

# SCIENCE 8 (NCERT SOLUTION)

## CHAPTER 1.

### CROP PRODUCTION AND MANAGEMENT

- (a) crop (b) preparation (c) float (d) water; nutrients
- i. (e) ii. (d), (a) iii. (b) iv. (c)
- (a) Paddy, maize (b) Wheat, gram
- (a) Seeds germinate in soil. Plants grow and are anchored in the soil. They absorb water and minerals from soil. Therefore, soil preparation is necessary for the growth of healthy and bumper crop. Soil preparation involves ploughing and levelling of soil. Ploughing loosens the soil which allows easy and deeper penetration of the roots.  
(b) Sowing is the process of putting seeds in the soil. Seeds should be sown in moist soil at optimum time and season, and at proper depth. There should be sufficient spacing between the seeds. The seeds sown too deep may fail to germinate due to lack of water or nonavailability of oxygen.  
There are two methods of sowing seeds: Manual method or Broadcasting and mechanical method. Manual Method or Broadcasting involves scattering of seeds by hand. Seeds are later covered with soil by leveller to avoid wastage. Seeds of Maize, Wheat, Berseem and Bajra are sown by this method. This results in unequal distribution and wastage of seeds. Mechanical Method involves the use of a seed drill. The seed drill makes furrows in the soil and seeds fall into the furrows at regular distance and at proper depth.  
(c) The unwanted plants that grow naturally along with crop plants are called weeds. The removal of weeds from the field without harming the crop plants is called weeding. Weeding is essentially needed because weeds compete with the crop plants for nutrients, water, sunlight and space, and affect their growth badly. They may produce toxic substances that interfere with the growth of crop plants, and thus affect the harvest. They may be poisonous to humans and domestic animals. Also, they attract pests and spread them to the crop plants.  
Weeding is done either by pulling out the weeds by hand or removing them with the help of harrow or rake, trowel or hoe or by using chemicals called weedicides. Some natural enemies of weeds are released in the field which feed on weeds and destroy them. For example, cochineal insect is used to eliminate prickly pear (*Opuntia*) from the crop fields in Tamil Nadu.  
(d) The process of separating grains from husk is called threshing. It can be done manually and by using animals or machines. In manual threshing, harvested crop is threshed by striking against a hard surface. For threshing with animals, the harvested crop is heaped on the ground and animals like oxen, buffaloes, camels, etc. are made to walk over it in a circle. The cattle's feet release the grains from chaff (bhusa). In mechanical threshing, a machine called thresher is used for threshing. The farm machine, combine is used for both harvesting and threshing.
- Hint:** Refer 'Table 1.4'.
- The process of watering crop plants in the field at different intervals is called irrigation.  
The two methods of irrigation that conserve water are:
  - **Sprinkler Irrigation:** In this system, perpendicular pipes are laid in the field at regular intervals. These pipes are joined to the main pipeline at one end and have rotating nozzles at the top end. Water is pumped in the main pipe under pressure. It escapes through the rotating nozzles and gets sprinkled over the crop plants.
  - **Drip Irrigation:** This system provides water to the plants drop by drop just near the roots. The water is not wasted at all and the plants get regular water supply.
- If wheat is sown in the *kharif* season, the seedlings will not grow well due to absence of optimum conditions of temperature and water.
- Soil supplies mineral nutrients to the plants, which are essential for the growth of plants. Continuous growing of crops in the same field without leaving it uncultivated for some period, makes the soil poorer in certain nutrients and reduces the fertility of soil.
- The unwanted plants that grow naturally with crop plants are called weeds.  
**Control of weeds:** **Hint:** Refer 'Methods of Weeding'.
1. Preparation of soil 2. Ploughing the field 3. Sowing 4. Manuring  
5. Irrigation 6. Harvesting 7. Sending crop to sugar factory
- Down:** 1. IRRIGATION 2. STORAGE 5. CROP  
**Across:** 3. HARVESTER 4. GRAM 6. WINNOWER

## CHAPTER 2.

### MICROORGANISMS: FRIEND AND FOE

1. (a) microscope (b) nitrogen (c) yeast (d) bacteria
2. (a) (ii) (b) (ii) (c) (i) (d) (ii) (e) (iii) (f) (iii)
3. i. (e), (g) ii. (a) iii. (b) iv. (c) v. (d) vi. (f)
4. (a) No. They can be seen with the help of a microscope.
5. There are 5 major groups of microorganisms: Bacteria, Fungi, Algae, Protozoa, Viruses.
6. Some microorganisms which can fix atmospheric nitrogen are as follows:
  - (a) Symbiotic bacterium—*Rhizobium*
  - (b) Free-living soil bacteria—*Azotobacter* and *Clostridium*
  - (c) Some cyanobacteria or blue-green algae—*Anabaena* and *Nostoc*
7. **Hint:** Refer 'Beneficial Microorganisms'.
8. **Hint:** Refer 'Harmful Microorganisms'
9. Antibiotics are the substances that are obtained from some microorganisms and they kill or stop the growth of disease-causing microorganisms.

Antibiotics should be taken under the supervision of a qualified doctor. They should not be taken in overdose because they may cause harmful effects or may become less effective if needed in future. Also they kill the useful bacteria of the alimentary canal.

