

**Amazing**

**Science**

**Class - 8**

## 1. Crop Production and Management

### P.13 : Quick Review

- (a) tilling (b) earthworms  
(c) organic (d) healthy
- (a) False (b) True  
(c) False (d) False  
(e) True (f) False

### P.15 : Quick Review

- (a) harvester (b) weeding  
(c) trowel (d) nutrients, space
- (a) False (b) False  
(c) False (d) False

### Time to Review

- A. 1. (c), 2. (d), 3. (b), 4. (d), 5. (b)
- B. 1. two 2. seed drill  
3. organic 4. sickle  
5. weeds
- C. 1. False 2. True  
3. False 4. False  
5. False
- D. 1.-(e), 2.-(a), 3.-(d), 4.-(b), 5.-(c)
- E. 1. tilling 2. leveller  
3. irrigation 4. harvesting  
5. threshing
- F. 1. tilling 2. threshing  
3. irrigation 4. harvesting  
5. granaries
- G. 1. Similar plants grown and cultivated at one place on a large scale is called crop.  
2. The crops which are sown during monsoon season from June to July are called Kharif crops, for example, paddy and maize  
3. Rabi crops are sown in winter season from October to December, whereas Kharif crops are sown in monsoon season from June to July. Rabi crops require less water than Kharif crops.  
4. Tiller, plough and leveller are used before sowing seeds.  
5. Fertilizers are chemicals prepared in factories, which do not provide any humus to the soil. Manures are organic substances which provide a lot of humus to the soil.

- H. 1. The process of turning and loosening soil using a plough is called ploughing or tilling. This helps the root of plants to penetrate deep into the soil and to breathe easily as loosened soil contains enough air.

### Advantages of Ploughing

- Loosens soil allows deeper penetration of roots.
  - It helps to mix manure with the soil.
  - It improves circulation of air in the soil, helping roots to respire easily.
  - It increases the water retention capacity of the soil.
  - It removes weeds from the soil.
2. Weeds are undesirable plants that grow with the crop to affect the growth of the crop plants. Weeds need to be removed. Various methods are used to remove weeds such as uprooting them with the help of a trowel or manually. Farmers also use some chemicals to control weeds. 2,4-D and MCPA are such chemicals. They are sprayed before flowering or seed formation.
3. Seeds can be sowed using different methods. They are sprinkled manually into the soil, but this results in uneven distribution of seeds and some of the seed are destroyed by birds. A seed drill is a better way to sow seeds. It ensures the sowing of seeds at proper distances and depths for the proper growth. This also prevents damage of seeds by birds.
4. The practice of growing two or more different crops in a field one after another is known as crop rotation. It is one of the oldest and most effective cultural control strategies. It means the planned order of specific crops planted on the same field. It also means that the succeeding crop belongs to a different family than the previous one. Some disease-causing organisms are hosts specific. For example, rice stem borer feeds mostly on rice. If we do not rotate rice with other crops belonging to a different family, the problem continues as food is always available to the pest. However, if we plant legume as the next crop, then corn, then beans, then bulbs, the insect pest will likely die due to absence of food.

5. Drip irrigation saves water and fertilizer by allowing water to drip slowly to the roots of plants, either onto the soil surface or directly onto the root zone, through a network of valves, pipes, tubing, and emitters. It is done through narrow tubes that deliver water directly to the base of the plant.

6. During green revolution high-yielding dwarf varieties of wheat were introduced from Mexico and Australia. New varieties of wheat with desirable characteristics were developed by cross-breeding method. Mexican wheat was a high-yielding variety. It was resistant to pests. It was dwarf and required less irrigation and pesticides. Duration of crop maturity was also shorter.

High-yielding varieties of rice, maize, bajra, sugarcane, etc., were also developed by Indian scientists that were well-suited to the Indian conditions.

Professor M.S. Swaminathan started green revolution in India.

### HOTS Questions

1. Earthworms are known as friends of farmers since they turn and loosen the soil. They also add humus to soil by decomposing the dead plants and animals in the soil. Humus is a storehouse of essential plant nutrients. It provides high water absorption and water holding capacity through the soil by increasing air spaces.
2. The grain that float on water surface are not healthy. They are destroyed by insects or birds. So the grains that sank at the bottom are healthy. They should be cooked.
3. Chemical fertilizers do not make the soil fertile, but they add chemicals to the soil required by the crop. Manures are organic substances that make the soil fertile. So it is recommended to add them to the soil.

## 2. Microorganisms : Friends or Foes

### P. 25 : Quick Review

1. (a) roots, stems, leaves (b) Brown  
(c) *Lactobacillus* (d) oval  
(e) Spirilla (f) legumes
2. (a) True (b) False  
(c) False (d) True

### P. 27 : Quick Review

1. (a) host (b) bacterial  
(c) inside (d) fungus  
(e) albugo, puccina (f) potato blight
2. (a) False (b) False  
(c) True (d) False

### Time to Review

1. (c), 2. (a), 3. (a), 4. (b), 5. (d), 6. (a), 7. (a), 8. (d)
1. 78% 2. bacterial  
3. Amoeba 4. Bacteria  
5. brown 6. saprophyte.  
7. bacteria. 8. fungi
- (a) True (b) False  
(c) False (d) False  
(e) False
- 1.-(c), 2.-(a), 3.-(d), 4.-(b)
1. Microbiology 2. Pathogen  
3. Nitrogen-fixing bacteria 4. Toxin  
5. *Lactobacillus* 6. Bacteria  
7. Streptomycin 8. Sodium benzoate
1. An amoeba moves by changing its shape sending out pseudopodia, the finger-like projection.  
2. According to their shape, bacteria are classified into four groups : cocci, bacilli, spirilla and vibrio.  
3. Based on the pigment present, algae are classified into four groups : red algae, blue-green algae, brown algae and green algae.  
4. Most bacteria break down dead organisms and organic waste into basic components such as carbon dioxide, water, nitrogen and sulphur. In this way they help to keep the environment clean.  
5. Bacteria causes many diseases in humans, plants and animals.
1. **Microbes as food** : Microbes provide us a variety of food products. These organisms are used in cheese flavouring, manufacture of enzymes, organic acids, alcohols and many other such products. Yeasts are involved in the manufacture food items like bread, beer, wine, vinegar. Fungi like mushrooms are directly used as a delicious food. Bacteria like *Lactobacillus* are responsible of curdling of milk.

**Industrial uses of microbes :** Enzymes, amino acids, vitamins, antibiotics, organic acids and alcohols are commercially manufactured from the microorganisms. Microbial enzymes are generally extra cellular and marketed in crude form.

Flavouring agents of candy, ice cream and such other confectioneries, as a preservative for stored food and in ointments and cosmetics, the microbes are being used.

Lactic acid and acetic acid are commercially significant microbial byproducts. Lactic acid is used as food preservative and acetic acid is the major component of vinegar.

**Microbes in agriculture :** The microbes play an important role in recycling of the important elements like oxygen, carbon, nitrogen, and sulphur and phosphorous.

The nitrogen which is an essential component of the proteins is completely an inert gas. Yet it can mostly be fixed by certain bacteria independently or in symbiotic association of other organisms.

**Microbes in medicine:** The horrible epidemics like small pox, diphtheria, whooping cough, polio have been either reduced to a great extent or completely controlled by use of vaccination developed from the microbes. A large number of antibiotic have been developed from many microorganisms. Penicillin, streptomycin and tetracycline are examples of it.

2. **Bacteria :** Bacteria are unicellular organisms. There are many bacteria, which are harmful not only to humans, but also to plants and animals. They live inside the bodies of plants, animals and humans and cause diseases. Tetanus, tuberculosis, diphtheria, anthrax and leprosy are some of the diseases caused to humans by bacteria. Blight of paddy, citrus canker and soft rot are some of the common diseases caused to plants by bacteria.

**Viruses :** These are simple microorganisms, which cannot survive outside the host for long periods, so they are mainly transmitted by blood-to-blood. In the human body, they have to invade the cells to multiply. Viruses

usually cause systemic infections, affecting the whole body. Some diseases caused by viruses in human beings are polio, AIDS, colds, measles, chicken pox, swine flu and mums. In animals, viruses spread from one diseases organism to another.

**Fungi :** These are a group of living organisms, consisting from unicellular yeasts, and multicellular moulds and mushrooms. Some fungi are beneficial, others cause diseases in plants, animals and human. In human beings, ringworm is a common disease caused by a fungus. Potato blight and rust of wheat are diseases caused in plants by fungi.

**Protozoans :** These are unicellular organisms such as amoeba and paramecium. Plasmodium is a parasite which causes malaria to humans.

3. All life requires nitrogen compounds, for example, proteins and nucleic acids. Air, which has 78% nitrogen gas, is the major reservoir of nitrogen. But most organisms cannot use nitrogen in this form. Plants secure their nitrogen in fixed form. Animals secure their nitrogen compounds from plants.

Four processes participate in the cycling of nitrogen through the biosphere : nitrogen fixation, ammonification, nitrification and denitrification. Microorganisms play major roles in all four of these.

**Nitrogen fixation :** The energy of lightning breaks nitrogen molecules and enables their atoms to combine with oxygen in the air forming nitrogen oxides. These dissolve in rain, forming nitrates, that are carried to the earth and are absorbed by the plants.

Certain bacteria have ability to fix nitrogen of the atmosphere. They are called nitrogen-fixing bacteria. They live in a symbiotic relationship with leguminous plants such as soybeans. They convert atmospheric nitrogen into nitrogen compounds used by plants. The first stable product of the process is ammonia, this is quickly incorporated into protein and other organic nitrogen compounds.

**Ammonification :** The proteins made by plants are used by animals and human

beings. The metabolic reactions inside the body produce organic nitrogen compounds that return to the environment, chiefly in excretions. The microorganisms of decay break down the molecules in excretions and dead organisms into ammonia.

**Nitrification** : Ammonia can be taken up directly by plants, usually through their roots. However, most of the ammonia produced by decay is converted into nitrates by nitrifying bacteria. Through their activities nitrogen is made available to the roots of plants.

Many legumes, in addition to fixing atmospheric nitrogen, also convert some of their organic nitrogen to nitrites and nitrates. These reach the soil when they shed their leaves.

**Denitrification** : The three processes above remove nitrogen from the atmosphere and pass it through ecosystems. Denitrification reduces nitrates and nitrites to nitrogen gas, thus replenishing the atmosphere.

4. Food preservation usually involves preventing the growth of bacteria, fungi, or other microorganisms as well as retarding the oxidation of fats that cause rancidity.

Canning, freezing and drying food are the most common methods for preserving foods at home today. However, there are many other methods and some are easier and less expensive.

**Canning** : It is the process of heating the food at a specified temperature for a specific length of time (pasteurizing), and then vacuum sealing the pasteurized food in special glass jars designed for this purpose. It can be used with most foods, including fruits, vegetables, meats, seafood, and some prepared foods.

**Freezing** : It is the process of chilling foods to at least 0°C. It can be used with all foods, including fruits, vegetables, meats, seafood, grains, nuts, dairy, eggs, and prepared foods.

**Drying** : It is the process of dehydrating foods until there is not enough moisture to support microbial activity. It can be used with most foods, including fruits, vegetables, meats, seafood, grains, legumes, and nuts.

**Pickling** : It is the process of soaking food in a solution containing salt, acid, or alcohol. It can be used with most foods, including fruits, vegetables, meats, seafood, legumes, and eggs. Pickling is often combined with another method, such as canning or refrigerating.

5. Unlike other microorganisms, viruses have some non-living characteristics. They are found inside the cells of plants, animals and humans, which are not required by other microbes.
6. Nitrogen is the largest part of air but plants cannot take advantage of this nitrogen because they do not have the necessary enzymes to convert it into useful forms. However, nitrogen can be fixed by certain bacteria called rhizobium. They live in soil and interact with legume roots to form specialized structures called nodules in which nitrogen fixation takes place. This process entails the reduction of atmospheric nitrogen to ammonia. Through symbiotic nitrogen fixation, the plant benefits from using an endless source of nitrogen from the atmosphere. The process contributes to soil fertility because the plant root system leaves behind some of the nitrogen.

