*Enhanced Edition
NEP 2020 Guidelines

FACTS of SCIENCE

Teacher Manual

8

YBPL

Chapter 1 — Production and Management of Crops

Quiz Time (Page 11)

1. Wheat and Ragi are classified as cereals and Cotton and Jute are classified as fibre crops.
2. Rabi crops.
3. Seeds are often grown in nurseries and then transplanted to the fields. It is necessary to see that there is sufficient space left between seeds and seedlings while sowing and transplanting is required to them.
4. Pully system, chain pump, lever system, Dhekli are some of the traditional methods of irrigation.

Quiz Time (Page 15)

1. The unwanted plants which grew along with cultivated crops in the fields are known as weeds. eg.; chaulai, grass
2. Chemicals like weedicides, pesticides are sprayed on the crop. To avoid the consumption of chemicals by humans, it is advised to be extra careful in cleaning fruits and vegetables before consuming.
3. At home, dried neem leaves are added in the bin to prevent pest Infestation.
4. Rhizobium is the nitrogen fixing bacteria found in nodules of leguminous plants.

Exercise

A. 1. (b) Gram 2. (b) Wheat, Gram, Barley 3. (d) Grass
4. (c) Thresher 5. (b) Threshing 6. (b) Pisciculture

B. 1. Rainy 2. Cumbs 3. Natural
4. Drip 5. Apiculture

C. 1. T 2. F 3. T 4. T 5. F

D. 1. e 2. d 3. a 4. b 5. c

E. 1. Mr. M.S. Swaminathan

2. Green Manure is formed by the decomposition of fast growing leguminous plants.

3. Steps involved in nitrogen cycle are as follows:
   - Nitrogen fixation
   - Nitrification
   - Nitrogen Assimilation
   - Ammonifiction
   - Denitrification

4. To prevent the attacks of pests, grains should be dried before storage.

5. The process of conversion of atmospheric nitrogen by bacteria into such compounds that are consumed by plants is known as nitrogen fixation.

6. The branch of agriculture which deals with the management breeding, food, health and care of livestock or domestic animals is known as animal husbandry.

F. 1. The crops which grow in the rainy season are called Kharif crops. The crops are sown during the beginning of the rainy seaon, i.e., June and July. They are harvested during the months of October and November. Eg: Paddy, Jowar, jute, etc.

   The crops which grow in the winter season are known as Rabi crops. They are sown during the beginning of the winter season, i.e., October and November. They are harvested during the months of March and April. Eg: Gram, Barley, Potato.

   The crops which grown in the summer season are called zaid crops. They are sown in March and April and harvested during the months of July and August. Eg. Moong, Musk, etc.

2. The steps involved in crop production are:

- Preparation of soil
- Adding manures and fertilizers
- Crop protection
- Storage
- Seed selection and sowing
- Irrigation
- Harvesting

3. Manures are natural substance made from dead plant and animal wastes in the fields. They supply essential nutrients and humus to the soil and make it fertile. Eg. Cattle dung, peels, other wastes from yard is used to make manure.

   Fertilizers are inorganic substances prepared in factory. The most commonly used NPK fertilizers which are rich in nitrogen, phosphorus and potassium salts.

4. Some modern methods of irrigation are:
   1. Sprinkler System

      In this method, horizontal pipes having revolving nozzles on their top used. Water escapes with a force from the rotating nozzles in all the directions.

   2. Drip Irrigation

      It is a very economical system. It provides drop by drop water and hence called drip irrigation. The system which have specially prepared nozzles attached to them. Nozzles are located near the roots of plants to provide water drop by drop.

5. The various methods to remove weeds are:
   - Manual method:

     This method involves uprooting the weeds manually.
   - By using tools:

     This method involves the use of hand trowel (Khurpi), or a tractor driver harrow to uproot weeds.
   - By Chemical method:

     In this method, an insect or any other organism is introduced in the crop field which selectively destroys the weeds.

6. The kinds of animals that provides us with food are:
   - Meat and egg-yielding animals such as goat, chicken, fish and sheep etc.
   - Milk (or milk-yielding animals) such as cow, buffalo, goat, etc.
   - Honeybees provides us honey.

G. 1. Soil anchors the roots of plants, provides nutrients and water to them, and also provides oxygen to the roots. The preparation of soil is the first step involved in the process of growing crops. It is an essential stage for cultivating any crop plant. It usually involves two steps:
   - Ploughing : The Process of loosening and turning up the soil is called ploughing or tilling. It makes the soil airy and allows the roots to breathe well so that plant roots to breathe well so that plant roots penetrate easily in the soil. It enhances the water retaining capcaity of the soil.
   - Levelling: The field is levelled for sowing as well as for irrigation. Levelling of land is done with the help of levellers. It helps the soil to retain moisture.