## CHAPTER 3.

### SYNTHETIC FIBRES AND PLASTICS

1. Some fibres are made by human beings through chemical process. That is why, they are called synthetic fibres.
2. (b)
3. (a) artificial, man-made (b) petrochemicals (c) polymer
4. The following examples show that nylon fibres are very strong.
  - (a) They are used to make ropes for rock climbing.
  - (b) They are used to make car seat belts.
  - (c) They are used to make fishing nets.
5. Plastic containers are favoured for storing food because they are lightweight and easy to handle. Also they have lower price and good strength.
6. **Hint:** Refer Table 3.1.
7. (a) Saucepan handles are made of bakelite because it is a poor conductor of heat, i.e., it does not melt on heating or becomes hot.
  - (b) Electric plugs/switches/plug boards are made of bakelite because it is a poor conductor of electricity, i.e., it does not allow electric current to pass.
8. The products that can be recycled are plastic toys, carry bags, ball point pens, plastic bowls, plastic covering and electrical wires. The products that cannot be recycled are telephone instruments, cooker handles and electrical switches.
9. He should buy cotton shirts for summer because they absorb the sweat released by his body and keep his body cool.
10. The examples plastic mug and plastic handles of cooking utensils do not react with air and water when tested with them. As a result, they do not get corroded and are considered noncorrosive in nature.
11. The handle and bristles of a toothbrush should be made of the same material called thermoplastic because they can bend easily, are lightweight, strong and durable.
12. Plastics are nonbiodegradable, i.e., do not get decomposed easily. When thrown carelessly, they may choke the drains and affect the sewage system causing water to overflow. As a result, mosquitoes breed in choked drains spreading diseases like malaria and dengue. Cows and other animals may swallow these plastics thrown in the garbage. This may even result in the death of animals. On burning these waste plastics, they release toxic gases and cause air pollution. Therefore, we should avoid plastic as far as possible.
13. (i) (d) (ii) (c) (iii) (a) (iv) (b)
14. Synthetic fibres are made by human beings through chemical processes. To make synthetic fibres, there is no use of plant and animal materials. Plants and animals are necessary parts of forests. This shows that manufacturing synthetic fibres is usually helping conservation of forests.
15. Take a polythene bag and allow the electric current from a dry cell to pass through it. We observe that the electric current does not pass through it. This shows that thermoplastic, i.e., polythene bag, is a poor conductor of electricity.

## CHAPTER 4.

### METALS AND NONMETALS

1. (a) 2. (c)
3. (a) reactive (b) good; electricity (c) more (d) hydrogen
4. (a) F (b) T (c) F (d) F
5.

Properties	Metals	Nonmetals
1. Appearance	Lustrous	Dull
2. Hardness	Hard	Soft
3. Malleability	Malleable	Brittle
4. Ductility	Ductile	Nonductile
5. Heat conduction	Good conductors	Bad conductors
6. Conduction of electricity	Good conductors	Bad conductors
6. (a) Aluminium foils are used to wrap food items because they are leakproof, sturdy, stackable and keep food items fresh for longer time.  
 (b) Immersion rods for heating liquids are made up of metallic substances because metallic substances are good conductors of heat. As a result, they heat the liquids quickly.  
 (c) Copper is less reactive than zinc, therefore, it cannot displace zinc from its salt solution.  
 (d) Sodium and potassium are highly reactive. They violently react with air and water even at room temperature. That is why, they are kept under kerosene.
7. No, lemon pickle contains a weak acid which reacts with metals like aluminium to form toxic and poisonous salt. This salt may cause food poisoning. Therefore, lemon pickle cannot be stored in an aluminium utensil.
8. (i) (d) (ii) (e) (iii) (c) (iv) (f) (v) (b) (vi) (a)
9. (a) When dilute sulphuric acid is poured on a copper plate, copper sulphate and hydrogen gas are formed.  
 Copper + Dil. Sulphuric acid → Copper sulphate + Hydrogen gas  
 (b) When iron nails are placed in copper sulphate solution, they displace copper from its salt solution and form iron(II) sulphate and copper.  
 Iron nails + Copper sulphate solution → Iron(II) sulphate + Copper
10. (a) She will find the poisonous gas named carbon monoxide along with carbon dioxide.  

$2C$	+	$O_2$	→	$2CO$
Carbon		Oxygen		Carbon monoxide (neutral)

 (b)

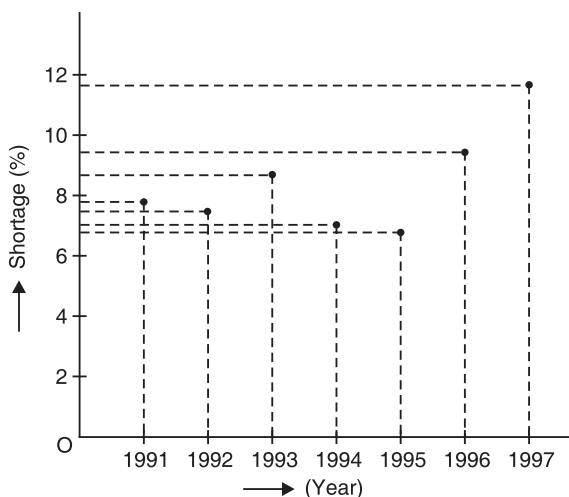
$C$	+	$O_2$	→	$CO_2$
Carbon		Oxygen		Carbon dioxide (acidic)
11. When goldsmith dissolves old gold jewellery in a mixture of nitric acid and conc. hydrochloric acid in the ratio 1 : 3, a little quantity of gold gets dissolved in this mixture. That is why, they found a slight loss in the weight of jewellery.