### HOTS Questions

1. Mosquitoes breed in stagnate water. They carry disease-causing germs from a sick person to a healthy person. So we should not collect water. Kerosene kills mosquitoes. So it is said to put kerosene in water tanks of coolers.
2. Common cold is a viral disease. Person-to-person transmission of common cold often occurs when an individual who has a cold blows, squeezes or coughs the secretion spread in air, when a healthy person breathes, he/she inhale droplet of this secretion suspended in air and subsequently become infected.
3. Your drain has a U- shape in it and water collects there. It blocks sewer gas from raising and coming into the house but since your sink was backed up, that water probably got mucky and there is now mucky stuff on the walls of the inside of the pipes. Bleach will kill the odour and bacteria.

### 3. Synthetic Fibres and Plastics

#### P. 36 : Quick Review

- (a) artificial silk (b) Nylon  
(c) Nylon  
(d) polyester and natural fibre
- (a) True (b) False  
(c) True (d) False

#### P. 39 : Quick Review

- (a) thermosetting plastics (b) melamine  
(c) bakelite (d) pipes, coating wires
- (a) False (b) True  
(c) True (d) False

#### Time to Review

- A. 1. (a), 2. (c), 3. (c), 4. (a), 5. (d), 6. (a), 7. (c)
- B. 1. synthetic fibres 2. bad  
3. acrylic 4. synthetic fibres  
5. perspex 6. perspex  
7. teflon
- C. 1. True 2. False  
3. False 4. False  
5. False 6. False
- D. 1.-(d), 2.-(c), 3.-(a), 4.-(b)
- E. 1. Artificial fibre 2. Rayon  
3. Nylon 4. Rayon  
5. Thermoplastic  
6. Thermosetting plastic
- F. 1. A polymer consists of multiple units of different chemical substances joined together.  
2. Polymers are used to make synthetic fibres, which are cheaper and more durable than natural fibres.  
3. Rayon is a synthetic fibre, which is obtained from silk by means of chemical treatment.  
4. Rayon has a lustrous appearance. It can be dyed in different colours. It does not shrink. It is cool to wear.  
5. We can use jute, cloth or paper bags instead of plastic bags. We should encourage disposal of plastic bags and reuse of plastic items.  
6. Bakelite is poor conductor of electricity and heat, so it is used to make switches.  
7. The strength and light-weight of nylon makes it highly suitable for making parachutes and ropes for climbing.

- Electric plugs are made of bakelite, which is strong electric and heat resistant.

G. 1.

Thermoplastic	Thermosetting plastic
It can be remoulded on heating.	It cannot be remoulded on heating.
It gets soft and deformed on heating	It does not soften, melt or get deformed on heating.

- Natural fibres often fall prey to moth and carpet beetles, whose larvae feast on things like cotton, wool and silk. Synthetic fibres are not a good food source for these fabric-damaging insects.

Synthetic fibres do not break down easily when exposed to light, water, or oil.

Compared to natural fibres, many synthetic fibres are more water resistant and stain resistant. Some are even specially enhanced to withstand damage from water or stains.

Synthetic fibres are cheaper than natural fibres.

- Plastic materials when thrown out destroy the natural beauty of a place and provide homes for many pathogens.

Plastic bags choke the drains which results in overflowing of waste water. This provides a good breeding place for mosquitoes.

Plastic bags sometimes eaten by animals like cows along with leftover food results in their death.

Use of recycled plastic bags to keep food items is harmful for health.

Burning of plastic releases poisonous gases into the atmosphere causing air pollution

Dumping of plastic goods in water bodies poses a threat to aquatic life.

#### How to tackle plastic pollution :

- Reduce the dependence on plastic bags and other items made of plastics.
- Carry cloth bag or jute bag for shopping.
- Never burn plastic items in the open.
- Don't throw plastic articles here and there after use.
- Keep separate garbage bins in your home for biodegradable non-biodegradable wastes.

#### 4. Biodegradable Wastes :

- They are decomposed and degraded by microbes
- Their degradation process is rapid.
- They are not accumulated but are used up in short time.
- They are used to produce manure, compost and biogas.

#### Non-biodegradable Wastes :

- They cannot be decomposed and degraded by microbes.
- Their degradation process is slow.
- They often accumulate.
- They can be separated and recycled but the process is very expensive.

5. **Bakelite** : It is used to make electric switches and plugs. It is also used in utensils.

**PVC** : It is used to manufacture coating of wires and cables. It is also used to make hose pipes.

6. (a) Thermosetting plastics are poor conductor of heat. So Saucepans have handles and lid covers made of plastics.

(b) Thermosetting plastics are poor conductor of electricity. So plug boards are made of thermosetting plastics.

### HOTS Questions

1. Separate garbage bins for biodegradable non-biodegradable wastes help to use biodegradable substance and to dispose off non-biodegradable wastes.
2. Polyester catches fire easily.

### 4. Metals and Non-metals

#### P.49 : Quick Review

1. (a) sodium, water, air (b) mercury  
(c) silver, platinum (d) bad  
(e) phosphorus (f) less
2. (a) False (b) True  
(c) False (d) False  
(e) False

#### P.52 : Quick Review

1. (a) iron, carbon (b) corrosion  
(c) blackened, sheen (d) ornaments
2. (a) True (b) False  
(c) True

### Time to Review

- A. 1. (d), 2. (a), 3. (c), 4. (c), 5. (c), 6. (c), 7. (a), 8. (a),  
9. (c), 10. (a), 11. (b), 12. (b), 13. (c), 14. (a)
- B. 1. hydrogen 2. boron  
3. magnesium, iron 4. silver  
5. bad 6. pop
- C. 1. water 2. magnesium oxide  
3. sodium 4. oxygen  
5. zinc sulphate, copper
- D. 1. False 2. False  
3. True 4. False  
5. False 6. False  
7. False 8. False  
9. False 10. False
- E. 1. sodium 2. mercury  
3. graphite 4. chlorine  
5. iodine 6. carbon  
7. gold
- F. 1. Atom is the smallest particle of an element that has all the properties of that particular element.  
2. Aluminum is a metal which is ductile whereas carbon is a non-metal, which is not ductile.  
3. Diamond is the hardest substance. It is a non-metal, a form of carbon.  
4. Lustre is a gentle sheen or soft glow shown by metals.  
5. Carbon and sulphur show lustre.  
6. The metals that are fairly unreactive are called noble metals. Silver, platinum and gold are noble metals.  
7. Metals react with acids to give respective salts and hydrogen gas.  
8. Metals react with oxygen to give metallic oxides.
- G. 1. Elements are substances consisting of atoms of the same kind. Elements are chemically the simplest substances and hence cannot be broken down using chemical methods. Elements are divided into metals and non-metals. Some elements have properties of both metals and non-metals. They are called metalloids.  
2. Sonority is the ability of a metal to produce sound when struck by something hard. The sonorous nature allows some of the metals

to be used in making bells. Since, most non-metals are liquids and gases, they do not have the ability to produce sound.

3. **Reaction with oxygen :** Metals react with oxygen to give metallic oxides, which are basic in nature. Non-metals react with oxygen to give non-metallic oxides, which are acidic in nature.

**Reaction with water :** Metals react with water to give oxides or hydroxides with the evolution of hydrogen gas. Non-metals do not react with water.

**Reaction with bases :** Metals do not react with bases, except aluminium, zinc and lead. The reaction of non-metals with bases are complex.

4. (a) Malleability is the ability of a metal to be hammered into thin sheets. Gold and silver are highly malleable. When a piece of hot iron is hammered it takes the shape of a sheet. The property is not seen in non-metals.
- (b) Ductility is the property of metals that allow them to be drawn into wires. Because of this property metals are used in making wires, utensils, frames of doors and windows, etc. Gold and silver are highly ductile metals. Non-metals are not ductile.
- (c) Sonority is the ability of metals to produce sound when struck against a hard surface. Non-metals are not sonorous.
5. Rusting is the common term for corrosion of iron and its alloys, such as steel. Many other metals undergo equivalent corrosion, but the resulting oxides are not commonly called rust. Certain conditions in the air around a metal have to be present for iron to rust. Iron rust which, generally appears brown, is itself a chemical compound quite different from the iron itself.

The rusting of iron can be prevented by applying paint, oil, or by depositing a layer of zinc on the surface of iron articles.

6. **Uses of metals :**
- Iron is used in making machinery, automobiles, cooking utensils, pipes, etc.

- Copper and silver are used to make ornaments.
- Copper is used to make electric wires.

**Uses of non-metals :**

- Chlorine is used in water purification process.
  - Iodine is used in antiseptics.
  - Phosphorus is used in matchsticks.
7. A displacement reaction is one in which a more reactive metal displaces a less reactive metal from its salt solution.
- For example, when zinc is added to aqueous solution of copper sulphate, it displaces copper forming zinc sulphate
- $$\text{CuSO}_4 + \text{Zn} \longrightarrow \text{Cu} + \text{ZnSO}_4$$
8. Malleability is the property of a metal to be beaten into sheets without breaking. Ductility is the property of a metal to be drawn into wires.
- H. 1. Aluminium does not easily react with food material and is also light in weight hence its foil is used for packaging.
2. Metals react with acid present in food to form compound that may be toxic.
3. The reason phosphorus is stored in water is because it will ignite on contact with air.
4. Sodium quickly oxidizes in air and is violently reactive with water, so it is stored in an inert medium, such as kerosene.

### HOTS Questions

1. In water, iron does not get oxygen which is required for rust to occur.
2. Plastic and wood are bad conductors of heat.
3. Metals produce sounds when struck against a hard material while wood does not. So bells are made of metals.
4. Copper is less reactive than zinc, so it does not replace zinc, and the reaction does not take place.

### 5. Coal and Petroleum

#### P. 62 : Quick Review

1. (a) exhaustible  
(b) petroleum  
(c) methane, ethane  
(d) clean, destructive distillation

2. (a) False (b) False  
(c) True (d) False

### Time to Review

A. 1. (d), 2. (d), 3. (c), 4. (c), 5. (b), 6. (b), 7. (c), 8. (a)

B. 1. solid 2. is  
3. petroleum 4. absence

C. 1. False 2. False  
3. False 4. False  
5. True 6. True

D. 1. fossils 2. carbonisation  
3. coal tar 4. coke  
5. fractional distillation 6. water  
7. petroleum 8. naphthalene

E. 1. The useful materials provided by the nature are called natural resources. Forests, animals, air, water, soil, sunlight, fossil fuels, metals, minerals are natural resources.

2. Two natural resources of energy are exhaustible resources and inexhaustible resources.

Air, water, and sunlight are inexhaustible resources of water.

Coal, petroleum and natural gas are exhaustible resources of energy.

3. Any source of energy that is limited and cannot be replaced when it is used, such as petroleum, coal, and natural gas.

4. Coal is composed of carbon, hydrogen, oxygen, nitrogen and varying amount of sulphur.

5. Petroleum is called liquid gold because of its high price and value and its economic need.

6. Coal is formed from the plants that lived hundreds of millions of years ago in swamp forests, even before the dinosaurs. When these plants died, they formed layers at the bottom of the swamps. Heat and pressure produced chemical and physical changes in the plant layers which forced out oxygen and left rich carbon deposits. In time, material that had been plants became coal.

7. Petroleum is formed from organisms living in land and seas about 300 millions years of ago. When these organisms died, their bodies settled at the bottom of sea after which the

same got covered with layers of sand and clay. The temperature converted them into petroleum and natural gas.

8. Destructive distillation is the chemical process involving the decomposition of feedstock by heating to a high temperature. The process breaks up or cracks large molecules. Coke, coal gas, coal tar and coal gas are obtained.

E. 1. An inexhaustible resource is one that is replaceable, while an exhaustible resource is not replaceable.

Exhaustible resources include fossil fuels such as, coal petroleum, gases etc. These are in limit quantity and hence should be conserved.

Inexhaustible resources include wind, water and sunlight. A good example of using an inexhaustible resource in this way is solar energy. Solar panels collect the energy from the sun's rays and turn them into energy to power a home or building.

2. Petroleum, coal and natural gas are fossil fuels. They were formed over millions of years, from the remains of dead organisms, coal was formed from dead plant material, petroleum and natural gas were formed from dead marine organisms.