   2. Following are the precautions that must be kept in mind while sowing seeds in a fields are:
      - Good quality seeds are selected as they are clean and healthy.
      - Seeds should be sown at proper distances.
      - Proper care is taken to ensure that the seeds should penetrate to a particular depth in the soil.

      There are various methods of sowing seeds, namely:

- Broadcasting: Seeds are sown manually by scattering them on the field directly.
- Seed Drill: It has a funnel at the top and several tubes running from the funnel to the ground level. Seeds are put into the funnel and drill is run over the ground. As it scratches the ground making furrows for the seeds, the seeds are sown into them.
- Transplantation: When the seeds sprout into seedlings, these seedlings are planted manually into the fields from nurseries.

3. Some organisms like bacteria, fungi and virsuses destroy crops and the damaged crops are also not good for healthy consumption. Various substances are used to protect the crops.
   - Pests can be controlled by pesticides which are poisonous chemicals. Eg: Insecticides like DDT, malathion, etc. are used to destroy insects.
   - Fungicides like sulphur, lime sulphur, etc, are used to destroy fungi.
   - Rodenticides like zinc phosphide war-farni etc. are used to destroy fungi.
   - Birds can be scared by putting scarecrows in the fields.
4. Nitrogen is used by life forms to carry out many of the functions of life. Following is the process of Nitrogen cycle:
   1. Nitrogen fixation: The process of conversion of atmospheric nitrogen by bacteria into such compounds that are consumed by the plants is known as nitrogen fixation. Nitrogen fixing bacteria are found in nodules attached to the roots of legumes like peas, beans, groundnuts, moong, etc.

      Plants cannot absorb the atmospheric nitrogen directly. It combines with oxygen, carbon and hydrogen and is then used as a nutrient like water. Nitrogen is returned to the atmosphere forming a cycle called nitrogen cycle.
   2. Nitrification: Some of the compounds are taken up by the plants and the rest are converted into nitrates by nitrifying bacteria present in the soil. The process of conversion of ammonia into nitrates is called nitrification.
   3. Nitrogen Assimilation: Plant absorbs nitrates from soil and produce proteins in their cells. When the consumer eats the plants, the nitrogen enters the food chain by the process called nitrogen assimilation.
   4. Ammonification: When organisms die, microorganisms act on them and decompose their nitrogen components into ammonia. This is called ammonification.
   5. Denitrification: The rest are converted to free nitrogen gas by denirifying bacteria. This is called denitrification.

      This ammonia may be released into the atmosphere, thus completing the nitrogen cycle.

Enrichment Learning

Do it yourself.

Scientific Thinker

Do it yourself.

Hots

1. Due to improper drainage, melon fruit absorb more water. Hence, over absorption bursts the melon.
2. No, farmers adopt crop rotation to maintain the balance of nutrients in the soil. They don't adopt crop rotation to soil different products in the market every season.
3. (i) This practice is known as crop rotation.

   (ii) Crop rotation replenishes the soil with nitrogen naturally and increases the soil fertility.

Value Based Question

Do it youself.

Chapter-2 — Microorganisms: Friend and foe

Quiz Time (Page 26)

1. Microbiology
2. Cocci
3. (a) Algae (b) Protozoa (c) Virus
4. They do not meet all the criteria of being living. Moreover, they reproduce and metabolize after entering in a body known as host.

Exercise

A. Tick the correct-

1. (b) spiral-shaped	2. (a)	3. (c)
4. (d)	5. (c)	6. (b)
7. (b)		

B. Fill in the blank

1. Cyst	2. moist	3. hyphae
4. anopheles	5. cancer, gene	6. flavour

C.

1. d	2. e	3. f
4. a	5. c	6. b

D.
1. Anton Van Leeuwenhoek
2. Louis Pasteur
3. Typhoid, Tetanus, Cholera, Tuberculosis are source of the disease caused by the bacteria.
4. Curd is prepared from pasteurized milk by the process called curdling with the help of lactobacillus bacteria.
5. Pasteurization.
5. Chemical preservatives such as sodium benzoate and sodium metabisulphite help control microbial growth. They are used to preserve jams, squashes and ketchups.