## CHAPTER 5.

### COAL AND PETROLEUM

1. The advantages of using CNG and LPG as fuels are that they are less polluting and cleaner fuels. They do not produce smoke but give more heat as compared to other fuels.
2. Bitumen is used for surfacing the roads.
3. **Hint:** Refer 'Answer D-2'.  
 The slow conversion of dead trees and plants into coal is called carbonisation.
4. (a) Coal; petroleum; natural gas (b) refining (c) CNG
5. (a) F (b) F (c) T (d) T (e) F
6. **Hint:** Refer 'Answer L-2'.
7. **The characteristics of coke are:**
  - (a) It is a tough, porous and black substance.
  - (b) It is an almost pure form of carbon.**Uses of coke are:**
  - (a) It is used in the manufacture of steel.
  - (b) It is used in the extraction of many metals.
8. Petroleum was formed from the remains of very tiny animals and plants that lived in the sea and died millions of years ago. After they died, their bodies sank and got buried at the bottom of the sea. Over the time, they were covered by layers of sand, silt and clay. Over millions of years, the layers of sand, silt and clay became very thick and the remains buried deeper and deeper. In the absence of air, enormous heat and pressure from these layers slowly changed the dead organisms into petroleum and natural gas.

9.



## CHAPTER 6.

### COMBUSTION AND FLAME

- Hint:** Refer 'Answer C-1'.
- (a) pollution (b) LPG (c) ignition temperature (d) water
- On burning, CNG produces the harmful products in very small amounts. It is a cleaner fuel as compared to petrol and diesel. That is why, we can say that the use of CNG in automobiles has reduced pollution in our cities.
- LPG is a cleaner fuel. It burns completely and does not produce any harmful gas whereas wood does not burn completely. As a result of incomplete combustion, wood gives poisonous carbon monoxide gas.
- (a) Water is a good conductor of electricity. If it is used to put out fire caused by electricity, it will pass electric current giving electric shock to the person trying to put out fire. So water is not used to put out fires involving electrical equipments.  
(b) LPG is a better domestic fuel than wood because it burns completely and does not give any poisonous gas.  
(c) Ignition temperature of paper by itself is lower than a piece of paper wrapped around an aluminium pipe as aluminium is a good conductor of heat. As a result, heat gained by paper is conducted quickly by the aluminium pipe and the ignition temperature of a piece of paper around an aluminium pipe is not reached. Therefore, it does not burn.
- Hint:** Refer 'Fig 6.7'.
- The calorific value of a fuel is expressed in kilojoule per kg (kJ/kg).
- Hint:** Refer 'Answer C-5'.
- The ignition temperature of dry leaves is lower than a heap of green leaves because green leaves contain a lot of water in them. As a result, ignition temperature of a heap of green leaves is not reached and it is difficult to burn.
- A goldsmith uses the outermost zone of a flame for melting gold and silver because in this zone, a nonluminous blue flame with very high temperature is obtained due to presence of oxygen in plenty.
- Calorific value of the fuel =  $\frac{180,000}{4.5} = 40,000$  kJ/kg
- The process of rusting cannot be called combustion because though it occurs in the presence of oxygen gas but it does not produce heat and light.
- The beaker kept by Ramesh in outermost part of the flame will get heated in a shorter time due to its highest temperature 1400°C.

## CHAPTER 7.

### CONSERVATION OF PLANTS AND ANIMALS

- (a) protected (b) endemic species (c) climatic
- (a)

#### Wildlife Sanctuary

1. It is a smaller area.
2. Private ownership rights to collect minor forest products are provided.
3. It protects and conserves the plants and animals.

#### Biosphere Reserve

1. It is very large area.
2. Multiple land use is allowed.
3. It is meant to conserve and maintain biodiversity as well as culture of the area.

- (b) **Zoo:** In a zoo, wild animals are kept in cages, in captivity.  
**Wildlife Sanctuary:** A wildlife sanctuary is a protected land area reserved for the protection of wild animals, birds and plants. Hunting is strictly prohibited there. However, private ownership rights for collecting minor forest products, harvesting of timber and cultivation are granted so long as they do not interfere with the life of wild animals.
- (c) **Endangered species:** The species that are not likely to survive and will soon become extinct, if the causative factors continue, are called endangered species.  
**Extinct Species:** Species of plants and animals which are lost forever are called extinct species.
- (d) The plants found typically in a particular area form the flora of that area. The term fauna represents the wild animals found in a particular place or geographical region.
3. (a) Deforestation leads to loss of natural habitats of wild animals and depletion of their food sources. This condition leads to loss of wildlife.  
 (b) Deforestation increases temperature, reduces rainfall and increases wind velocity. These changes lead to climatic changes.  
 (c) Deforestation leads to flood, desertification of fertile land and causes soil erosion. This affects the agriculture and grazing areas of cattle. Also, fodder, firewood, fibres, etc. become short to rural people.  
 (d) In the absence of forests, the climate of urban areas changes drastically. The air becomes polluted. Many useful products obtained from forests are not available. For example, medicines, fibres, fruits, and wood or timber for making houses, furniture, buildings, etc. will be scarce.  
 (e) Deforestation increases the level of carbon dioxide in the atmosphere. This causes the greenhouse effect which leads to global warming.  
 (f) The next generation will be devoid of all the benefits of forests and will suffer a healthy and harmonious life.
4. (a) It will lead to desertification, soil erosion and serious environmental problems such as global warming, rise in the sea level, etc. This will ultimately affect all the living beings.  
 (b) This will disturb the life, growth and reproductive potential of that animal.  
 (c) It will be blown away by the wind or washed away by the running water making the soil infertile.
5. (a) Wildlife is a valuable biological resource. The conservation of biodiversity is essential because:
  - Biodiversity maintains a balance in nature or in the ecosystem through food chains and food webs.
  - Biodiversity regulates climate, rainfall and wind speed.
  - Wild animals and plants provide a variety of commodities.
  - Wildlife is needed for breeding programmes in agriculture, horticulture, sericulture, apiculture, etc.
  - It helps in cycling of nutrients and preservation of soil fertility.
 We, the human beings, are a part of nature and all the components of nature are interdependent. Any damage to biodiversity will threaten the human existence. Therefore, biodiversity needs to be conserved.
- (b) Encroachment by people living in the neighbourhood, indiscriminate killing and poaching of wild animals for skin, fur, horn and tusk has caused reduction and elimination of many wild animals living in protected forests.  
 (c) Forests support tribal people living there by providing them with a variety of essential commodities such as food, fodder, firewood, fruits, fibres, medicines, essential oils, etc.  
 (d) **Hint:** Refer 'Causes of Deforestation', 'Consequences of Deforestation'.  
 (e) **Hint:** Refer 'The Red Data Book'.  
 (f) Migration is the seasonal movement of an animal from its habitat to some safer area, due to climatic changes, where it breeds and returns when climatic conditions become favourable.
6. Because of great increase in human population, more and more trees are cut every day. This has led to the rapid decline in biodiversity. This is also causing changes in the temperature and rainfall patterns. These are responsible for global warming and melting of glaciers. Such changes have adverse effects on biodiversity. Thus, alternative sources for forest products should be explored. To restore forest cover and forest wealth, tree saplings should be planted regularly. This will ensure regular supply of forest products and will not disturb the ecological balance in nature.
7. (a) Creating awareness in mass regarding the importance of plants through different media.  
 (b) Establishing the Ecoclubs in housing societies.  
 (c) Organising debates, street shows, poster making competitions, etc.  
 (d) Plantings the saplings of trees on bare land.
8. Deforestation leads to increased amount of carbon dioxide in air which results in global warming, i.e., increase in the earth's temperature. This disturbs water cycle which reduces rainfall.
9. Do yourself.
10. Paper is made from wood. It takes 17 fully grown trees to make one tonne of paper. By saving paper, we can save many trees. Also, we save energy and water required for manufacturing paper.
- Ways to save paper:**
- (a) Not wasting paper and minimising the use of paper.  
 (b) Taking maximum use of paper by writing on both sides of it.  
 (c) Using e-card instead of paper greeting cards or using old greeting cards and wedding cards for making new cards or invitation cards, etc.