Because they come from processes that happened over many million years. Once they are gone there will be no more for a very long time. So they are called exhaustible resources.

Fossil fuel are sources of energy. They burn to give power our vehicles and industries, heats and cools our buildings, and runs appliances.

3. Since fossil fuels take millions of years to create, they are nonrenewable. Once the resources are depleted, people will not be able to obtain any more coal, petroleum and natural gas. These fuels are needed for a variety of items that make our lives easier or prolong our lives. For this reason, it is important to conserve fossil fuels by using them as sparingly as possible and finding alternative sources of energy to perform some of the functions that we currently rely upon fossil fuels to perform.

4. Coal, oil and natural gas are fossil fuels. They have been in existence for millions of years. Many people use these fuels as an energy source. However, fossil fuels are non-renewable; if resources are depleted, they will never be available again. It is therefore important to conserve fossil fuels, using alternative sources of energy when possible.

There would be a great impact both on human beings and the environment of using excess of fossil fuels.

- Being non-renewable sources of energy, they would not be available once depleted.
  - Excessive use of fossil fuels can cause acid rain, global warming and massive air pollution.
  - Excessive coal mining can result in destruction of fertile agricultural lands.
5. Coal is actually just very old organic material that has been super compact to the point where most everything has been driven off except for carbon, the main constituent of coal. It was left behind by swamps during the height of the carboniferous period.
6. CNG (compressed natural gas) is a clean-burning fuel. It is actually the cleanest of all fossil fuels. Since CNG is a clean burning fuel, combusting it leaves little or no residue compared to petrol or diesel. Thus, the damage to the pipes and tubes of the vehicle's engine is greatly reduced. There is also less particulate matter that can contaminate the motor oil.

CNG is a non-toxic fuel that does not pose any danger of contamination to air and ground water.

### HOTS Questions

1. Natural resources takes a long time to convert into fossil fuels. So it is not possible to prepare natural resources in a laboratory.
2. Yes, water, air, and sunlight are inexhaustible resources of energy.
3. Using public transport is a better practice to save fuels.

## 6. Combustion of Flame

### P.70 : Quick Review

1. (a) combustible (b) continues  
(c) explosion (d) non-luminous
2. (a) False (b) True  
(c) True (d) True

### Time to Review

- A. 1. (a), 2. (d), 3. (d), 4. (c), 5. (c), 6. (a), 7. (b), 8. (a)
- B. 1. outermost 2. very easily  
3. ignition temperature 4. carbon monoxide  
5. global warming 6. innermost
- C. 1. False 2. False  
3. False 4. False  
5. False 6. True
- D. 1. kilojoule/kg 2. ignition temperature  
3. oxygen 4. explosion
- E. 1. Combustion takes place when fuel, most commonly a fossil fuel, reacts with the oxygen in air to produce heat.
2. Three things are required in proper combination before ignition and combustion can take place are heat, oxygen and fuel.
3. A flame is the visible, gaseous part where combustion takes place. It is caused by a highly exothermic reaction taking place in a thin zone. A fuel burns to produce a flame.
4. The calorific value of a fuel is the quantity of heat produced on complete combustion of 1 kg of fuel.
5. Substances that burn in air or oxygen to produce heat and light are called combustible substances. Substances that do not burn in air to produces heat and light are called non-combustible substances.
6. Substances that have low ignition temperature and catch fire easily are called inflammable substances.
7. The lowest temperature at which a substance catches fire is called its ignition temperature.
- F. 1. Carbon dioxide extinguishers contain a mixture of liquid and gaseous carbon dioxide. Carbon dioxide is normally a gas at room temperature and pressure. It has to be stored under high pressure to make it a liquid. When the pressure is released, the

gas expands enormously and cools to make a huge white jet. Carbon dioxide attacks the fire triangle in two ways : it smothers the oxygen and, because it is so cold, it also removes heat.

2. Environmental pollution is one of the major harmful effect of burning fuels. It is a known fact that carbon dioxide, gas released when fossil fuels are burnt, is one of the primary gas responsible for global warming. Rise in temperature of earth which results in melting of polar ice caps, flooding of low lying areas and rise in sea levels.

Sulphur dioxide is one of the pollutant that is released when fossil fuels are burnt and is a main cause of acid rain. Acid rain can lead to destruction of monuments made up of brickwork or marbles. It also harm plants and animals.

Fuels like wood, coal, and petroleum release unburnt carbon particles which are harmful. These particles remain suspended in the air. This air when inhaled causes respiratory problems. Air pollution can result in asthma, chronic obstructive pulmonary disorder or lung cancer.

3. The flame is divided into three zones : outermost, middle and innermost.

The outermost zone, which is blue in colour, is the hottest zone of a flame. Complete combustion takes place here.

The middle zone is yellow in colour. It is the part where partial combustion takes place.

The innermost zone is dark in colour. It is the zone of the unburnt wax vapour.

For diagram Fig. 6.2 see page 67 of textbook.

4. Rapid combustion takes place rapidly evolving a lot of heat and light in a short period of time. In spontaneous combustion, the fuel does not need external heat to start combustion, and it catches fire on its own.
5. (a) **Global warming** : Global warming is the increase of Earth's average surface temperature due to effect of greenhouse gases, such as carbon dioxide from burning fossil fuels or from deforestation, which trap heat that would otherwise

escape from Earth. It results in disastrous consequences such as melting of ice caps or glaciers leading to rise in the sea level.

- (b) **Acid rain** : When fossil fuels burn, these, release gases like carbon dioxide, sulphur dioxide and oxides of present in air form acids, which fall on earth with rain. This is known as acid rain. Acid rain causes damage to plants and animal life. It adversely affects the fertility of soil.

Acid rain can also have a damaging effect on many objects, including buildings, statues, monuments, and cars. The chemicals found in acid rain can cause paint to peel and stone statues to begin to appear old and worn down, which reduces their value and beauty.

- G. 1. Petrol is an inflammatory fuel, so it catches fire easily.
2. The outer zone is the hottest zone of a flame. So the goldsmith blows it with a metallic blowpipe.
3. The calorific value of LPG is more than wood. It also does not produce much smoke.
4. A luminous flame is usually is observed in inadequate supply of oxygen but a black flame is one which is seen when little oxygen is available. So it produces more residue than a luminous flame.
5. Water is not used for extinguishing a fire cause by an electric circuit as water may conduct electric current and prove rather harmful. Since water is heavier than oil, so it sinks beneath oil. The oil keeps floating on top of and continue to burn. So we do not use water to put off fire by oil.

### HOTS Questions

1. Water is not used to extinguish a fire cause by an electric circuit as water may conduct electric current and prove rather harmful. So fighter use oil instead of water.
2. Due to lack of oxygen in the closed room, the burning of the angithi cannot fully oxidize and thus forms dangerous carbon monoxide.

Carbon monoxide will prevent oxygen exchange in the lungs, resulting in the person dozing off to a state of unconsciousness and eventually death.

3. See answer to question 2 of Give reasons.

## 7. Conservation of Plants and Animals

### P.77 : Quick Review

- (a) biodiversity (b) animal  
(c) deforestation
- (a) False (b) True  
(c) True

### P.80 : Quick Review

- (a) discriminate, depletion (b) Gujarat  
(c) India (d) endangered
- (a) False (b) False  
(c) True

### Time to Review

- A. 1. (b), 2. (a), 3. (a), 4. (b), 5. (a), 6. (c), 7. (a),  
8. (a), 9. (b)
- B. 1. deforestation 2. endemic  
3. migration 4. endangered  
5. endangered
- C. 1. False 2. False  
3. False 4. True  
5. True
- D. 1. national park 2. endemic species  
3. vulnerable species 4. Project Tiger  
5. endangered 6. desertification  
7. sanctuary 8. Red Data Book
- E. 1. (a) **Sanctuary** : A wildlife sanctuary is an area that is set aside exclusively for the use of wild animals, which are protected when they roam or live in that area.  
(b) **Desertification** : It is a type of land degradation in which a relatively dry land region becomes increasingly arid, typically losing its bodies of water as well as vegetation and wildlife. It is caused by a variety of factors, such as climate change and human activities.
- Endangered animals are species that are under the threat of extinction. When an animal or species is termed endangered, it is either disappearing fast or is very sparsely populated.
  - Reforestation is the restocking of existing forests and woodlands that have been depleted, usually through deforestation.

4. Migration is the seasonal movement of animals in groups from one habitat to another to find food, a more hospitable climate or places to breed.

- F. 1. Deforestation can have a severe impact on the environment. Some of the consequences of deforestation are given below.
- Rainfall and soil fertility decreases resulting in increased chances of natural calamities like floods and droughts.
  - Deforestation increases the ambient temperature.
  - The groundwater level plunges and the entire balance of nature gets disturbed.
  - It causes a decrease in the water-holding capacity of soil. As a result, the infiltration rate or the movement of water from the soil surface into ground is also reduced. This again causes floods.
  - Deforestation causes change in the soil properties and makes the soil poor in nutrients and texture.
  - Fewer trees result in soil erosion. Hard and rocky layers of the soil are exposed with the removal of top layer. The fertile land gets converted into deserts.
  - Less trees means less carbon dioxide will be consumed by trees in the process of photosynthesis. This results in global warming.
2. Wildlife are under threat from many different kinds of human activities, from directly destroying habitat to spreading invasive species and disease. Most ecosystems are facing multiple threats. Each new threat puts additional stress on already weakened ecosystems and their wildlife. Deforestation and indiscriminate hunting has led to depletion of wildlife. Killing of one species may upset other species. In the long term, these changes may also affect the man.
- Habitat destruction is the main cause for wildlife extinction in India. The rapid deterioration of the environment due to human interference is aiding the disappearance of wildlife from the biosphere. Poaching of animals for their skin, fur, tusk,

horns and meat for medicinal purposes are a major threat to birds, mammals, plants and reptiles. Superstitious beliefs are the cause for the slaughter of certain species.

3. Biosphere reserves are the best way of wildlife conservation because of the following reasons.

**Conservation** : Biosphere reserves conserve genetic resources, species, ecosystems and landscapes without uprooting inhabitants. Rather the traditional life style and traditional resources of the local people are maintained.

**Development** : Sustainable economic, cultural, social and ecological developments are ensured.

**Restoration** : Biosphere reserve helps to rebuild any damage caused to ecosystems and habitats.

**Education and research** : Biosphere reserve provides a lot of scientific information for specific scientific studies and research. Exchange of information on restoration, conservation and development of biosphere can be made at national and international levels.

4. (a) **Species** : A group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding is called species.
- (b) **Ecosystem** : An ecosystem includes all of the living things (plants, animals and organisms) in a given area, interacting with each other, and also with their non-living environments (weather, earth, sun, soil, climate, atmosphere).
- (c) **Red Data Book** : A Red Data Book contains lists of species whose continued existence is threatened. Species are classified into different categories of perceived risk. Each Red Data Book usually deals with a specific group of animals or plants. They are now being published in many different countries and provide useful information on the threat status of the species.

5. **Causes of deforestation** :

**Agricultural activities** : Agricultural activities are one of the major factors causing

deforestation. Due to overgrowing demand for food products, huge amount of trees are felled down to grow crops and for cattle grazing.

**Logging** : Wood based industries like paper, match-sticks, furniture, etc., also need a substantial amount of wood supply. Wood is used as fuel both directly and indirectly, therefore trees are chopped for supplies.

**Urbanization** : Overpopulation directly affects forest covers, as with the expansion of cities more land is needed to establish housing and settlements. Therefore, forest land is reclaimed.

**Desertification of land** : It occurs due to land abuse making it unfit for growth of trees. Many industries in petrochemicals release their waste into rivers which results in soil erosion and make it unfit to grow plants and trees.

**Mining** : Oil and coal mining require considerable amount of forest land. Apart from this, roads and highways have to be built to make way for trucks and other equipment. The waste that comes out from mining pollutes the environment and affects the nearby species.

6. (a) **Endangered species** : An endangered species is a group of plants or animals that is in danger of becoming extinct. This could happen because there are few of that animal left, its predators have grown in number, or the climate that it lives in is changing, or the places it lives in have been destroyed. The World Conservation Union (IUCN) has worked out that endangered species are 40% of all organisms.
- (b) **Endemic species** : An endemic species is one that is only found in that region and nowhere else in the world. As such they are of conservation concern because they are not widespread and may be confined to only one or two protected areas.

