. |
| 4. Animals feeding on other animals –(1) | such as water, minerals, temperature and etc. |
| 5. Animals that feed on both animals and plants –(3) | Herbivorous. |
| 6. A situation when two organisms coexist together –(2) | they are equipped to survive in the dark. |

Question Bank

1. What are habitat and an environment?

Ans1) The place or environment where a plant or animal naturally or normally lives and grows is known as habitat. Whereas the surroundings or conditions in which a person, animal, or plant lives or operates is termed as environment.

2. Define the following ecology.

- a) population
- b) community
- c) ecosystem

Ans2) Population: All the inhabitants of a particular place is termed as population

Community: a group of living organism in the same place or having a particular characteristic in common.

Ecosystem: a biological community of interacting organisms and their physical environment.

3. What are physical factors that make up a physical environment.

Ans3) The environment

The physical environment plays a vital role in the lives of the living organisms existence. Although the environment doesn't particularly suit every living organism that exists in it, but the ability to adapt the environment helps them exist.

Light

As earlier studied, light plays a vital role for the existence of green plants. Main source of light for the plants and forests is the sun. The source of sunlight is important to other living organisms to survive as well. On the other hand some organisms that live below the earth do not necessarily have to be exposed to sunlight for existence. Others such as the deep-sea fishes and animals of the oceans do not require light, they are equipped to survive in the dark.

Temperature

Main source of heat for earth comes from sunlight. Survival of the living organisms depends on the environmental temperature of the habitat. Some species are active and continue to exist between temperature level of 0 C and 50 C, while some microscopic organisms can survive temperature levels well beyond 50 C.

Plants and animals each have their controlled temperature limits, for them to survive. Beyond which there existence may become extremely difficult.

Water

This is one resource that is essential for all living organisms, therefore most living organism's habitat in proximity to the abundance of water. Mostly plants and animal species live in the tropical rain forest region. Others who are in far away lands have the ability to store water or reduce water loss.

4. What do you mean by biotic environment?

Ans4) Living organisms interact with other organisms, therefore we live in unison with the environment. We share food, shelter, air, water, minerals and light from the environment.

5. Briefly describe the following types of relationships between organisms and give an example

- a) Predator – prey relationship
- b) Mutualism
- c) Commensalism
- d) Parasitism

Ans5) Predator – prey relationship

Animals that hunt on other animals are known as predators. The animals that are hunted are known as preys. So if in the jungle a lion tries to kill a deer, and feed on it, lion is the predator and deer is the prey

Mutualism

This is a situation when two organisms coexist together. Clown fish and the sea anemone, coexist together, and help one another by grouping together. The sea anemone provides shelter and protection for the clown fish, while the clown fish brings food to the sea anemone and even lures larger fish to its stinging tentacles.

Commensalism

This is the kind of situation between two organisms from which one benefits, and the other is neither harmed nor benefitted. This is exhibited by the commensalism of remora fish and shark. Remora fish attaches itself to the shark, and feeds on scattered food by the shark.

Parasitism

This is a special relationship between two organisms, parasite and the host. The parasite lives on the body of the host. And the host is harmed by the existence of a parasite on its body. Bacteria, for example tuberculosis, are a parasite that lives inside our bodies, and harms our body.

Chapter 12

Concept checker

1. The body is supported and its internal parts protected by a strong yet flexible frame work of Bones called the skeleton

a. **True** b. False

2. The adult skeleton contains 206 bones

a. True **b. False**

3. The nervous system is the body's main control system.

a. **True** b. False

(B) Fill in the blanks

1. Bones are relatively light, yet five times stronger than steel.
2. The nervous system regulates both voluntary activities, such as walking and walking, and involuntary activities, such as breathing.
3. Different areas of the cortex are involved in processing or analyzing sensory information.