- (d) Reusing gift wrappers.  
 (e) Sending e-invitation wherever possible instead of paper invitations.
11. **Down:** 1. ENDANGERED 2. RED DATA BOOK 5. DESERTS  
**Across:** 1. EXTINCT 3. ENDEMIC 4. BIODIVERSITY

## CHAPTER 8. CELL–STRUCTURE AND FUNCTIONS

1. (a) T (b) F (c) F (d) T
2. **Hint:** Refer 'Fig. 8.2'.  
 The nerve cell receives and transfers messages. Thus, it helps to control and coordinate the working of different parts of the body.
3. (a) Cytoplasm is a jelly-like semifluid substance that lies between the cell membrane and nucleus. It has up to 90% water. All chemical reactions inside the cell take place in the cytoplasm. A number of cell organelles are found suspended in the cytoplasm.  
 (b) Nucleus is a small spherical or oval structure. It is called the control centre of the cell. In animal cells, nucleus is located in the centre of the cell but in plant cells, it is shifted to one side because of the large central vacuole. The nucleus consists of four parts: nuclear envelop, nucleoplasm, nucleolus and chromosomes. The nuclear envelope surrounds the nucleus. Nucleoplasm is a dense fluid-like granular substance inside the nucleus. It contains a spherical body called nucleolus. Nucleolus contains ribonucleic acid (RNA) for the formation of ribosomes. In the nucleoplasm, there are fine thread-like structures called chromatin threads. They form chromatin net which condenses to form chromosomes.
4. Cytoplasm.
5. **Hint:** Refer 'Fig. 8.4 and Table 8.1'.
6. Cells that have true nucleus are called eukaryotic cells while the cells without a true nucleus are called prokaryotic cells.
7. Chromosomes are found in the nucleus. They are hereditary structures. They pass parental characters to the offspring.
8. A cell is the smallest part of the body of an organism. It is able to carry out all the basic functions of life like metabolism, growth and reproduction. Every part of our body and every part of a plant is made up of hundreds of thousands of cells. Therefore, a cell is the basic unit of structure and function in all living beings.
9. Chloroplasts contain a green pigment called chlorophyll. This provides green colour to the leaves which is necessary for photosynthesis.
10. **Across:** 1. CHLOROPHYLL 3. ORGANELLE 6. PROTOPLASM 8. GENES  
**Down:** 1. CHLOROPLASTS 2. ORGAN 4. MEMBRANE 5. VACUOLE  
 7. TISSUE

## CHAPTER 9. REPRODUCTION IN ANIMALS

1. Reproduction is important in the life of organisms because it helps in the continuity of life from one generation to the next generation.
2. The union of sperm and ovum is called fertilisation. In human beings, fertilisation occurs in the anterior part of oviduct.
3. (a) (i) (b) (ii) (c) (ii)
4. (a) (F) (b) (T) (c) (T) (d) (F) (e) (F) (f) (F) (g) (F) (h) (T) (i) (T) (j) (F)
5. Zygote is a single-celled structure while embryo is a multicellular structure. Zygote does not resemble with adult form whereas a foetus resembles the human form.
6. In asexual reproduction, a single organism (parent) produces genetically identical individuals of its own kind. The second parent is not needed.  
 The offspring produced by asexual reproduction are identical to each other and to the parent. They are called clones. Asexual reproduction is carried out in many ways:
- **Binary Fission:** It occurs in unicellular organisms like bacteria, *Ameoba* and *Paramecium*. First the nucleus of parent cell divides into two daughter nuclei. This is followed by the division of parent cell. Each half receives one daughter nucleus and forms a daughter organism. Thus, two daughter organisms are formed from one organism.
  - **Budding:** In budding, a new organism is formed as an outgrowth from the parent body. In *Hydra*, a small bulge appears from the lower part of the body. This grows into a bud, detaches from parent body and develops into a young *Hydra*.
7. Uterus