### HOTS Questions

1. Due to overgrazing vegetative cover of soil is destroyed. The uncovered soil is easily washed away by water and air. As a result, soil loses its nutrients containing top layer. Hence, soil

becomes barren, which leads to desertification. Due to increasing the population, forests are being destroyed for residence and agriculture purpose. It results in destruction habitats of wild animals. After destruction of their habitats, these animals moves towards residential areas.

2. When we recycle products like paper, we prevent new trees from being cut down. About one-third of the wood from trees that are cut down is used to make paper and paper board. By recycling of paper we can save our trees.
3. Global warming is projected to have a number of effects on the oceans. Ongoing effects include rising sea levels due to thermal expansion and melting of glaciers and ice sheets, and warming of the ocean surface, leading to increased temperature stratification.

## 8. Cell Structure and Functions

### P.86 : Quick Review

1. (a) cell (b) multicellular  
(c) shape, size  
(d) cell membrane, nucleus, cytoplasm  
(e) proteins, lipids
2. (a) False (b) True  
(c) False (d) True  
(e) True

### P.88 : Quick Review

1. (a) absent, present (b) nucleus  
(c) clear (d) nucleoplasm
2. (a) True (b) True  
(c) False (d) False

### Time to Review

- A. 1. (c), 2. (a), 3. (b), 4. (c), 5. (a), 6. (b), 7. (b), 8. (a), 9. (c), 10. (b)
- B. 1. genes 2. cell  
3. eukaryotic, prokaryotic  
4. absent 5. absent
- C. 1. False 2. False  
3. False 4. False  
5. False
- D. 1.-(e), 2.-(g), 3.-(i), 4.-(h), 5.-(b), 6.-(c), 7.-(a), 8.-(d), 9.-(f)
- E. 1. cell wall 2. Robert Hooke  
3. cell 4. multicellular  
5. chloroplasts 6. nuclear membrane

7. cytoplasm 8. nucleus
- F. 1. Cell is the structural and functional unit of life.  
2. The cell theory states that cells are the structural and functional units of living organisms, and they arise by the division of the pre-existing cells.  
3. The organisms made up of only one cell are called unicellular or single-celled organisms. Examples : amoeba and paramecium.  
4. Unicellular organisms are made up of only one cell. Multicellular organisms are made up of many cells.  
5. Mitochondria are the sites of energy production and storage of energy during cellular respiration. So they are called powerhouse of the cell.  
6. Plastids are large cytoplasmic organelles found in of plant cells. They are the site of manufacture and storage of important chemical compounds used by the cell. They often contain pigments used in photosynthesis.  
7. Chloroplasts are plastids in green colour. They contain chlorophyll pigments.  
8. Chloroplasts are the site of photosynthesis; so they are called the kitchen of the cell.
- G. 1. Plastids are organelles found inside plant cells and some algae, which are primarily responsible for activities related to making and storing food.

Chloroplasts, chromoplasts, and leucoplasts are the types of plastids.

The **chloroplasts** contain chlorophyll, and are responsible for photosynthesis. They are found in green leaves.

The **chromoplasts** are non-green plastids found in flowering plants, fruits, and aging leaves. The chloroplasts actually convert over to chromoplasts. One of the main reasons for these structures and the colours is to attract pollinators.

The **leucoplasts** are the non-pigmented organelles. Unlike the others we have talked about, leucoplasts have no colour at all. They are found in the non-photosynthetic parts of

the plant, such as the roots. They are meant for storage of food.

- The cell nucleus acts like the brain of the cell. It controls all activities of the cell. The nucleus is not always in the centre of the cell. It will be a big dark spot somewhere in the middle of all of the cytoplasm. The nuclear membrane surrounds the nucleus and all of its contents. It is a membrane similar to the cell membrane around the whole cell. There are pores and spaces for proteins to pass through while the nuclear membrane keeps all of the chromatin and nucleolus inside. The nucleolus looks like a nucleus inside of the nucleus.
- Not all cells have a nucleus. The cells which have a well defined nucleus are called eukaryotic cells. The cells with no defined nucleus are called prokaryotic cells.
- See Fig 8.4 on page 87 of the textbook.

Animal Cell	Plant Cell
Does not have a cell wall	Has a cell wall
No chloroplast is present	Chloroplast is present
Small temporary vacuoles or no vacuole	Large vacuoles located in the centre of the cell
Starch grains not present	Starch grains present
The nucleus is usually located centrally	Due to the central location of the vacuole, the nucleus of the cell may be located at the edge of the cell.
Centrosome is present	Centrosome is absent

- The shapes of cells are quite varied with some, such as nerve cells being longest, and red blood cells being smallest in animals. The size of cells is also related to their functions. Eggs are very large, often being the largest cells an organism produces. The large size of many eggs is related to the process of development that occurs after the egg is fertilized.

In plants, the cells present in the stem have the thick cell wall to provide support and protection, while the cells present in the roots have root hairs with thin cell walls to increase the surface area for absorption of water.

## HOTS Questions

- Some of the characteristics are transferred to the child through genes by parents. So the child resembles the parents.
- A drooping plant has lost much of its water and the vacuoles are shrinking. It still maintains its basic structure because of the cell walls. When the plant finds a new source of water, the vacuoles are refilled and the plant regains its structure.  
When plants are placed into a strong sugar or salts solution water will pass out of the cells by osmosis. As water passes out, the sap vacuole starts to shrink. These cells are no longer firm they are limp. We say that they are flaccid and the plant will wilt.
- Cells are very small. They cannot be observed without a microscope. So, cells were discovered after the invention of the microscope.
- Muscle cells are used for movement, which requires lots of energy, mitochondria create energy, therefore they have lots of mitochondria.

## 9. Reproduction in Animals

### P.96 : Quick Review

- (a) sexual, asexual (b) sperm  
(c) sexual (d) oviduct
- (a) False (b) False  
(c) True

### Time to Review

- (b), 2. (c), 3. (a), 4. (a), 5. (a), 6. (b)
1. sexual 2. binary fission  
3. oviparous 4. adult  
5. sexual 6. zygote
1. human beings 2. internal fertilization  
3. sperm 4. viviparous  
5. hydra 5. caterpillar
1. ovum 2. fertilization  
3. binary fission 4. asexual  
5. pupa 6. cloning
1. zygote, embryo, foetus, adult  
2. The process by which an organism is able to produce of its own kind is called reproduction.  
3. The kind of reproduction in which a single parent is involved in called asexual reproduction. Hydra, amoeba and bacteria reproduce by asexual reproduction.

4. Cloning is the process of producing similar populations of genetically identical individuals that occurs in nature when organisms such as bacteria, insects or plants reproduce asexually.
  5. The reproductive organs in humans are called gonads. Testes are male gonads which produce sperms. Ovaries are female gonads which produce eggs or ova.
  6. (a) Internal fertilization : birds, reptiles, mammals  
(b) External fertilization : frogs, starfish and toads
  7. Metamorphosis is a process by which an animal physically develops after birth or hatching. It involves a conspicuous and relatively abrupt change in the animal's body structure through cell growth.
- F. 1. The nucleus of sperm fuses with the nucleus of the ovum to form a single cell called zygote. The zygote divides repeatedly to develop into embryo. So the life begins with a single cell.
2. The amoeba usually reproduces asexually by a process called binary fission, in which the cytoplasm simply pinches in half and pulls apart to form two identical organisms or daughter cells. This occurs after the parent amoeba's genetic material, contained in the nucleus, is replicated and the nucleus divides. Thus, the hereditary material is identical in the two daughter cells.
  3. The hydra reproduce asexually. A bud begins to form on the tubular body of the adult hydra. The bud develops a mouth and tentacles. The bud detaches from its parent. The new hydra is fully developed and will find its own location for attachment.
  4. (a) **Difference between sexual and asexual reproduction**  
**Asexual reproduction** : In asexual reproduction, only one parent creates offspring on its own. Asexual reproduction is completed in a very short period of time. No formation or fusion of gametes takes place. There is very little chance of variation with asexual reproduction.

**Sexual reproduction** : In sexual reproduction, two parents involve to produce their offspring. Sexual reproduction can take several months to complete. Sexual reproduction can take several months to complete. Formation and fusion of gametes occurs. Sexual reproduction leads to genetic variation in new generations of offspring.

(b) **Difference between oviparous and viviparous animals**

**Oviparous animals** : Females lay fertilized or unfertilized eggs. The development of zygote takes place outside the female's body. Females lay eggs in a safe place in the environment but the chances of survival are less.

**Viviparous animals** : Females give birth to young ones. The development of zygote takes place inside the female's body. Females deliver young ones and the chances of survival are more.

(c) **Difference between internal and external fertilization**

**Internal fertilization** : It occurs inside the body of the female. The number of gametes produced is less. The male gametes are deposited in the body of the female with the help of copulatory organ.

**External fertilization** : It occurs outside the body of the female. A large number of gametes are released in the surrounding medium, for example water, where fertilization takes place.

5. A mature human sperm cell has a snake-like structure. It has following parts :

**Head** : It is spherical in shape consisting of large nucleus and a dome shaped acrosome present on the nucleus.

**Neck** : It contains centrioles which are proximal centriole and distal centriole.

**Middle piece** : It is tubular structure in which mitochondria are spirally arranged.

**Tail** : It arises from middle piece and it is the end part of the sperm.

For diagram see Fig. 9.5 on page 95 of the textbook.

6. Unlike the female reproductive system, most of the male reproductive system is located outside of the body. These external structures include a pair of testes, two sperm ducts or vas deferens, and a penis.

**Testes :** These are oval organs about the size of large olives that lie in the scrotum. They are responsible for making testosterone, the primary male sex hormone, and for generating sperm. Within the testes are coiled masses of tubes called seminiferous tubules. These tubes are responsible for producing sperm cells.

**Vas deferens :** These are also called sperm ducts. They pass over the urinary bladder and join the urethra from behind. The vas deferens transports mature sperm to the urethra, the tube that carries urine or sperm to outside of the body, in preparation for ejaculation.

**Scrotum :** This is the loose pouch-like sac of skin that hangs behind and below the penis. It contains the testicles as well as many nerves and blood vessels. The scrotum acts as a climate control system for the testes. For normal sperm development, the testes must be at a temperature slightly cooler than body temperature.

**Penis :** This is the male organ used in sexual intercourse. It has three parts : the root, which attaches to the wall of the abdomen; the body, and the glans, The glans is the cone-shaped part at the end of the penis. It is covered with a loose layer of skin called foreskin. The opening of the urethra, the tube that transports semen and urine, is at the tip of the penis. The glans of the penis also contains a number of sensitive nerve endings.

For diagram see Fig. 9.3 on page 94 of the textbook.

7. The human female reproductive system is made up of oviduct, ovaries, uterus, cervix and vagina.

**Oviduct :** These are a pair of tubes that extends from the ovaries to the uterus. The oviduct, also called the fallopian tube, is the vessel through which egg cell travels to the

uterus. Each ovary is connected to the uterus by an egg tube.

**Ovaries :** These are a pair of small, almond-shaped structures near the front of the abdomen. Females are born with hundreds of undeveloped egg cells or ova. These eggs are stored in the ovaries and released every month, after puberty. Unused eggs dissolve and pass out during menstruation.

**Uterus :** This is like an inverted pear, held in place by ligaments and muscle. It has very soft lining, which holds the fertilized egg and nurtures it till it is a fully developed baby.

**Cervix :** The cervix is a ring of muscle located at the lower portion of the uterus. It forms a barrier between the uterus and the vagina. Until birth, the baby is held in place by the cervix.

**Vagina :** This is an elastic, muscular canal that connects the cervix to the outside of the woman's body. It is the tube that receives the male organ during mating. During menstruation, it is the same tube through which the blood flows out.

For diagram see Fig. 9.4 on page 94 of the textbook.

8. The process of human fertilization is a complicated one, but the egg and sperm will unite in the long run. In order for fertilization to occur, the sperm must penetrate the egg. The sperm secrete an enzyme which helps to form an entry way in the outer zone of the egg. The nucleus of the sperm fuses with the nucleus of the ovum to form the zygote. Out of the millions of sperms only a few reach the oviduct and only one fertilizes the ovum. When a zygote is formed, it moves towards the uterus.