E.
1. – Most microganisms are hardy and can be found in virtually every habitat present in nature such as habitat present in nature such as air, water, soil, etc.
   – They are even found in hostile environments such as poles, deserts, rocks and deep sea.
   – Some organisms are known to survive in vaccume also.
2. The organisms which cannot be seen with naked eyes and can only be seen through a microscope are known as microorganisms or microbes. The five groups into which they are divided are:
   – Bacteria
   – Fungi
   – Virus
   – Protozoa
   – Algae
3. The three types of bacterial along with examples are as follows:
   – Bacilli are red-shaped bacteria like pseudomona, lactobacillus.
   – Cocci are spherical-shaped bacteria like sarcina, streptococcus.
   – Spirilla are spiral-shaped bacteria like treponema, vibrio.
4. Bacteria often in combination with yeasts and moulds are used in the preparation of curd. It is prepared from pasteurized milk by the process called curdling with the help of loctobacillus bacteria.
5. Viruses are considered as living and non-living. They do not meet the criteria of the generally accepted definition of life. But, the become living when they enter in some living organisms. They start reproducing and metabolizing. So, viruses are considered on the boundary between living and non-living.

6. The microorganisms which cause disease are known as pathogens. They are also known as causative organism of the disease. They are considered powerful as they get inside the host and damage the cells of the organisms or affecting it with a chemical substance which they produce.

F. 1. (a) Bacteria:

Useful Bacteria

- Presence of gut flora in the large intestine can help to prevent growth of potentially harmful microbes.
- Bacteria are capable of digesting the hydrocarbons in petroleum used to clean oil spills.
- Some bacteria are used to make fermented food such as vinegar, pickles, etc.

Harmful Bacteria

- Some bacteria causes tetanus, typhoid, syphilis, etc.
- Anthrax is a disease that affects human and cattle.
- In plants, bacteria cause leaf spot, fire blight, etc.

(b) Algae:

Useful Algae:

- Some red-algae yield agar-agar which is used in laboratories to grow microorganisms and also to thicker food like fillies, puddings. etc.
- Brown algae are important sources of sodium, iodine and potassium.
- Shells of diatoms are used in making glass porcelain, tooth-powder, etc.

Harmful Algae:

- Algae growing in lakes and ponds can kill other living beings in water. They begin to use dissolved oxygen and nutrients from the lakes or ponds.

(c) Fungi:

Useful Fungi:

- Some fungi such as edible fungi.
- Yeast cells are good sources of various vitamins.
- Yeast is also used to make Idli, Dhokla, etc.
- Yeast is used in fermentation of carbohydrates to produce alcohol.

Harmful Fungi:

- Some fungi cause disease to plants and animals.
- Food crops are destroyed due to fungees if not stored properly.
- Some fungi are responsible for destruction of useful goods such as leather, cloth, paper, etc.

2. Protozoa are unicellular organisms that commonly shows animal-like characteristics. They may be aquatic, terrestrialor parasites. They are colourless organisms with varied forms. They more with the help of finger like pseudopodia or cilia.

Some uses of protoza are as follows:

- Protoza help considerably in the treatment of waste and sewage.
- They are also used as research material for various biological activities.

Following are the ways in which protozoa are harmful:

- Several protozoa cause disease in humans and other animals.
- Some examples of such diseases are sleeping sickness, malaria, etc.

3. Some common methods of food preservation are:

Drying or Dehydration: It is the process of removing water contents from fruits and vegetables. It results in the decrease of moisture content. Cereals, pulses, spices are preserved by this method.

Freezing: It means low temperature and reduction of water activity to prevent microbial growth. The food materials are frozen or made cold much below 0° C. The enzymes become inactive.

Salting: The high concentration of salt drains out water from the food material. The cells of microorganisms also lose moisture and they die. Eg: Pickles.

Pickling: It is method of preserving food by placing it in a substance that inhibits or kills bacteria and other microorganisms. Eg: Ethanol, Vinegar etc.

Canning: It involves storing food in sterilized tine containers and boiling the containers to kill or weaken any remaining bacteria.

Pasteurization: A method of preserving milk by heating it to a high temperature and then cooling it quickly. It kills most of the microorganisms present in milk without affecting the flavour.

Scientific Thinker

Do it yourself

Enrichment Learning

Do it yourself

Hots

A. Curd turns sour faster in summer than in winter as the moisture content in the sourrounding is high in summers.
B. The sealed packed of chips are sold usually filled with nitrogen as it prevent oxidation of food.
C. Flamingoes are pink due to their food. Flamingoes eat beta carotene which gives it pink colour.

Value Based Question

A. One should keep a napkin on nose and mouth while sneezing or coughing as the bacteria may spread in the environment.
B. From air, direct contact, etc.
C. She is obedient.

Chapter-3 — Synthetic Fibres and Plastics

Quiz Time (Page 40)

1. Three natural fibres are: Cotton, wool, jute. Three man-made fibres are: Nylon, Rayon, Polyester.
2. The two types of plastics are: Thermoplastic and Thermosetting.
3. Bottles, Plugs, Sockets, Helmets, Containers.
4. They are airtight and hence useful for storing food materials.
5. Plastics bags can also contaminate food stuff because of poisonous dyes getting absorbed into food.