8. The change in form and shape from larva to adult is called metamorphosis. In frogs, the development of the embryo takes place outside the female body. The embryo develops inside the egg. The embryo hatches out of the egg as larva, called tadpole. The tadpole undergoes several changes in its form and structure and changes into an adult frog.
9. **External Fertilisation:** When the fusion of male and female gametes takes place outside the body of female, it is called external fertilisation. This type of fertilisation takes place in water. It is found in frog and aquatic animals such as fishes and starfishes.
- Internal Fertilisation:** In internal fertilisation, fusion of male and female gametes takes place inside the body of the female. Internal fertilisation occurs in reptiles, insects, birds and mammals including human beings.
10. **Across:** 1. FERTILIZATION 6. INTERNAL 7. BUDS 8. OVARY  
**Down:** 2. TESTES 3. ZYGOTE 4. OVIPAROUS 5. BINARY

## CHAPTER 10.

### REACHING THE AGE OF ADOLESCENCE

1. Hormone.
2. The period of life when the body undergoes changes leading to reproductive maturity is called adolescence.
3. Menstruation is the periodic discharge of blood and lining of uterus in females. Between two successive ovulations, the wall of uterus becomes thick and vascular to receive the developing embryo. In case the egg is fertilised, pregnancy results. In case ovum is not fertilised, the thickened lining of uterine wall and its blood capillaries break down. This causes bleeding. This blood discharge is called menstrual flow and it lasts for 3 to 7 days. The cycle of breakdown of wall of uterus and its blood capillaries causing menstrual flow every 28th day is called menstruation or menstrual cycle.
4. The changes that take place at puberty are:
  - (a) Increase in height
  - (b) Changes in body shape
  - (c) Change in voice box and voice
  - (d) Increase in the activity of sweat glands and sebaceous glands
  - (e) Maturation of sex organs
  - (f) Growth of beard and moustaches in boys
  - (g) Beginning of menstruation in girls
5. **Hint:** Refer Table 9.3.
6. Hormones secreted by testes and ovaries are called sex hormones. Testes secrete testosterone and ovaries secrete estrogen. They are secreted by sex organs so they are called sex hormones. They stimulate changes in the body and produce secondary sexual characters in males and females.
7. (a) (ii) (b) (i) (c) (ii)
8. (a) At puberty in boys, the larynx begins to grow and protrudes out in the throat region. This is called Adam's apple.  
 (b) The external features that help to distinguish a male from a female are called secondary sexual characters. For example, beard and moustaches, hair on chest and thighs, adam's apple in males, and developed breasts, wide pelvic region and shrill voice in females.  
 (c) **Hint:** Refer 'Determination of Sex of Child in Human Beings'.
9. **Across:** 3. ADAM'S APPLE 4. ENDOCRINE 7. PITUITARY 8. HORMONE  
 9. INSULIN 10. ESTROGEN  
**Down:** 1. TESTOSTERONE 2. THYROID 3. ADOLESCENCE  
 5. TARGET SITE 6. LARYNX 7. PUBERTY
10. Do yourself.

## CHAPTER 11.

### FORCE AND PRESSURE

1. Two examples showing push or pull in order to change the state of motion of objects are pushing a trolley and pulling a drawer.
2. Two examples showing a change in the shape of an object on applying force are pressing a lump of dough with hands and stretching a rubber band.
3. (a) pull (b) attracts (c) push (d) repels
4. (a) shape (b) muscular (c) contact (d) gravity, friction
5. (a) Here, fingers are agent and a piece of lemon is object on which force acts. When force acts on the lemon, its shape changes and juice is pushed out of it.  
 (b) Here, thumb is agent and a toothpaste tube is an object on which force acts. When pushing a toothpaste tube, paste comes out of it and the shape of the tube gets changed.

- (c) Here, spring is an object and a load is an agent. When a load is suspended from a spring, spring gets stretched.  
 (d) Here, an athlete is an agent and the earth is an object on which force acts. When an athlete makes a high jump, he pushes the ground in order to change the position.
- The force due to hammering changes the shape of the piece of iron.
  - Electrostatic force is responsible for the attraction between the balloon and the wall.
  - Muscular force and gravitational force. Because muscular force acts upwards and gravitational force acts downwards in order to maintain the balance and there is no possibility of change in the state of motion.
  - Gravitational force and mechanical force act on the rocket immediately after leaving the launching pad.
  - (d)

## CHAPTER 12.

### FRICTION

- (a) relative motion (b) nature (c) heat (d) reduces (e) smaller
- (c) **3.** (a) **4.** Do yourself. **Hint:** In the opposite direction of the slope.
- It would make it more difficult to walk on the floor because smoothness of floor and slippery nature of soap will reduce the friction.
- Sportsmen use shoes with spikes in order to have an extra grip on the ground while playing.
- Seema will apply a larger force because heavier the box, larger is the force of friction acting on it.
- Lesser force is required to move the object while sliding whereas larger force is required to move the object in static condition because it is in rest position. Therefore, sliding friction is less than static friction.
- Fixing a nail on the wall is not possible without friction. This example shows that friction is necessary or a friend. Rubbing of mechanical parts produces heat and damages the moving parts. This example shows that friction is a foe or an evil.
- The objects moving in fluids must have special shapes because these objects require a lot of energy to overcome the drag. To reduce this problem, these objects are having a special body shape called streamlined shape.