### HOTS Questions

1. Yes, there is a technique through which the woman can conceive. The freshly released eggs and male sperm are collected by a doctor. There are kept together for a few hours for fertilization. This kind of fertilization is called invitro-fertilization, which takes place outside of the female's body. Once the fertilization takes place, the zygote is allowed to develop for about a

week, after which it is transferred to the mother's uterus. The baby is born like other babies.

2. In frogs and most fishes, the fertilization takes place outside of the body of the mother fish. Frogs and fish lay eggs in water, which are fertilized there. A large number of eggs laid ensures that at least a few of them would get fertilized. In hens the fertilization takes place inside the body of the female. So, an egg at a time ensures the development of baby.
3. The tail or flagella helps the sperm to swim the long way from the vagina to the oviduct where it fertilizes the egg.
4. The process of reproduction helps the organism to continue its race. So it is important for all organisms to reproduce for the continuance of their race on the earth.

## 10. Reaching the Age of Adolescence

### P.102 : Quick Review

1. (a) control, coordinate (b) influence, regulate  
(c) thyroxine
2. (a) True (b) False  
(c) True

### P.105 : Quick Review

1. (a) sex chromosomes (b) a pair of  
(c) thyroid gland
2. (a) False (b) False  
(c) False

### Time to Review

- A. 1. (d), 2. (d), 3. (d), 4. (b), 5. (d), 6. (b), 7. (b)
- B. 1. ovary 2. reproductive  
3. menopause 4. grow  
5. adolescence
- C. 1. True 2. False  
3. False 4. False  
5. False 6. False
- D. 1.-(b), 2.-(c), 3.-(d), 4.-(e), 5.-(a)
- E. 1. testosterone 2. hormone  
3. thyroxine 4. pituitary gland  
5. oestrogen 6. adrenaline  
7. pituitary gland
- F. 1. Adolescence as the period in human growth and development that occurs after childhood and before adulthood, from ages 11 to 19. It

represents one of the critical transitions in the life span and is characterized by a tremendous pace in growth and change that is second only to that of infancy.

2. Reproductive phase in females begins at puberty lasting till the age of 45 to 50 years. During this period this period the walls of the uterus is thick enough to release one ovum in around 28 to 30 days.
  3. The chromosomes which determine the sex are called sex chromosomes. There is a pair of chromosomes that determine the sex. In males, this pair is XY chromosomes, and in females it is XX chromosomes.
  4. It is the age at which reproductive organs become functional. It refers to the onset of sexual maturity in individuals as well as the gender.
  5. Testosterone hormone plays a key role in the development of male reproductive tissues such as the testes and prostate as well as promoting secondary sexual characteristics such as increased muscle, bone mass, and the growth of body hair.
- F. 1. While primary sex characteristics are those that are present at birth, secondary sex characteristics are those that appear during puberty. These secondary sex characteristics are caused by hormones released at the time of puberty, which usually is around two years earlier in girls than in boys. While both boys and girls grow taller in their teenage years, the male body becomes more muscular, and the shoulders grow broader than the hips, while the female's hips become wider than her shoulders, and breasts develop. Some of the first changes in a boy are the growth of his testicles and growth of pubic hair. Later, the chest becomes larger, hair grows in the armpits, muscles grow in the arms and legs and shoulders become larger and stronger. The larynx becomes larger resulting in a deeper voice. In girls, pubic hair begins to grow, followed by underarm hair; breasts develop. The menstrual cycle begins. In general, girls gain less height and weight than boys do during their teenage years.

2. At the onset of puberty, male hormones (testosterone) begins to release by the testes in boys, while the ovaries in girls begin to produce the female hormone (oestrogen). The production of these sex hormones is controlled by a hormone secreted by the pituitary gland. The hormone from the pituitary gland stimulates the testes and ovaries to release sex hormones.

3. **Nutritional needs of adolescents :** There is rapid growth during adolescence. So a balanced diet is necessary, which includes nutrients in right proportions. Milk is regarded as a complete food.

**Personal hygiene :** It is very important to keep the body neat and clean. Undergarments should be changed everyday. Girls should be more particular about cleanliness during the time of menstrual flow.

4. **Menstruation :** It is the regular discharge (once in about 28-29 days) of blood and mucosal tissue from the inner lining of the uterus through the vagina. Women report having some symptoms prior to menstruation, which include acne, tender breasts, bloating, feeling tired, irritability, and mood changes.

**Menarche :** The first menstrual flow that begins at puberty is termed as menarche.

**Menopause :** Menstruation stops around the age between 45 and 50 years. This stage is called menopause.

5. The sex of the child is determined at the time of fertilization. It depends upon the male gamete that fuses with the female gamete. The males produce two types of gametes; one carrying X-chromosome and the other carrying Y-chromosome. The females produce gametes that carry the X-chromosomes. If the male gamete carrying X-chromosome fuses with the female gamete, the offspring is a female. If the male gamete carrying Y-chromosome fuses with the female gamete, the offspring is a male.

### HOTS Questions.

1. Iodine deficiency negatively affects the health of women. The production of thyroxine by thyroid

gland requires iodine, which is insufficient in hilly regions. So the doctor advice the woman to take iodised salt.

2. In frogs, metamorphosis is controlled by thyroxine secreted by thyroid gland. The production of thyroxine requires iodine in water. Ponds have sufficient amount of iodine, so tadpoles live in water but not frogs.
3. Physical exercise helps to keep us healthy as hormones secrete properly.
4. Yes. reproductive phase in a women is from menarcha to menopause.

## 11. Force and Pressure

### P.114 : Quick Review

1. (a) can (b) push or force  
(c) contact force (d) newton  
(e) non-contact
2. (a) False (b) False  
(c) False (d) False

### P.116 : Quick Review

1. (a) increases (b) lateral pressure  
(c) equally (d) own
2. (a) False (b) False  
(c) True

### P.118 : Quick Review

1. (a) air (b) less  
(c) applications (d) barometer
2. (a) False (b) False  
(c) False

### Time to Review

- A. 1. (a), 2. (d), 3. (c), 4. (d), 5. (c), 6. (a), 7. (b)
- B. 1. height 2. pressure  
3. contact 4. Newton  
5. magnitude 6. attracts
- C. 1. False 2. False  
3. True 4. True  
5. True 6. False  
7. False
- D. 1.-(e), 2.-(c), 3.-(d), 4.-(b), 5.-(a)
- E. 1. newton 2. manometer  
3. gravitational 4. atmospheric
- F. 1. force 2. magnetic force  
3. pressure 4. electrostatic force

5. friction
  6. atmospheric pressure
  7. non-contact force
  8. electrostatic force
- G. 1. (i) Hitting a cricket ball bowled by a bowler  
(ii) Stopping a ball hit by a bat
2. (i) Stretching a rubber band  
(ii) Kneading flour to make chapati
  3. Force acting on a unit area is termed as pressure.  
(i) Filling ink in a fountain pen  
(ii) Rubber suckers used as hooks

- H. 1. Contact forces take effect immediately after the force is applied whereas there is a time gap between the application and the effect of non-contact forces.

There is always a field associated with a contact force, but there are no fields associated with a non-contact force.

2. Force changes the state of a body from rest to motion or motion to rest. For example, in football, a player applies force on the ball to score a goal but opponent team player applies force to stop the ball from goal.

Force changes the direction of motion of a moving body. For example, in cricket, the batsman changes the direction of the ball hitting with the bat.

Force changes the shape and size of the body. For example, the shape and size of a spring can be changed by applying a force on it.

3. The strength of a force is expressed by its magnitude. If the magnitude of the applied force changes, its effect also changes. If more than one force acts on a simultaneously on an object in the same direction, the forces simply added together. If two opposite and unequal forces act simultaneously on an object, the object will move in the direction of the larger force.

- F. 1. We do not get crushed under atmospheric pressure because the atmospheric pressure acts equally in all direction.

2. The sharp edge reduces area on which the force acts, thus increasing pressure. So knives and piercing tools have sharp edges.

3. When we rub a plastic comb on dry hair, a charge develops on it. When we bring the charged comb near bits of paper, they are attracted towards the comb because of the charge developed on the comb.
4. The atmospheric pressure reduces at high altitudes. Because of this the blood pressure in blood vessels inside the nose increases and it becomes more than the atmospheric pressure. The blood vessels rupture and it results in nose-bleeding.
5. When the grains are emptied from the poly-pack, they get rubbed against the poly-pack and becomes charged and struck to the poly pack.
6. Like jet airplanes, space rockets work on a principle called action and reaction. The massive force generated by hot gases firing backward from a rocket's engines produces an equal force that pushes the rocket forward through space. Most of the fuel on-board a rocket is used in the first few minutes of the mission to achieve an escape velocity of at least 40,000 km/h—the speed a rocket must theoretically attain to escape Earth's gravity.
7. The greater the area of the surface, the smaller is the pressure. The flat and broad feet of the camel increase the area to reduce the pressure, and so it walks on the sand with ease.
8. When we suck a drink with a straw, the air of the straw goes into our lungs and thus, air pressure in the straw decreases. The atmospheric pressure acting on the surface of the drink forces it to move up in the straw, which then reaches our mouth.

### HOTS Questions

1. The net force is zero.
2. Spikes increases friction, and the athlete does not slips while running.
3. Without friction moving bodies would keep on moving. It would not be possible to move.  
If there were no friction, it would not be possible to hold any object hand with.
4. The air pressure from the second hole pushes the liquid to come out.
5. Muscular forces

## 12. Friction

### P.125 : Quick Review

- (a) opposes (b) causes  
(c) slows
- (a) False (b) False  
(c) True

### P.128 : Quick Review

- (a) less (b) heat, energy  
(c) fluid (d) smooth
- (a) False (b) False  
(c) False (d) True

### Time to Review

- A. 1. (b), 2. (a), 3. (c), 4. (b), 5. (d)
- B. 1. opposite 2. some  
3. reduces 4. increase  
5. rough, smooth
- C. 1. True 2. True  
3. False 4. False  
5. False 6. False
- D. 1. Spring balance 2. Streamlined  
3. Friction 4. Rolling friction  
5. Fluid friction
- D. 1. Friction is the force that opposes the motion of an object. To stop a moving object, a force must act in the opposite direction to the direction of motion. The force that opposes the motion of an object is called friction.
2. An approximate measurement of friction can be made using a spring balance.
3. Irregularities or roughness of the surface in contact causes friction.
4. The friction exerted by fluids is called drag.
5. The shape of the body and the nature of the fluid affect fluid friction.
6. Friction enables a moving body to come to rest.  
Friction helps to lit a matchstick.
7. The force opposing the motion of an object as it slides on a surface of another object is called sliding friction.  
The resistance to motion of one body as it rolls over the surface of another body is called rolling friction.

- F. 1. The nature of the friction is to oppose the motion of a moving body. It is in fact the force of the friction that makes a ball roll on the ground first to slow down and then virtually stop. It is always directed opposite to the direction of the motion. For friction to act two bodies have to be in contact.
2. For most practical purposes friction is caused by the roughness of the surfaces in contact. However, even if you make a surface perfectly smooth there's still some friction.
3. The measurement of friction can be made using a spring balance. A spring balance consists of a coiled spring which gets stretched as a force is applied. Stretching of spring is indicated by a movable pointer attached to it. See activity 2 on page 130 of textbook.
4. • Using grease or any other lubricant  
• Using smoother surfaces  
• Using rollers, wheels or ball bearings  
• Objects like cars and planes are modelled with streamlined shapes.
- Tyres of all vehicles are treaded to provide a better grip as they move on the road. Had the tyres not been treaded , the vehicles would end up ramming into one another.
5. See activity 6 on page 132 of textbook.
6. Although we normally hear about trying to reduce or eliminate friction, it actually has some important uses.  
Without friction, we would not be able to walk, drive a car, or hold objects. Pens and pencils would not work.  
Since friction is a resistance force that slows down or prevents motion, it is necessary in many applications to prevent slipping or sliding. In those cases, there is an advantage of having friction.
7. Friction has both its advantages and disadvantages in different conditions. It causes wear and tear, which results in loss of energy and material. Hence, friction is considered an evil. But no motion is possible without friction. Hence, it is a necessary evil.
8. There are different types of tyres depending on what kind of racing they are doing. But pretty much all racing tyres tries to be gripper

than regular tires. This usually means that they wear out faster, and create more road noise than regular tyres, which no one really cares about if can win them the race.