Exercises

A. 1. b 2. d 3. d 4. c 5. c

B. 1. wood 2. Rayon 3. Nylon
4. Thermosetting 5. Reuse, Reduce and Recycle

C. 1. T 2. F 3. T 4. T 5. T

D. 1. e 2. d 3 b
4. c 5. f 6. a

E. 1. Different types of Rayon are viscose, lyocell, modal etc.
2. It is called a regenerated fibre because the original raw material, cellulose, is broken down and then reformed.
3. Orlon, acrilan and cashmilon
4. All plastics are made of polymers.
5. Many small units combine together to form as large single unit known as polymer.

F. 1. Natural fibres and their resources are as follows:

Natural Fibres	Resources
Cotton	fruit of cotton plant
Jute	stem of jute plant
Wool	Soft hair of rabbit, sheep, goat
Silk	cocoon of silkworm
Hemp	Stem of marijuana plant
Coir	Outer shell of coconut seed
Linen	Stem of flax plant

2. The synthetic fibres are made by chemical processes. So, these are known as synthetic or man-made fibres.
3. Polyester is made by repeating units of a chemical called an ester. It is very strong, crease-resistant, light, elastic and absorbs very little water. It has properties similar to those of nylon. Terylene, Terene and Dacron are different types of polyester fibres.
4. Three properties of Polyester are:
   – Polyester fabrics and fibres are extremely strong.
   – Polyester is very durable: resistant to most chemicals, stretching and shrinking, wrinkle resistant, mildew and abraison resistant.
   – It has very low water retention capacity. It is easily washed and dried. So, requires minimum care.
5. The process of linking together small monomers to form polymers is called polymerisation. There are two types of arrangements of units in the plastic:
   Linear arrangement: This is a chain like structure in which all the monomers exist in a single line.
   Cross-linked arrangement: The arrangement in which monomers are cross-linked together to form a three-dimensional network polymers.

G. 1. Nylon is the first synthetic fibre to be made entirely of chemicals. It is a plastic with super-long heavy molecules built up of short, continually repeating sections of atoms. The polymers can be mixed with various substances to achieve different variations in properties.
   Advantages of fabric made of Nylon are as follows:
   – They are long lasting.
   – Fabrics made.
   – They are light and wrikle free.
   Disadvantages of fabrics made of Nylon are as follows:
   – They are not comfortable in the summer season.
   – They catch fire easily.
2. We know all the natural fibres are obtained from plants and animals. But, the need for synthetic materials is listed below:
   – They are cheap as compared to natural fibres.
   – Natural fibres are produced in limited quantity which is not enough to meet the requirement of growing population.
   – Clothes made of synthetic fibres are attractive and durable.
3.

Thermosetting	Thermoplastics
Can be heated and moulded again and again to form a new substance.	Once formed cannot be heated and moulded to make a new substance.
Example of thermosetting are: PVC, Polythene, Perspex, etc.	Example of thermoplastic are: Bakelite and Melamine.
Used to make raincoats, bottles, etc.	Used to make non-stick cookware, etc.

4. Some common uses of plastics are as follows:
   - Containers to keep food materials like rice, pulses, spices, etc. in the kitchen.
   - Bottles to keep water.
   - Cabinet of refrigerators and televisions.
   - Packaging materials for burgers, chips, cakes, biscuits, meat, etc.
   - Plugs, sockets, doors and window frames.
   - Helmets and covers of electric wires.
5. Five advantages of using plastics are as follows:
   - Light weight: Since plastics are very light, it is easy to carry them easily. Its transportation cost is also very less as compared to iron or wood.
   - Insulators: Plastics are insulators, i.e., they do not allow electricity or heat to pass through them. That is why, electric plugs and sockets are made up of plastic materials.
   - Rust free: Unlike iron, plastics are free from rusting even when they are kept in water. That is why, water supply pipes as well as gutter pipes are now made of plastics called PVC.
   - Flexible: Some plastics are flexible which are used to keep shampoo, toothpaste, creams, etc. so that you can take out cream from the tube by squeezing it.
   - Less reactive: Most of the plastics do not react with many kinds of acids and other materials. That is why, these acids are stored in plastic bottles.
6. The followig steps can be taken to minimize the use of plastics at individual levels:
   - Make minimum use of plastics materials.
   - Take your own cotton or jute bags to bring materials from the market.
   - Avoid storage of eatables in plastic bags.
   - Ask the shopkeepers to use paper bags.
   - Do not burn plastics, they produce poisonous gases.
   - Do not throw plastics bags anywhere, try to reuse it.
   - Try to use steel lunch boxes instead of plastic boxes.
   - Avoid unnecessary packaging of gifts in plastic covers.
   - Follow 3R'S principles- Reduce, Reuse, Recycle.