## CHAPTER 13.

### SOUND

- G. 1. (d) 2. (c)
- (a) T (b) F (c) F (d) T (e) F (f) F (g) T
  - (a) Time period (b) amplitude (c) hertz (Hz) (d) noise (e) frequency
  - Number of oscillation ( $n$ ) = 40, time ( $t$ ) = 4 s  

$$\therefore \text{Time period (T)} = \frac{t}{n} = \frac{4}{40} = 0.1 \text{ s}$$
 and frequency ( $\nu$ ) =  $\frac{1}{T} = \frac{1}{0.1} = 10 \text{ Hz}$
  - Given that  $\nu = 500$ ,  $T = ?$   

$$T = \frac{1}{\nu} = \frac{1}{500} = 0.002 \text{ s}$$
  - (a) Dholak – Stretched skin (b) Sitar – string (c) Flute – air column
  - Hint:** Refer 'Answer C-5'.
  - Do yourself.
  - Hint:** Refer 'Answer D-3'.
  - We would suggest our parents to buy the house three lanes away from roadside because traffic on road is one of the causes of noise pollution.
  - Hint:** Refer Fig. 12.6. The sound producing organ of our body is called larynx or voice box. It is located in the throat at the upper end of the windpipe. Inside the voice box, there are two ligaments called vocal cords. When lungs force out air through the larynx, the vocal cords vibrate to produce sound. The muscles attaching the vocal cords can make them loose or tight. This is called changing the tension in the vocal cords. The tension on the vocal cords can change to produce a higher or a lower tone.
  - Hint:** Refer 'Answer F-1'.



## CHAPTER 14.

### CHEMICAL EFFECTS OF ELECTRIC CURRENT

- G. 1. (a) acids, bases, salts (b) chemical (c) negative (d) electroplating
2. Yes, the taken sample of solution would be a good conductor of electricity hence, due to magnetic effect of electricity, the magnetic middle shows deflection.
3. Tap water, salt solution, lemon juice, etc.
4. The possible reasons of not glowing the bulb joined in tester may be:
- (i) The sample liquid may be a bad conductor of electricity.
  - (ii) The bulb may be fused.
  - (iii) The battery may be discharged.
5. (i)
6. No, we can mix some table salt, lemon juice or soda in pure water to make it conduct electricity.
7. In case of a fire, the firemen involved at the site use impure water to extinguish the fire. The impure water is a good conductor of electricity and it causes electric shocks so they shut off the main electrical supply for the area.
8. Seawater contains more salts as compared to drinking water because drinking water gets purified to remove excess salt. Hence, seawater is a better conductor than the drinking water so the child gets more deflection in compass needle in case of seawater.
9. No, it is not safe because rainwater can get slightly acidified as well as it wets the equipments that can cause electric shock.
10. In atmosphere, a plenty of smoke particles is present. They contain many nonmetallic oxides like  $\text{CO}_2$ ,  $\text{NO}_2$ ,  $\text{SO}_2$ , etc. which mix with rainwater and form acids like  $\text{HNO}_3$  (nitric acid),  $\text{H}_2\text{CO}_3$  (carbonic acid),  $\text{H}_2\text{SO}_3$  (sulphurous acid) or  $\text{H}_2\text{SO}_4$  (sulphuric acid). Thus, mixing of acids can cause acid rain, therefore, rainwater gets impure and becomes good conductor of electricity.
11. Do yourself. **Hint:** Car parts, taps, kitchenware, gas stove, cutlery, etc.
12. Impure thick copper rod should be attached to the positive terminal of the battery because when copper sulphate ( $\text{CuSO}_4$ ) gets decomposed, the copper (copper ion) gets attracted towards the negative electrode and converting into copper gets deposited here. Further, sulphate part goes to positive electrode and again converts its copper sulphate by decreasing the thickness of impure copper plate.

## CHAPTER 15.

### SOME NATURAL PHENOMENA

1. (b) 2. (b)
3. (a) F (b) T (c) F (d) F
4. A crackling sound is heard while taking of a sweater because the sweater gets charged electrically on rubbing with our skin.
5. When we touch a charged body with our hand, the charge flows from that body to our hand because human body behaves as a good conductor of electricity. Thus, the charged body loses its charges.
6. Richter scale. Yes, an earthquake of measure 3 be recorded by a seismograph. No, it will cause no damage.
7. Some important safety measures to protect from lightning are as follows:
- When inside**
- (a) Stay away from doors and windows.
  - (b) If the thunderstorm is present, do not plug or unplug TVs, telephones, stereos or other electrical appliances.
  - (c) Stay away from plumbing, avoid running water and do not take a shower or bath.
- When outside**
- (a) If caught outdoors, seek cover indoors as quickly as possible.
  - (b) Do not stand under a tree for cover because taller and moist objects are more prone to lightning strike.
  - (c) Do not use an umbrella, lawn mower, bicycle or similar objects.
  - (d) If caught in an open field, crouch low, with your head bent in between your arms and legs close together.
8. As the two charged balloon have the similar charges, hence they repel each other. But when an uncharged balloon is brought near a charged balloon, it is induced an opposite charge to itself and hence gets attracted.
9. **Hint:** Refer 'Fig of Activity-3'.  
Also, Refer 'Answer D-1'.
10. Jammu and Kashmir, Rajasthan and Gujarat
11. We should take these precautions to protect ourselves:
- If we are Driving**
- (a) Pull over to the side of the road, stop and set the parking brake.
  - (b) Avoid bridges, power lines, poles, signboards, buildings and trees, as much as possible.
  - (c) Stay inside the vehicle until shaking stops.