### HOTS Questions

1. As the swimmer moves body ahead in water, the friction caused by molecules of water opposes the motion.
2. Handles of motorcycles are covered with a rubber sheet with spikes so that to make the grip strong.
3. Because of water the grip of tyres and road becomes weak, and the vehicle can slip instead of coming to rest on applying brakes.

## 13. Sound

### P.136 : Quick Review

1. (a) vibrating (b) larynx  
(c) time period (d) percussion
2. (a) False (b) False  
(c) False (d) True

### P.138 : Quick Review

1. (a) amplitude (b) SONAR  
(c) faster (d) 330 m/s
2. (a) False (b) False  
(c) False (d) False

### Time to Review

- A. 1. (a), 2. (c), 3. (a), 4. (d), 5. (d)
- B. 1. False 2. True  
3. False 4. False  
5. False 6. False
- C. 1. larynx 2. decibel  
3. ear drum 4. ultrasonic  
5. noise
- D. 1. Sound is a form of energy that produces sensation of hearing in our ear.  
2. Sound is produced when a source of sound vibrates.  
3. The loudness of the sound is determined by its amplitude. The pitch of the sound is determined by its frequency.  
4. Noise could cause permanent damage to ears if exposed for a large duration of time. It can also affect circulatory system.  
5. For its propagation sound requires a material

medium. It travels faster in solids than liquids and gases.

6. The sensation of a frequency is commonly referred to as the pitch of a sound. A high pitch sound corresponds to a high frequency sound wave and a low pitch sound corresponds to a low frequency sound wave.
7. Loudness is characterized by high volume and intensity. The loudness of a sound depends on the amplitude of the wave. The bigger the amplitude, the louder the sound.
8. Difference between music and noise are given below :
  - Music has pleasing effect on ears and mind, whereas noise appears to be irritating and a nuisance.
  - Music has high frequency and there are recognizable patterns of changes in wavelength and amplitude. On the other hand, noise has low frequency, has irregular wavelengths and produces sudden changes in amplitude and wavelength.
  - Music has a combination of frequencies and their harmonics, while noise has no such properties.
  - Music is harmony, whereas noise is chaos.
  - Music is a special category of noise. To some, it is organized noise. On the other hand, noise is nothing but random sounds with no order or rhythm.
9. **Amplitude** : The maximum displacement of a vibrating body from its mean position is called amplitude.  
**Frequency** : The number of oscillations executed by an oscillating body in one second is called the frequency of the oscillation.  
**Vibration** : The to and fro motion of an object about a mean or central position is called vibration.
- E. 1. Musical instruments can be classified by their effective range , their material composition, size, etc. Mainly musical instruments are divided into three groups :  
**Percussion instruments** : These instruments produce sounds beating the skin head. They include tabla, drum and dholak.

**Stringed instruments** : These instruments produce sound by vibrating strings. The guitar, sitar, and sarangi are stringed instruments.

**Wind Instruments** : These instruments produce sound by vibrating columns of air. The flute and bigule are common wind instruments.

- See Activity 4 on page 143 of textbook.
- The human ear is divided into three sections, the outer, middle and inner ear.

The **outer ear** consists of the pinna that leads into the external auditory canal. It collects sound waves from a wide area and funnels the sound into the external ear passage. On the inside surface of the outer ear is the tympanic membrane (eardrum). It is stretched across the end of the auditory canal separating the outer ear from the middle ear.

The **middle ear** consists of small bones called ossicles. They transfer sound waves to the inner ear. Located covering an opening into the inner ear is called the oval window.

The inner ear comprises a coiled structure called the cochlea. It contains the receptors for sound and the vestibular apparatus that is associated with a sense of balance. The cochlear duct contains the organ of Corti, which contains auditory receptor cells. The auditory nerve transmits sound vibrations to the brain.

- The human voice is produced by the voice box which is called larynx. The larynx is present towards the top of the windpipe. The larynx is consisted of two muscular flap-like membranes known as vocal cords. The vocal cords have a neck-like space. As we speak the air in the lungs is forced out through the slit which makes the vocal cords to vibrate and produce sound. The lung must produce adequate airflow and air pressure to vibrate vocal cords. The muscles of the larynx adjust the length and tension of the vocal cords to fine tune pitch and tone.
- F. 1. Frequency of the fork = 512 Hz  
Frequency is the number of oscillations made

by in one second. So the time period of the tuning fork is 1 second.

- Number of oscillations = 40  
Time taken = 5 s  
Timer period =  $\frac{5}{40} = 0.125$  s  
Frequency =  $\frac{40}{5} = 8$  Hz
- Time period =  $\frac{15}{500} = 0.002$  second

### HOTS Questions

- Sound needs a medium to propagate. There is no air on the moon, so we cannot hear sound on the moon.
- The sounds produced by men, women and children is different because of the variation in the length of vocal cords.
- If we are watching the sky, we see the lightning before we hear the thunder. That is because light travels much faster than sound waves.
- Noise is formed more than 60 dB, which cause permanent loss to hearing.
- No. This is because of the length of the vocal cords which has same length.

### 14. Chemical Effects of Electric Current

#### P.145 : Quick Review

- (a) electric charge (b) bad  
(c) vinegar, lemon juice, hydrochloric acid
- (a) False (b) False  
(c) False

#### P.148 : Quick Review

- (a) non-electrolyte (b) molten  
(c) conductivity (d) sulphuric acid
- (a) False (b) False  
(c) False

#### Time to Review

- A. 1. (b), 2. (a), 3. (d), 4. (a), 5. (c), 6. (d), 7. (b)
- B. 1. electricity 2. good conductors  
3. positive, negative 4. anode  
5. negative
- C. 1. False 2. False  
3. False 4. False  
5. False
- D. 1. iron 2. rubber  
3. electrolysis 4. anode

- E. 1. Pure water is not a conductor of electricity. To make the water a conductor of electricity, a small amount of acid is added to it.
2. An LED is used to make a tester in place of an electric bulb, which glows when the current flowing through the filament is high.
3. When an electric current is passed through a solution of a substance, the substance undergoes a chemical reaction and breaks up into its components. This process is called electrolysis.

- F. 1. Electroplating is a procedure of coating a metal on top of another metal that gets easily corroded. The metal used for electroplating does not corrode easily. The plating is done by using electric current.

Electroplating is a common application of electrolysis. The metal to be deposited is made anode by connecting it to the positive terminal of the battery and the metal object on which the metal has to be deposited is made cathode by connecting it to the negative terminal of the battery. Aqueous solution of a soluble salt of the metal to be deposited is chosen as an electrolyte. As current is passed, a layer of metal to be coated gets deposited over the cathode which is the object to be coated.

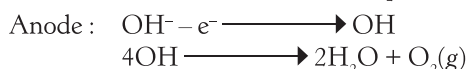
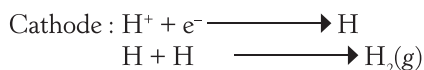
Electroplating is done to improve the properties of a metal. For example, electroplating iron with chromium not only prevents iron from rusting or corrosion but also makes it scratch-resistant and lustrous. Iron objects electroplated with chromium find use in making a lot of objects such as sanitary fittings like shower nozzles and taps, bicycle parts, wheel rims, etc.

Electroplating gives an attractive finish and increases the commercial value of articles. A lot of artificial jewellery is made of an inexpensive metal and is then plated with gold or silver to increase its saleable value.

2. Pure water is a bad conductor of electricity. To make it an electrolyte, a small amount of an acid is added to it. The resulting solution is called acidulated water.

The acidulated water is taken in a voltmeter

consisting of platinum electrodes. A test tube filled with acidulated water is inverted over each electrode. On electrolysis, hydroxyl ions move towards the anode and lose one electron each to become OH atoms. These atoms combine to form water and oxygen gas, which is liberated at the anode. The reactions taking place at electrodes are as :



3. Distilled water does not conduct electricity. Tap water contains some impurities dissolved, so it conducts an electric current.
4. Electroplating is the deposition of a metal coating onto an object by putting a negative charge on it and putting it into a solution which contains a metal salt. The metal salt contains positively charged metal ions which are attracted to the negatively charged object and are reduced to metallic form upon it.

Let us electroplate an iron spoon with copper. First we fill an electrolytic cell with copper sulphate solution. Connect the iron spoon to the negative terminal of the battery and positive terminal to the copper wire. Dip the spoon and copper wire in the copper sulphate solution. Switch on the battery and observe the spoon after 5 to 10 minutes. You would observe a reddish brown deposit of copper on the spoon.

5. Electrolysis is used to electroplate objects. This is useful for coating a cheaper metal with a more expensive one, such as copper or silver.

The negative electrode should be the object that is to be electroplated.

The positive electrode should be the metal that you want to coat the object with.

The electrolyte should be a solution of the coating metal, such as its metal nitrate or sulphate.

#### Electroplating with silver

The object to be plated, such as a copper spoon, is connected to the negative terminal

of the power supply. A piece of silver is connected to the positive terminal. The electrolyte is silver nitrate solution.

See Fig 14.5 of the textbook on page 148.

6. (a) **Electrolytes** : The substances which in their aqueous solution or in molten state can conduct an electric current and decomposed as a result of it are called electrolytes.

**Non-electrolytes** : The substances which in their aqueous solution or in molten state cannot conduct an electric current are called non-electrolytes.

- (b) LED stands for Light Emitting Diode. LEDs do appear to be bulbs but in fact are not. LED's are tiny semiconductors encapsulated in plastic, which protect their components and help focus the light. A bulb creates light by use of a filament. When power is applied, the filament glows, generating heat, in turn, producing light. LEDs are the opposite. They create light through a cold process, when power is applied to semiconductors they are stimulated by the movement of electrons.

### HOTS Questions

1. Tin cans used for storing food are made of iron electroplating with a coat of tin. Tin is less reactive than iron, and prevent foods packed in them from getting spoiled.
2. No, electroplating cannot be done on non-electrolytes.

### 15. Some Natural Phenomena

#### P.160 : Quick Review

1. (a) Sparking, (b) Earthing, (c) Richter scale, (d) Mantle, (e) Crack, (f) Focus
2. (a) True, (b) False, (c) False, (d) False, (e) False, (f) False

#### Time to Review

- A. 1. (d), 2. (d), 3. (b), 4. (a), 5. (c)
- B. 1. iron, 2. tectonic plates, 3. crust, 4. induction, 5. electroscope
- C. 1. Lightning conductor, 2. electroscope, 3. Richter scale, 4. seismograph, 5. epicentre
- D. 1. The earth's crust is made of tectonic plates, which are in constant motion. Their collision causes an earthquake.
2. Our body acts as a good conductor of heat

and electricity. When we touch a charged body with our hand, the charge of the charged body reaches the earth through our body.

3. Precautions from lightning when outside of the house :
  - (a) Keep yourself away from all metallic poles, fences, etc.
  - (b) Prefer to seek shelter in a strong building.
  - (c) Place your hands on your knees with your head between your hands. Such a position would make you less prone to be struck.
- F. 1. (a) An earthquake is the sudden shaking of the surface of the Earth, which can be violent enough to destroy major buildings and kill thousands of people. The severity of the shaking can range from barely felt to violent enough to toss people around. Earthquakes result from the sudden release of energy in the Earth's crust that creates seismic waves. Earthquakes are measured using observations from seismographs.
  - (b) Earthquakes generate seismic waves which can be detected with a sensitive instrument called a seismograph. Advances in seismograph technology have increased our understanding of both earthquakes and the Earth itself.
  - (c) The occurrence of a natural electrical discharge of very short duration and high voltage between a cloud and the ground or within a cloud, accompanied by a bright flash and typically also thunder is called lightning.
2. (a) Charge is a vaguely defined concept, while current is a well-defined concept. Current is the flow of charges, stationary charges cannot give any current. Charge gives rise only to an electric field, while current produces both electric and magnetic fields.
  - (b) The point where the earthquake originates is called the focus and the point on the surface of the earth immediately above the focus is called epicentre.
3. A lightning conductor consists of a thick, flat metallic strip generally of copper. The top of the strip is in the form of a spike which projects out of the building in air and the bottom is immersed deep in the earth, joint to a metallic plate.