Enrichment Learning

Do it yourself

Hots

A. Since Rayon is a synthetic fibre, it will stick to the body when burnt.

B. Burning cotton smells like burning paper because both are entracted from the plants containing cellulose. Burning wool smells like burning hair because wool is extracted from sheep hair and they both have sulphur in them.

C. Do it yourself

D a. Fiber P - Nylon
   Fiber Q - Terylene
   Fiber R - Rayon

   b. Polymer D is cellulose.

   c. Rayon is a made from natural raw material i.e., wood pulp.

   d. Fibre Q, Terylene contains same type of groups as those in PET jar.

Chapter-4 — Metals and Non-Metals

Quiz Time (Page 50)

1. 118 elements
2. Sodium and Potassium
3. Gold
4. Bromine
5. Gold
6. Metal A
7. Yes, they form hydrides. eg:

$$\underset{\text{Hydrogen}}{H_2} + \underset{\text{Sulphur}}{S} \longrightarrow \underset{\text{Hydrogen Sulphide}}{H_2S}$$

Exercise

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

B. 1. 94 2. Mercury 3. high
4. Diamond 5. Chlorine

C. 1. Sodium Oxide
2. Zine oxide + Hydrogen
3. Aluminium oxide + Hydrogen
4. Sodium chloride + Hydrogen
5. Hydrogen Sulphide

D. 1. e 2. c 3. d 4. b 5. a

E. 1. The extraction of metals from their ores and their purifications is called metallurgy.
2. Sodium and Potassium 3. Carbon 4. Hydrogen
5. Sodium 6. Y is above Z 7. Graphite
8. Sulphur is used for hardening of rubber in tyres. This process is called vulcanization.
9. Silicon is used to make insulating material for electrical appliances.
10. Gold

F. 1. The property of elements that they can be beaten into sheets is called malleability.
The property of elements, due to which they can be drawn into thin wires is called ductility.
Metals are malleable and ductile in nature but non-metals are brittle in nature i.e., they cannot be stretched into wires or beaten into sheets.

2. Wood is a non-metal hence it is brittle which will break into piece of stretched to make wires. On the other hand, copper or aluminiums can be stretched into wires because they are ductile.
3. Three important uses of aluminium are:
   - It is used to make utensils.
   - It is used to make thin sheets of aluminium.
   - It is also used in making of body of aircrafts due to its light weight.
4. (a) Corrosion: It is a natural process where metal corrodes in presence of moist atmosphere.
   (b) Galvanization: The process of depositing a layer of zinc or iron is called galvanization.
   (c) Anodising: The process of depositing layer of aluminium is called anodising.
5. Three imporant uses of sulphur are:
   - It is used to manufacture sulphuric acid.
   - It is used in skin ointments as it is a fungicide.
   - It is used for hardening of rubber in tyres.
6. An alloy is a mixture of two or more than two metals or non-metals. Alloying is done to increase the hardness of metals and make it resistance to corrosion.

G. 1.

Metals	Non-Metals
Generally solid at room temperature.	Occur is solid, liquid and gaseous forms.
They are malleable ductile in nature.	Non-metals are brittle in nature.
High melting and boiling point.	Soft in nature.
Lustrous	Non-lustrous
Eg. Gold, copper	Eg. Carbon, Hydrogen

2. Aim: To show the electrical conductivity of metals.
Material Required: Cell, Bulb, wire, any metal object (iron nail)
Method: Join a bulb with a battery. Now, replace the iron nail of circuit with the metal.
Observation: You will see that bulb glows which explains that iron nail (metal) conducts electricity.

3. When a more reactive metal displaces a less reactive metal from its salt solution, the reaction is called displacement reaction.

(a) Zinc and Copper Sulphate

$$\underset{\text{Zinc}}{Zn} + \underset{\text{Copper sulphate}}{CuSO_4} \longrightarrow \underset{\text{Zinc sulphate}}{ZnSO_4} + \underset{\text{Copper}}{Cu}$$

Zinc displaces copper as it is the most reactive.

(b) Copper and Magnesium Sulphate

$$\underset{\text{Copper}}{Cu} + \underset{\text{Magnesium sulphate}}{MgSO_4} \longrightarrow \text{No reaction}$$

Displacement reaction will not occur as copper is uses reactive than magnesium sulphate, hence no reaction.