Match the suitable

- | | |
|--|-----------------------------|
| 1. Bones are compose of two types of tissue (2) | spinal nerves |
| 2. Bones of many joints are held in place by (3) | cancellous and compact bone |
| 3. The spinal cord's main function is to
Transmit information between the brain and (1) | ligaments |

Question Bank

1. Discuss briefly the human skeleton system.

Ans1) The body is supported and its internal parts protected by a strong yet flexible framework of BONES called the skeleton. These bones meet at JOINTS, most of which allow movement between the bones they connect. As well as protection and movement, bones provide a store for the mineral calcium, which is vital to the working of nerves and muscles. They also contain bone marrow, which makes blood cells and stores fat.

2. Differentiate between axial skeleton and appendicular skeleton.

Ans2) Human skeleton fall into two groups;

Axial Skeleton

Axial skeleton, made up of the bones of the head, spine, ribs, and breastbone

Appendicular skeleton

Appendicular skeleton, containing the bones of the limbs, the pelvis, the shoulder blades, and the collarbones.

3. What are bones?

Ans3.)Bones contain cells, minerals, protein, and water. Bones are composed of two types of tissue: cancellous (spongy) and compact bone. These are living tissues that are constantly broken down and rebuilt by the cells they contain.

Bones have an outer layer of compact bone, one of the body's hardest materials. One the inside is an area of cancellous bone, which may contain red bone marrow. In adult long bones, like this femur, the shaft is compact bone overlaying an area that may contain yellow bone marrow (a fatty tissue).

4. What are joints? Give their types.

Ans4) Joints are the parts of the body where bones meet. Some, such as the joints in the cranium, allow no movement between the bones. Others, such as the joints in the spine, allow limited movement. A few, such as the hip joints, permit a wide range of movement. The bones of many joints are held in place by muscles and bands of tissue called ligaments.

TYPES

Ball and socket Joint

This colour-enhanced X-ray shows the shoulder joint, which, like the hip, is a ball-and-socket joint. The rounded upper end of the humerus fits into the cup-shaped socket of the scapula. This allows the humerus to rotate freely. The joint is kept in place by surrounding muscles and ligaments.

Hinge Joint

The elbow joint, where the humerus of the upper arm and the radius and ulna of the lower arm meet, is shown on this X-ray. The elbow is an example of a hinge joint. It enables the arm to bend and straighten, but it allows little side-to-side movement.

5. How the nervous system controls the entire body?

Ans5) The nervous system is the body's main control system. It is made up of the CENTRAL NERVOUS SYSTEM (or CNS) and a network of NERVES that extend from the CNS to all parts of the body. The nervous system regulates both voluntary activities, such as walking and talking, and involuntary activities, such as breathing.

6. Discuss the workings of central nervous system?

Ans6) The CNS has two main tasks. It has to process information, both about the outside world (obtained by organs such as the eyes) and about the inside of the body (obtained by internal receptors). It also has to generate responses such as movement that will protect and maintain the body. Some activity within the CNS is quite simple REFLEX (automatic) activity. But much of its activity, particularly in the brain's cerebrum, is complex and conscious.

7. Briefly state the different parts of the brain and their functions.

Ans7) The main parts of the brain are the large folded cerebrum, the brainstem, which forms a stalk at the foot of the brain, the cerebellum behind it, and central structures, such as the thalamus.

The cortex (outer layer) of the cerebrum has many functions. Different areas of the cortex are involved in processing or analysing sensory information, sending signals to direct muscle movements, or in other activities such as reasoning, memory, or creative thought.

8. What do you mean by autonomic nervous system? Explain with the help of example.

Ans8) In its simplest sense, a reflex is an emergency reaction of the nervous system to a threat such as a hot object touching the skin. In a wider sense, reflexes are automatic responses to a wide range of situations in the body and are key to many internal activities, such as the heart beat. A division of the nervous system called the autonomic nervous system is in overall control of these internal activities.

Example

The immediate withdraw of hand in the case of touching hot pot is a commonly observed example of reflex action