A lightning conductor is used to protect a

building from getting damaged by lightning. It is installed on the building. When the lightning strikes, the lightning conductor projecting above the building provides path for the charge to flow through strip down into the earth to the metal plate.

4. Measures to be taken during the earthquake :
- Do not be panic, keep calm.
  - Douse all fires.
  - If the earthquake catches you indoors, stay indoors. Take cover under a sturdy piece of furniture. Stay away from glass, or loose hanging objects.
  - If you are outside, move away from buildings, steep slopes and utility wires.
  - If you are in a crowded place, do not rush for cover or to doorways.
  - If you are in a moving vehicle, stop as quickly as safety permits, but stay in the vehicle until the shaking stops.
  - If you are in a lift, get out of the lift as quickly as possible.
  - If you are in a tunnel, move out of the tunnel to the open as quickly as safety permits.
5. In electricity supply systems, an earthing system or grounding system is circuitry which connects parts of the electric circuit with the ground, thus defining the electric potential of the conductors relative to the Earth's conductive surface.
6. See answer to question 4 above.

### HOTS Questions

1. All fabrics have some tendency to build up a static charge, but synthetics like nylon, polyester and acrylic are particularly good at generating, and then holding on to, static charge. But whatever your clothes are made out of, nor how much you rub different layers together, if the air is humid the static charge will leak away into the atmosphere.
2. An umbrella is dangerous during a thunderstorm. It may get lightning to kill the person carrying the umbrella.
3. During a thunderstorm, there are chances of lightening. So we should not bath during a thunderstorm.
4. It is not completely a safe place but it can provide protection to some extent.

## 16. Light

### P.167 : Quick Review

1. (a) energy, light, (b) light, (c) virtual, same size, (d)  $30^\circ$
2. (a) False, (b) True, (c) True

### P.172 : Quick Review

1. (a) sclera, (b) retina, (c) vitreous, (d) concave
2. (a) False, (b) False, (c) False, (d) True

### Time to Review

- A. 1. (d), 2. (c), 3. (a), 4. (a), 5. (a), 6. (b), 7. (a)
- B. 1. reflection, 2. inversion, 3. multiple, 4. irregular, 5. kaleidoscope, 6. white, 7. retina, 8. cone
- C. 1. False, 2. False, 3. True, 4. True, 5. False
- D. 1. Reflected, 2. Snail's law, 3. Seven, 4. Cornea, 5. Blind spot, 6. Ciliary muscles, 7. Irregular
- E. 1. Light makes the things visible.
2. Bouncing back of light after striking the surface is called the reflection of light.
  3. Characteristics of image formed by a plane mirror : virtual, laterally inverted, erect and of the same size
  4. An apparatus consisting of a tube attached to a set of mirrors, by which an observer can see things that are otherwise out of sight is called a periscope.
  5. A kaleidoscope is based on the principle of multiple reflection in mirrors.
  6. Scleroid is the outermost layer that is dead, tough and white except in the front where it is transparent and forms cornea.
  7. The iris regulates the size of pupil to control the amount of light that enters the eye.
  8. The laws of reflection are :
    - (a) The incident ray, normal, and reflected ray all lie in the same plane
    - (b) The angle of incidence is equal to the angle of reflection
  9. Upon passage through the prism, the white light is separated into its component colours— red, orange, yellow, green, blue, indigo and violet. The separation of visible light into its different colours is known as dispersion.
  10. See page 171 of the textbook.
  11. The ability of the eye to focus objects lying

at different distances is called the power of accommodation of the eye.

- F. 1. (a) When a parallel beam of light rays is incident on a smooth and plane surface, the reflected rays will also be parallel. This type of reflection is called regular reflection.

When a beam of parallel light rays is scattered in all directions. Therefore the parallel rays incident on the surface will reflect in different directions. This type of reflection is called irregular reflection.

- (b) The ray of light from a source of light that strikes a reflecting surface is called incident ray.

The ray of light that gets reflected in the same medium after striking the reflecting surface at the point of incidence is called reflected ray.

- (c) Aqueous humour is a clear liquid found in the space between the cornea and the lens. It is constantly generated throughout the entire lifetime by pigmented and non-pigmented epithelium of the ciliary body.

Vitreous humour is a clear, gel-like substances present in the rear part of the eyeball, which includes the space between the lens and the retina. This gelatinous mass forms during the embryonic stage and does not replenish with age as it is not served by any blood vessel. Vitreous humour is secreted by non-pigmented ciliary body.

2. (a) **Multiple reflection** : Reflected light can get reflected again. The phenomenon of a ray of light getting reflected more than once is called multiple reflection. The number of images formed is the same as the number of times light gets reflected.

**Lateral inversion** : Lateral inversion means the apparent reversal of the mirror image's left and right when compared with the object. Lateral just means sideways.

3. See page 168 of the textbook.  
4. **Incident ray** : It is a ray of light from a surface of light that strikes a reflecting surface.

**Reflected ray** : It is the ray of light that gets reflected in the same medium after striking the reflecting surface at the point of the incidence.

**Normal** : The perpendicular drawn to the reflecting surface at the point of incidence is called the normal.

**Angle of incidence** : It is the angle which the incident ray makes with the normal.

**Angle of reflection** : It is the angle which the reflected ray makes with the normal.

For diagram see Fig. 16.1 on page 165 of textbook.

5. Visible light, also known as white light, consists of a collection of component colours. These colours are often observed as light passes through a triangular prism. Upon passage through the prism, the white light is separated into its component colours — red, orange, yellow, green, blue and violet.
6. A rainbow is a natural phenomenon showing dispersion of light. In monsoon, after the rain or when there are clouds in the sky with their innumerable droplets of water, a curved band of seven colours is often seen in the sky. It is seen in the west in the morning or in the east in the evening. This band of colours is known as rainbow. The dispersion of white light plays a very important role in the formation of rainbow. When rays of sunlight pass through the droplets of water suspended in the air, they get split up into rays of seven colours. Here the droplets of water act as tiny prisms. The outer edge of the rainbow appears red and the inner edge appears violet. The remaining colours can be seen between these two in the usual order.

### HOTS Questions

1. The retina is responsible for passing any light information that arrives at it down the optic nerve to the brain. The total absence of rods and cones gives rise to colour blindness.
2. The person will not be able to see anything.
3. Oil lamp

## 17. Stars and the Solar System

### P.182 : Quick Review

1. (a) sun, (b) east to west, (c) Venus, (d) Ursa Minor
2. (a) False, (b) True, (c) False, (d) False

### P.185 : Quick Review

1. (a) Mars and Jupiter, (b) Ceres, 700 km, (c) tail, (d) waning gibbous
2. (a) False, (b) False, (c) False, (d) True

## Time to Review

- A. 1.(a),2.(b),3.(c),4.(b),5.(a),6.(c),7.(b),8.(a),9.(b)
- B. 1. constellation, 2. satellite, 3. meteors, 4. planet, 5. artificial, 6. Jupiter
- C. 1. False, 2. False, 3. True, 4. False, 5. False, 6. True, 7. False, 8. False
- D. 1. satellite, 2. Alpha Centauri, 3. Sirius, 4. Mercury, 5. William Herschel
- E. 1.–(e), 2.–(a), 3.–(d), 4.–(b), 5.–(c)
- F. 1. One light year, 2. Aryabhata, 3. Neptune, 4. Mars, 5. Venus, 6. Full moon night
- G. 1. A celestial body is any natural body outside of the Earth's atmosphere, for examples the Moon, Sun, and the other planets of our solar system.
2. There are eight planets in our solar system.
3. The Earth takes 365 and quarter days to complete one round around the sun
4. Venus can be seen in the morning; so it is called morning star.
5. Mars from a distance appears reddish in colour, hence it is called red planet.
- H. 1. Artificial satellites are human-built objects orbiting the Earth and other planets in the Solar System. This is different from the natural satellites, or moons, that orbit planets, dwarf planets and even asteroids.

Here are some of the key uses of artificial satellite :

- Scientists use artificial satellites for scientific research and to study the universe.
  - Weather satellites help scientists to study weather patterns and forecast the weather. Weather satellites observe the atmospheric conditions over large areas
  - are used in communication for example, to make long distance calls, television relay, radio broadcasts, sending of telex and fax messages and in internet services.
2. A constellation is a group of stars that make an imaginary shape in the night sky. They are usually named after mythological characters, people, animals and objects. In different parts of the world, people have made up different shapes out of the same groups of bright stars.

**Ursa Major :** The constellation Ursa Major contains the group of stars commonly called the Big Dipper. The handle of the Dipper is

the Great Bear's tail and the Dipper's cup is the Bear's flank.

**Ursa Minor :** The constellation Ursa Minor contains the group of stars commonly called the Little Dipper. The handle of the Dipper is the Little Bear's tail and the Dipper's cup is the Bear's flank.

**Orion :** The constellation Orion lies in the northern sky, on the equator. It is one of the brightest and best known constellations in the night sky. Orion is also known as the Hunter.

3. The other members of the solar system are given below :

**Asteroids :** These are rocky objects that orbit the sun, but are too small to be called planets. Tens of thousands of these minor planets are gathered in the main asteroid belt, a vast doughnut-shaped ring between the orbits of Mars and Jupiter. The biggest asteroid is Ceres.

**Meteors :** These are usually dust or sand grain sized pieces of rock which speed through space and when they enter the Earths atmosphere they burn up, creating bright or brilliant streaks across the sky. So they are often called as **shooting stars**.

**Comets :** These are small celestial bodies that orbit the Sun. They are primarily made of dust and ice. One of the distinguishing features of comets is that most of them develop a tail or a coma when they come close to the Sun. However, as a comet comes closer to the Sun, the Sun's heat vaporizes the ice and dust of the comet. These vaporized gases collect dust and stream out of the centre of the comet like a tail. This tail can be thousands of miles long.

While most comets passing by the Sun are hard to observe from Earth without specialized equipment, some comets are bright enough to be seen by the naked eye. The brightness of the comet is due to sunlight reflecting and refracting off the dust in the tail.

4. Meteors are usually dust or sand grain sized pieces of rock which speed through space and when they enter the Earths atmosphere they burn up, creating bright or brilliant streaks across the sky. So they are often called as shooting stars.

Meteors are very common sights. Anyone who stares at a clear night sky will eventually see a brief trail of light left by a meteor. The trails usually last for less than a second. Meteors can be seen at any time, but the best time to look for them is during periodic showers. Such showers appear around the same dates each year, when Earth passes through a stream of dust left behind by a passing comet.

5. The changing shape of the bright part of the moon that we see is called its phase. The revolution of the moon around the Earth makes the moon appear as if it is changing shape in the sky. From the Earth we see the moon grow from a thin crescent to a full disk, or full moon, and then shrink back to a thin crescent again before vanishing for a few days. The Moon phases are produced by the alignment of the moon and the sun in the sky.

The phases of the moon depend on its position in relation to the sun and the Earth. As the moon makes its way around the Earth, we see the bright parts of the moon's surface at different angles. These are called phases of the moon.

There are eight phases of the moon. The phases are named after how much of the moon we can see, and whether the amount visible is increasing, or decreasing each day. These phases are New Moon, Waxing Crescent, First Quarter, Waxing Gibbous, Full Moon, Waning Gibbous, Last Quarter, and Waning Crescent.

6. Earth is a habitable planet. It is the only planet in the solar system that supports life. Its distance from the sun is appropriate to give support life. It is neither as hot as Mercury or Venus nor as cold as Jupiter. It has abundance of water (71%) which no other planet has. It has the biosphere which provides us with food, shelter, clothing and minerals. It does not have poisonous gases like helium or methane as Jupiter has. It is rich in oxygen which makes life possible on the earth. Its atmosphere acts as a blanket protecting the earth from extremes of temperature.
7. The moon is Earth's only natural satellite. It is one of the largest natural satellites in the Solar System, and, among planetary satellites, the largest relative to the size of the planet it orbits. The moon is in synchronous rotation

with Earth meaning the same side is always facing the Earth.