(c) Aluminium and Copper Sulphate

$$\underset{\text{Aluminium}}{2\,Al} + \underset{\text{Copper Sulphate}}{3\,CuSO_4} \longrightarrow \underset{\text{Aluminium Sulphate}}{Al_2(SO_4)_3} + \underset{\text{Copper Sulphate}}{3\,Cu}$$

Aluminium displaces copper as it more reative than copper.

(d) Ironsulphate and Copper

$$FeSO_4 + Cu \longrightarrow \text{No reaction}$$

Copper is less reactive than Iron hence no reaction takes place.

4. Non-metals reacts with oxygen to form acidic non-metal oxides. Non-metals oxides are acidic or neutral in nature.

Eg. $\underset{\text{sulphur}}{S} + \underset{\text{Oxygen}}{O_2} \longrightarrow \underset{\text{Sulphur Dioxide}}{SO_2}$

$\underset{\text{Carbon}}{C} + \underset{\text{Oxygen}}{O_2} \longrightarrow \underset{\text{Carbon Dioxide}}{CO_2}$

$\underset{\text{Hydrogen}}{H_2} + \underset{\text{Oxygen}}{2O_2} \longrightarrow \underset{\text{water}}{2H_2O}$

SO_2 and CO_2 are acidic non-metal oxides whereas H_2O is neutral non-metal oxides.

5. (a) Brass:
Constituents of Brass: Copper and zinc
Uses: Utensils, electrical goods, cartridge containers, parts of watches.

(b) Bronze:
Constituents of Bronze: Copper and Tin
Uses: Statues, Bearings.

(c) Stainless Steel:
Constituents of Stainless Steel: Carbon, Iron, chromium, Nickel
Uses: Utensils, cutlery, surgical instruments.

(d) Duralumin:

Constituents of Duralumin: Aluminium, copper, magnesium, Manganese
Uses: Bodies of Aeroplane, vehicles.

(e) Solder:
Constituents of Solder: Tin, Lead
Uses: Joining metals.

Scientific Thinker

Do it youself

Enrichment Learning

Do it yourself

Hots

A. Electric wires are not made of silver as they are expensive.
B. It will rust.
C. Metal P is reactive than metal Q hence it replace Q but it is not the same in case of salt of metal P.

Chapter-5 — Coal and Petroleum

Quiz Time (Page 67)

1. We should increase our dependency on inexhaustible resources as these resources can be used again and again and are found in great abundance. Also, they do not cause any kind of pollution.
2. Fuels which are used in the form in which they occur in nature are called primary fuels.
3. It is crude oil which is a mixture of hydrocarbons formed originally from marine animals and plants, found beneath the ground trapped between layers of rocks.
4. Fractional Distillation

Exercise

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

B. 1. c 2. d 3. a 4. e 5. b

C. 1. High 2. Coal 3. Pennsylvania
4. Fractional Distillation 5. Propellant

D. 1. F 2. T 3. T 4. F 5. F

E. 1. Minimum temperature required to burn a substance is called ignition temperature.
2. Peat, Lignite, Bituminous, Anthracite
3. When air is passed over red hot coke, produces gas is produced in contents of carbon monoxide and nitrogen.
4. Alcohol, liquid hydrogen, paraffin.
5. Gas and kerosene
6. Natural gas

F. 1.

Exhaustible resources	Inexhaustible resources
The resouces which are present in limited quantity in the nature are more likely to get exhausted in the near future because of human consumption.	The resources which are present in unlimited quantity and may not exhaust by human consumption.
Eg. coal, petroleum.	Eg. Solar energy, wind energy.

2. Following are the example of solid, liquid and gaseous fuels.

Solid: Wood, coal, cattle dung cakes, etc.

Liquid: Petrol, diesel, alcohol, etc.

Gaseous: Liquified petroleum gas, coal gas, water gas, etc.

3.

Primary Fuels	Secondary Fuels
Fuel which are used in the form in which they occur in nature and called natural fuels.	The fuel which are processed after a long physical and chemical processes, they are secondary fuels also known as processed fuels.
Eg. Wood, coal	Eg. Coke, diesel.

4. a. Compressed Natural Gas
   b. Trinitrotoluene
   c. Liquid Petroleum Gas
   d. Petroleum Conservation Research Association
5. Different components of coal are obtained by destructive distillation. In this process, coal is heated strongly to 1000°C in the absence of air. We get various products like:
   Coke– Residue left behind after the process is called coke. It is free from any volatile impurities. It is a tough, porous and black substance.
   Coal Gas– It is a mixture of methane, hydrogen and carbon monoxide. It is obtained during the processing of coal to get coke.
   Coal Tar– It is thick black liquid with unpleasant smell. It contains about 200 substances which are separated by fractional distillation.
6. a. $C + H_2O \longrightarrow CO + H_2$
   b. $2C + O_2 + 4N_2 \longrightarrow 2CO + 8\ N_2$