(d) If a power line falls on the vehicle, stay in till a trained person removes it.

**If we are Outdoors**

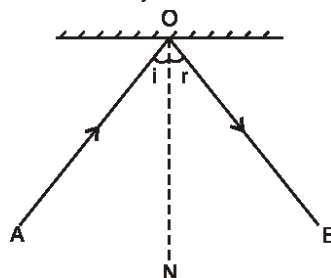
- (a) Look for a place away from trees, poles, power lines, buildings and hoardings.  
 (b) Drop to the ground, till the tremors stop.
12. If it is predicted that a thunderstorm is likely to occur on a certain day and we have to go out on that day, then carrying an umbrella is not a good idea because an umbrella has metallic wires and rods that can cause electric shock during thunderstorm. Also, we have to face a lot of difficulties due to storms.

## CHAPTER 16. LIGHT

1. No, we cannot see the objects kept in a dark room when we are also present in the room. Yes, we can see the objects outside the room because the light comes from them to our eyes.
2. **Hint:** Refer 'Answer C-3'.  
 No, diffused reflection does not mean the failure of laws of reflection.
3. Regular reflection will take place in case of striking a beam of light on (a) polished wooden table, (d) marble floor with water spread over it and (e) mirror. In these cases, surfaces are too smooth.  
 Diffused reflection will take place in case of light striking on (b) chalk powder, (c) cardboard surface and (f) piece of paper. In these cases, surfaces are so rough that regular reflection cannot take place.
4. **Hint:** Refer 'Answer C-2'.  
 5. **Hint:** Refer 'Activity-1'.  
 6. (a) 2 (b) left, left (c) bigger (d) less  
 7. (a) 8. (b)  
 9. **Hint:** Refer 'Activity-5'.  
 10. **Hint:** Refer 'Fig. 15.11'.  
 11. Laser beam is not preferred to human eyes because it can damage the living cells (rods and cones specially). Hence, the teacher advised Gurmit not to perform the activity related to varying the pupil's size in bright and dim light, using a laser torch.  
 12. **Hint:** Refer 'Answer D-5'.  
 13. According to question, angle between incident ray and reflected ray is  $90^\circ$ . Let us sketch a ray diagram to understand it clearly.

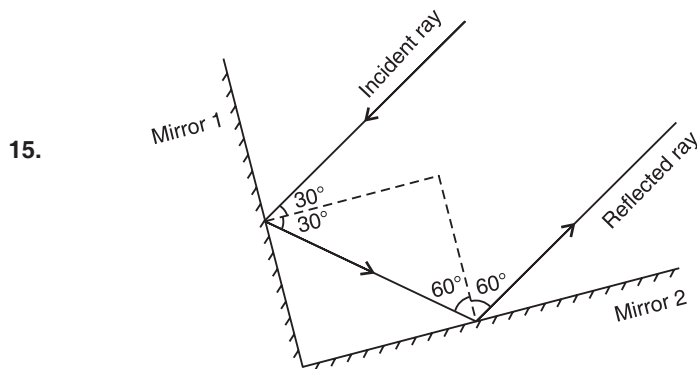
Here,  $\angle AOB = 90^\circ$  (from question)  
 $\therefore \angle AON = \angle BON$  (Law of reflection)  
 i.e.,  $\angle i = \angle r$   
 So,  $\angle i + \angle r = 90^\circ$   
 or  $\angle i + \angle i = 90^\circ$

$$\text{or } 2\angle i = 90^\circ \quad \therefore \angle i = \frac{90^\circ}{2} = 45^\circ$$

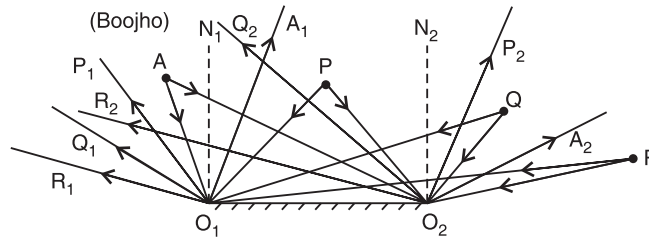


14. Infinite images, because the number of images formed by two plane mirrors does not depend upon distance between them. It depends upon the angle between them.  
 As the angle between two parallel plane mirrors is  $0^\circ$ .  
 So number of images,

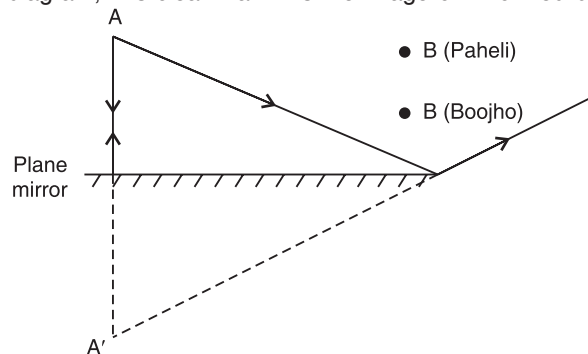
$$= \frac{360^\circ}{\theta} - 1 = \frac{360^\circ}{0} - 1 = \infty - 1 = \infty$$



16. From the ray diagram shown below, we observe that



- Boojho standing at A cannot see his image himself because reflected rays (as drawn  $O_1A_1$  and  $O_2A_2$  from two ends) go away from him.
  - Position of A lies between reflected rays  $O_1P_1$  and  $O_2P_2$  as well as  $O_1Q_1$  and  $O_2Q_2$ , hence he can see the images of P and Q only.
  - Similar to that of A, reflected rays  $O_1R_1$  and  $O_2R_2$  move away from A so he cannot see R also.
17. (a) From the sketched ray diagram, it is clear that  $A'$  is the image of A formed by the given plane mirror.