See the phases of moon in question 5 above.

8. Distinguish between
- (a) A stars twinkle in the sky but a planet does not twinkle. A star has its own heat and light whereas a planet have no its own light; It reflects the light of a star that falls on its surface. A star does not revolve around another body but a planet revolves around a star. A star is very big in size whereas a planet is very smaller in comparison of a star.
- (b) A comet is a relatively small body that orbits the sun. When close enough to the sun they display a visible coma and sometimes a tail. A meteor is usually dust or sand grain sized piece of rock which speeds through space and when it enters the Earths atmosphere it burns up, creating bright or brilliant streaks across the sky
- (c) A galaxy is a collection of billions of stars whereas a constellation is a collection of only a few stars. There are billions of galaxies in the universe. There are only about 88 constellations. There are not many galaxies, which are visible to the naked eyes. There are many constellations, which can be observed with the help of naked eyes.

### HOTS Questions

1. Stars of a constellation do not fall at the same distance which do not fall in the same line of sight in the sky.
2. Planets have their own orbits and their time of revolution are different so they do not collide with each other.
3. Unlike on Earth, there is no erosion by wind or water on the moon because it has no atmosphere and all the water on the surface is frozen as ice. Also, there is no volcanic activity on the moon to change the lunar surface features. Nothing gets washed away, and nothing gets folded back inside.

## 18. Pollution of Air and Water

### P.193 : Quick Review

1. (a) poisonous, (b) sulphur and nitrogen, (c) chlorofluorocarbons, (d) heat, (e) carbon dioxide
2. (a) True, (b) False, (c) False

### P.197 : Quick Review

1. (a) water, (b) taste and odour, (c) potable, (d) boiling
2. (a) True, (b) False, (c) False

### Time to Review

- A. 1. (d), 2. (b), 3. (c), 4. (b), 5. (d), 6. (d), 7. (a)(c), 8. (c)
- B. 1. nitrogen, 2. CFCs, 3. chlorine, 4. carbon dioxide, 5. 1985
- C. 1. True, 2. False, 3. False, 4. False, 5. False
- D. 1. carbon dioxide, methane and water  
2. chlorine  
3. carbon monoxide, carbon dioxide, oxides of sulphur and nitrogen, lead, SPM and CFCs  
4. greenhouse effect    5. global warming  
6. acid rain                7. potable water
- E. 1. CNG : Compressed Natural Gas  
LPG : Liquefied Petroleum Gas  
2. Water is used for drinking and washing.  
3. Plants cannot live without water. Green plants use water for making their own food by the process of photosynthesis.  
4. Animals give out carbon dioxide which is taken by plants to make food. During photosynthesis green plants give out oxygen which is taken by animals to breathe to stay alive.
- F. 1. The burning of fossil fuels releases gases like carbon dioxide, sulphur dioxide and nitrogen oxide into the atmosphere. These gases combine with water vapour in clouds to form sulphuric acid, carbonic acid and nitric acid. The rain that results from the precipitation of such clouds is highly acidic and so is called acid rain. The acid rain causes extensive damage to water, forests, soil resources and human health.
2. The Taj Mahal is regarded as the jewel of India. But, it is under threat due to the industries in and around it. The industries located in and around Agra, like rubber processing, chemicals and especially the Mathura oil refinery, have been responsible for producing pollutants like sulphur dioxide and nitrogen dioxide. These gases react with the water vapour present in the atmosphere to form sulphuric acid and nitric acid. When these acids mix with water in the rain, they form acid rain. This acid rain is very corrosive in nature. The yellowing of the Taj Mahal is due to the deposition of soot particles that are

emitted from the Mathura oil refinery.

3. The greenhouse effect is an atmospheric heating phenomenon in which the earth experiences rise in temperature because certain gases such as water vapour, carbon dioxide and methane, in the atmosphere allow incoming sunlight to pass through but trap heat radiated from the earth's surface. If these gases would not trap heat in the atmosphere, the earth would be colder. Because these gases warm our planet, they are called as greenhouse gases and the effect they create in the atmosphere is called as greenhouse effect.

Greenhouse gases normally trap some of the sun's heat, keeping the planet from freezing. Human activities, such as the burning of fossil fuels, are increasing greenhouse gas levels, leading to an enhanced greenhouse effect. The result is global warming and unprecedented rates of climate change.

4. All living things need specific nutrients to survive. Usually, nature does a pretty good job of providing just the right amount of nutrients, because too many or too few can cause problems. It makes sense that when there is not enough nutrition available for the variety of organisms living in an aquatic environment, serious problems will arise.

However, problems can also arise when the aquatic system has an overabundance of nutrients. When this happens we get **eutrophication**.

Eutrophication is most often the result of human activity. Farms, lawns and other fields tend to be heavily fertilized by people. These fertilizers are the perfect type of nutrients to feed hungry algae and plankton, and when it rains, these fertilizers run off into lakes, streams, rivers and oceans.

The most notable effect of eutrophication is algal blooms. When a bloom occurs, the stream, river, lake or ocean becomes covered with algae, which is usually bright green. It blocks light from reaching the water. This prevents the aquatic plants from photosynthesizing, a process which provides oxygen in the water to animals that need it, like fish and crabs.

5. Dumping of untreated sewage in the river on a daily basis is one of the main causes. Some of the main Ganga river pollution contributors are those in industry - specifically in this case

those of the leather industry who use vast amounts of chromium and other toxins and chemicals - the majority of which ends up in the slow paced waters of the Ganga during the dry season, peak time for the tanning industry and also when the river is moving at its slowest. Thousands of bodies are cremated on the banks of the river yearly with many being released into the river with hopes that their souls may have a direct path to heaven.

6. The addition of undesired substances into water that makes it toxic and unfit to use is called water pollution.

#### Causes of Water Pollution

**Industrial waste :** Industries produce huge amount of waste which contains toxic chemicals and pollutants. Many industries do not have proper waste management system and drain the waste in the fresh water which goes into rivers, canals and later into sea.

**Sewage and waste water :** The sewage and waste water that is produced by each household is chemically treated and released with fresh water. The sewage water carries harmful bacteria and chemicals that can cause serious health problems. The sewers of cities house several pathogens and thereby diseases.

**Chemical fertilizers and pesticides :** Chemical fertilizers and pesticides are used by farmers to protect crops from insects and bacteria. They are useful for the plants growth. However, when these chemicals are mixed up with water produce harmful for plants and animals. Also, when it rains, the chemicals mixes up with rainwater and flow down into rivers and canals which pose serious damages for aquatic animals.

7. Air pollution is one such form that refers to the contamination of the air. A physical, biological or chemical alteration to the air in the atmosphere can be termed as pollution. It occurs when any harmful gases, dust, smoke enters into the atmosphere and makes it difficult for plants, animals and humans to survive as the air becomes dirty.

#### Causes of Air pollution

**Burning of fossil fuels :** Sulphur dioxide emitted from the combustion of fossil fuels like coal, petroleum and other factory combustibles is one of the major causes of air

pollution. Pollution emitting from vehicles cause immense amount of pollution. Carbon monoxide caused by incomplete combustion and generally emitted from vehicles is another major pollutant.

**Exhaust from factories and industries :** Manufacturing industries release large amount of carbon monoxide, hydrocarbons, organic compounds, and chemicals into the air thereby depleting the quality of air. Petroleum refineries also release hydrocarbons and various other chemicals that pollute the air.

**Indoor air pollution :** Household cleaning products, painting supplies emit toxic chemicals in the air and cause air pollution. Have you ever noticed that once you paint walls of your house, it creates some sort of smell which makes it literally impossible for you to breathe.

**SPM :** Suspended particulate matter popular by its acronym SPM, is another cause of pollution. Referring to the particles afloat in the air, SPM is usually caused by dust, combustion etc.

8. (a) Acid rain is a result of air pollution. When any type of fuel is burnt, lots of different chemicals are produced. The smoke that comes from fires or the fumes that come out of a car exhaust contain the sooty grey particles and many gases that are harmful to our environment.

Power stations, factories and vehicles all burn fuels and therefore they all produce polluting gases. Some of these gases, such as nitrogen oxides and sulphur dioxide, react with the tiny droplets of water in clouds to form sulphuric acid and nitric acid. The rain from these clouds then falls as very weak acid. This rain is harmful to plants and animals. This also corrodes buildings.

- (b) See answer to question 3 above.

#### HOTS Questions

1. Carbon dioxide is the main greenhouse gas, the increasing percentage of which is the cause of global warming. To reduce it we should adopt alternative sources of energy that do not pollute atmosphere.
2. July is the month of monsoon. Rain help to grow plants.

3. Greenhouse gases are not green, but they are the cause of greenhouse effect. So they are called greenhouse gases.

### Model Test Paper I

- A. 1. apply force, 2. manure, 3. non-metal, 4. an artificial, 5. petroleum
- B. 1.-(c), 2.-(d), 3.-(e), 4.-(a), 5.-(b)
- C. 1. True, 2. False, 3. True, 4. True, 5. True
- D. 1. (a), 2. (d), 3. (b), 4. (a), 5. (d)
- E. 1. fossils, 2. pasteurization, 3. weeds, 4. teflon, 5. spring balance
- F. 1. Carbon (diamond) is used in jewellery.  
Chlorine is used as a disinfectant, bleaching agent, etc.  
Phosphorus is used in match-boxes and fertilizers.  
Sulphur is used in fire crackers, detergents, paints, etc.  
Iodine is used in the making of antiseptics.
2. (a) Pathogens are microorganisms, such as viruses, fungi, or bacteria, that cause diseases in another organisms.  
(b) Thermosetting plastics cannot be reshaped on heating. They do not soften or get deformed on heating.  
(c) Combustion is a chemical reaction that occurs between a fuel and an oxidizing agent that produces energy, usually in the form of heat and light.
3. (a) Ploughing is a form of cultivation of the ground that helps prepare the soil to create a seedbed. Ploughing involves turning over the top soil. This buries surface debris and loosens the soil so that seeds can be sown.  
(b) For diagram of nitrogen cycle see Fig 2.11 on page 29 of the textbook.
4. (a) For difference between plant cell and animal cell see table on page 88 of the textbook.  
(b) For difference between metals and non-metals see table 4.2 on page 45 of the textbook.
5. (a) **Coke** : It is solid product of coal obtained when coal is heated in the absence of air. It is used to manufacture steel and in the extraction of many metals.

**Coal tar** : It is a thick liquid which is used to manufacture a number of substances such as plastics, paints, etc.

**Coal gas** : It is obtained when coal is heated in the absence of air. It is used as a fuel in various industries.

- (b) Brown algae are used as fodder. Some bacteria are used to decompose sewage. Some bacteria are used to make dairy products such as yoghurt and buttermilk. Many algae are used in controlling plant diseases. Some microorganisms are used to get antibiotics.

### Model Test Paper 2

- A. 1. reflection, 2. moon, 3. oxides of sulphur and nitrogen, 4. 11–13 years, 5. mitochondria
- B. 1.-(d), 2.-(e), 3.-(a), 4.-(b), 5.-(c)
- C. 1. False, 2. True, 3. True, 4. True, 5. True
- D. 1. (c), 2. (d), 3. (c), 4. (a), 5., All
- E. 1. afforestation, 2. reproduction, 2. echo, 4. insulators, 5. periscope
- F. 1. Some of the wood is converted to charcoal and used for cooking. Fodder from the forest forms an important source for cattle and other grazing animals in the hilly and the arid regions and during a drought. There are many varieties of grasses, trees, and shrubs that are nutritious for the livestock.
2. (a) In females, the length of vocal cords is shorter than that of males. This is the reason that sound produced by females has higher pitch and shrillness than that of males.  
(b) For diagram of human sperm see Fig 9.5 on page 95 of the textbook.
3. (a) The frequency of ultrasonic waves is above 20000 Hz.  
(b) The process of decomposing a substance into its constituents by the passage of an electric current is called electrolysis.
4. A light-year is a unit of distance. It is the distance that light can travel in one year. Light moves at a velocity of about 300,000 kilometres each second. So in one year, it can travel about 10 trillion km. More precisely, one light-year is equal to  $9.4607 \times 10^{12}$  km.
5. For the life cycle of butterfly see page 97 of the textbook.