G. 1. Characteristics of a Good Fuel are:
   – It has high calorific value.
   – It must be easily available.
   – Easy to transport.
   – It has low ignition temperature.
   – Cheap
2. After fractional distillation, following are the products and uses:
   Gas: Used as a fuel, in the production of carbon black and hydrogen, in the production of LPG.
   Gasoline: Used as a motor fuel, as a solvent for dry cleaning.
   Kerosene: Used as household fuel, used as an illuminate, an aviation fuel.
   Gas oil and Diesel oil: Used as furnace fuel for diesel engines as heavy vehicles and generators.
   Lubricating oil, Paraffin wax, Asphalt/ Bituminous: Used as lubricating oil petroleum jelly for cosmetics as vaseline, paraffin wax for making candles and asphalt for making roads.
3. Advantages of Natural Gas are:
   – Natural gas is less polluting, that's why, it is also called clean fuel.
   – Its storage and transportation is easy. It is sent to far off places through the network of pipes.
   – It is cheaper than petrol.
   – It has high calorific value.

   Uses:
   – Natural gas is now being widely used in public transports especially buses, trucks and autorickshaws.
   – It is also used as Industrial fuel.
   – It is used for power generation.
   – It is also used as a starting material for the manufacture of a number of chemicals and fertilizers.
4. The causes of energy crisis are:
   – Dependence on fossil fuels: Fossil fuel are present in limited quantity. The supply of these energy source is low which is the main cause of energy crisis.

- Ever increasing consumption: Dependency on new appliance is increasing day by day. Most of these appliance need electricity to run, the rate of energy consumption is increasing rapidly.
- Uneven distribution: Most of the oil wells are concentrated in Arabain countries. The oil produced by India is not enough to meet its demand. We depend on these countries for oil. That is why petroleum product, are comparatively costly in India.
- Wastage: Due to ignorance and negligence of people, energy in a considerable amount go wasted.

5. The steps to take to prevent energy crisis are:
   - Switch off the electrical appliances which are not in use.
   - Reduce the flame while cooking and once the water starts boiling, it saves fuel.
   - Use air conditioner, heaters, gysers etc., only when in use.
   - Use public transport than private transport.
   - Food should be cooked in pressure worker.
   - Use CFLs and tubelights which consume less energy.
   - Pulses and other such items should be soaked for some time before cooking to reduce cooking time.
   - People should drive at a constant speed for better mileage and less pollution.

Scientific Thinker

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Enrichment Learning

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Hots

1. All combustible substances are not fuels because all combustible substances do not produce energy while burning.
2. The two properties of petroleum which makes it form a layer above water is as follows:
   - It is lighter than water.
   - It does not mixes with water.
3. 1. Coal
   2. (i) solid (ii) Black
   3. (i) carbonization (ii) destructive distillation
   4. Coke, coal gas and coal tar.

Value Based Question

A. She is concerned about nature. Carpool is a great way to control pollution and use less amount of fossil fuel.

Chapter-6 — Combustion And Flame

Quiz Time (Page 78)

1. Combustible substance, oxygen, heat
2. The substances which burn on heating with the release of heat and light are known as combustible substances.
3. a. LPG, Petrol, Paper
   b. a ribbon of phosphores catches fire
   c. Oxidation, Rusting
   d. Fire cracker

Exercise

A. 1. (a) oxygen 2. (d) Biogas 3. (d) Kerosene
4. (b) Spontaneous combustion 5. (c) Foam 6. (c) Dark zone
7. (d) Hottest part 8. (b) CO_2

B. 1. Carbon-dioxide 2. Different 3. Rapid
4. Inflammable 5. Lighter

C. 1. T 2. F 3. T 4. T 5. T

D. 1. Paper, kerosene, wood, CNG, LPG.
2. Phosphorus can catch fire even at roon temperature. Therefore, phosphorus is kept in kerosene or water.
3. $C_6H_{12}O_6 + 2O_2 \longrightarrow 6CO_2 + 6H_2O$ + Heat.
4. It cuts off the supply of oxygen, hence extinguishes fire.
5. It will conduct electricity and may electrocute the person involved.
6. Raindrops which contain soluble acids like nitric acid known as Acid Rain.