- (b) Yes, B can see this image.
- (c) Yes, C can see this image.
- (d) Position of A does not change so position of image will also not change when Paheli moves from B to C.

## CHAPTER 17. STARS AND THE SOLAR SYSTEM

1. (c) 2. (a) 3. (a)
4. (a) Neptune (b) Mars (c) constellation (d) moon or satellite (e) stars (f) Mars, Jupiter
5. (a) F (b) T (c) F (d) T (e) F (f) F
6. (i) (e), (g) (ii) (a) (iii) (c), (f) (iv) (d)
7. Venus is visible as an evening star in the western sky.
8. Jupiter.
9. A group of stars forming a recognisable shape is called a constellation. Two constellations are Ursa Major and Orion.
10. Refer 'Fig. 16.7' and 'Fig. 16.10'.
11. (a) Asteroids (b) Comets
12. On a clear moonless night during summer at about 9.00 pm, look towards the northern part of the sky and identify Ursa Major. Look at the two stars at the end of Ursa Major. Imagine a straight line passing through these stars and extend it towards the north direction. This line will lead to a star which is not too bright. This is the pole star. Pole star does not move at all as other stars drift from east to west.
13. No. The Pole Star does not move at all while other stars appear to move from east to west because the Earth rotates from west to east.
14. The distance between stars is expressed in light years because to express large distances, bigger units are used. The given statement means that the distance between the Earth and the star is equal to the distance covered by light in eight years, with the speed of 3,00,000 kilometres per second.
15. Let the radius of the Earth be  $R_1$   
As per question, radius of Jupiter =  $11 R_1$

$$\text{Ratio of volumes} = \frac{\text{Volume of Jupiter}}{\text{Volume of Earth}} = \frac{\frac{4}{3}\pi \times (11R_1)^3}{\frac{4}{3}\pi \times R_1^3} = \frac{\frac{4}{3}\pi \times 1331 R_1^3}{\frac{4}{3}\pi \times R_1^3} = 1331$$

Hence, Jupiter can accommodate 1331 Earths.

16. No. Refer Fig. 16.12 or Fig. 17.17 (NCERT Book).

## CHAPTER 18. POLLUTION OF AIR AND WATER

1. **Hint:** Refer 'Answer-5'.
2. To reduce air pollution at an individual level, we should use less polluting fuels like CNG and LPG instead of diesel and petrol. Also, we should use public transport instead of private transport and create awareness about the same among others by various ways like organising debate, quiz, street play, poster making competition, etc.
3. Clear, transparent water is always fit for drinking because this water is free from impurities and germs. As a result, there is no possibility of spreading any kind of waterborne disease.
4. The measures taken in order to ensure the supply of clean water to all the residents are:
  - (a) Be alert in order to purify the water through water treatment plant before supplying it to the residents.
  - (b) Ensure that people do not contaminate water in waterbodies.
  - (c) Ensure that sewage water does not mix with the purified water.
  - (d) Ensure that pipeline supplying water to the residents is not broken or leaking.
5. Pure air does not contain any harmful substances while polluted air contains smoke, poisonous gases, germs, etc. Polluted air is harmful to living beings.
6. Air pollutants like sulphur dioxide and nitrogen dioxide, emitted from vehicles, factories, power plants, etc., get mixed with the air. Sulphur dioxide and nitrogen dioxide react with oxygen and water vapour present in the air to form sulphuric acid and nitric acid, respectively. These acids dissolve in rainwater and fall on the earth. Rain with acids dissolved in it is called acid rain.  
Acid rain affects us in many ways:
  - (a) It contaminates lakes, rivers, etc., which may kill fishes and other creatures living in the water.
  - (b) It damages the leaves of trees, plants, etc.
  - (c) It damages the buildings, monuments, statues (especially made of marble and limestone).
  - (d) It causes health hazards to humans.
  - (e) It makes soil acidic which reduces its fertility.
  - (f) It causes damage to steel bridges, railway lines, etc. Metals may also get corroded.
7. (d)
8. Burning of fuels like coal, petrol, diesel, etc. releases carbon dioxide in the air. With an alarming rise in industries, factories, vehicles on roads, etc., more fuel is burnt today. As a result, an extra amount of carbon dioxide is entering the atmosphere every day. Carbon dioxide allows the sun's rays to reach the earth's surface but prevents the heat given out by the ground from escaping. This results in the warming of the earth's surface. The warming of the earth's surface due to trapping of sun's heat by carbon dioxide present in the earth's atmosphere is called greenhouse effect.
9. The increase in the average temperature of the earth is termed as global warming. Global warming is caused due to the greenhouse effect of excess amount of carbon dioxide gas in the atmosphere. Actually, carbon dioxide gas allows the solar radiation to reach the earth's surface but it does not allow the heat reflected by earth to escape. This increases the temperature of the earth. Due to global warming, the polar ice caps and snow on the mountains is melting on a faster rates. This extra amount of water is raising the sea level causing threat to low-lying coastal areas to get submerged.
10. The Taj Mahal is made of white marble and is known for its beauty. But, the beauty of the Taj is facing the risk of vanishing as its white colour is turning yellowish. This discolouration has resulted due to air pollution around the Taj Mahal. The industries located in and around Agra and the petroleum refinery at Mathura release air pollutants like sulphur dioxide and nitrogen dioxide which dissolve in water, forming acids. The gases released from the petroleum refinery at Mathura are the main cause of acid rain around the Taj Mahal. When the acid-containing rain showers the Taj Mahal, acids corrode the marble, making it weak and yellowish.
11. **Hint:** Refer 'Answer F-2'.