E. 1. a. Wood, coal b. Alcohol, Diesel
c. Gobar gas, Coal gas
2. a. Combustion is the chemical process of burning of substances with the evolution of heat and light.
b. A flame is a zone of combustion of gaseous substances with the evolution of heat and light.
c. The imbalance caused in the atmospheric proportion of gases by burning of fuels is known as pollution.
3. The substances which have a very low ignition temperature and can catch fire easily with a flame are called inflammable substances. Eg., LPG, Petrol, etc.
4. Combustion is of three types:
– Spontaneous: Starts without igniting a combustible substance.
– Rapid: Starts burning as soon as it is ignited and produces large amount of heat and light.
– Slow: No igniting or external heat is required.
5. Suspended Particulate Matter (SPM) are the fire particles of unburnt carbon released in the air. It produces smog in winters which causes major respiratory problems in human beings.
6. The world famous Taj Mahal is turning yellowish because of the type of pollution caused by a refinery in the close proximity which release sulphur dioxide (SO_2) which mixes with air and combines with rain to form acid rain. The acid rain is corrosive and harmful to plants, crops and buildings.

F. 1. (a) When methane is burnt in the presence of adequate supply of air, carbon-dioxide and water are formed and energy is released in the forms of heat and light. This is called complete cumbustion.
$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$ + Energy
When methane is burnt in short supply of oxygen, methane does not burn completely. This is called incomplete combustion.
$4CH_4 + 7O_2 \longrightarrow 2CO + 8H_2O + 2CO_2$
(b) The substances which burn on heating with the release of heat and light are known as combustible substances.
Eg., CNG, LPG, etc.
(c) When combustion starts without igniting a combustible substance. This combustion is known as spontaneous combustion. Eg., Forest fire.
When a substance starts burning as soon as it is iginited and produces large amount of heat and light, this combustion is referred to as rapid combustion.
Eg., LPG, Petrol, etc.

2. The gaps are left in between the pieces of coal in a chulha to allow air to enter in the chulha. If these gaps are not provided, then the coal may begin to release a lot of smoke which is a result of imcomplete combustion.
3. Foam extinguisher used to put out the fire caused due to oil its vapour are heavier than air, they settle down on the burning material and cut off the air supply.
4. Different zones of a candle flame are as follows:
   - Non-Luminous Zone: It is the outermost zone of the flame where complete combustion-takes place. It is the hottest part and this part gets sufficient supply of oxygen.
   - Luminous Zone: This is the area of imcomplete combustion. Due to inadequate supply of oxygen, this zone burns incompletely and the carbon particles glow with yellow light.
   - Dark Zone: No combustion takes place, it covers the area surrounding the wick containing unburnt vapours produced by the melting of wax.
   - Blue Zone: The small region at the base of the wick is called the blue zone. In this zone, carbon monoxide burns with blue colour.
5. The harmful effects of burning fuels are as follows:
   - Increase in air pollution which causes health risks.
   - It causes respirating problems like asthama, lung cancer, etc.
   - It increases temperature and causes global warming.
   - It corrodes buildings.
   - It destroys crops.
6. The main pollutants and their effects on environment:
   - Suspended Particulate Matter (SPM): In burning of fossil fuels, ash and fine particles of unburnt carbon is released in the air which are called SPM. SPM produces smog which causes major respiratory problems in human beings.
   - Carbondioxide: Combustion of most of the fuels release CO_2. It is pollutant gas. Excess of this gas traps heat energy from the sun, then by increasing the atmospheric temperature.
   - Carbon Monoxide: Incomplete combustion of fossil fuel releases carbon monoxide. It is a highly poisonous gas which causes respiratory problems. Excess burnt of CO may cause death too.
   - Sulphur Dioxide: It is produced during the burning of coal and diesel. When this gas mixes with air, it form sulphuric acid. This acid combines with rain and form acidic rain which is harmful to plants, animals and human beings.
   - Nitrogen Dioxide: It react with water vapour present in air and then it gets converted into nitric acid in presence of sunlight. During rain, this acid gets dissolved in the rain and damages plants, building and affects human beings also.

Scienticfic Thinker

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Hots

A. During extreme hot summer, the dry leaves collide with each other. The collision results in friction which produces spark. This results to forest fire.
B. It is easy to burn dry leaves as it easy to reach the ignition temperature as compared to the green leaves because of no moisture content.
C. Paper by itself catches fire easily whereas a piece of paper wrapped around an aluminium pipe does not as aluminium absorb heat which prevents paper to reach its ignition temperature.

D. Varun kept the beaker in the outermost part which is the hottest part hence the beaker which varun is holding will burn fast.

E. a. Spontaneous b. Rapid
c. Explosion d. Spontaneous

Value Based Question

Aruna's mother is concerned about her daughter. She is caring and protective.
Following steps should be followed while working in the kitchen:

– Always wear heat-resistant cloth.
– Be at a distance from the stove.
– Never play inside a kitchen.
– Take care of knob, always switch it off.

Chapter-7 — Conservation of Biodiversity

Quiz Time (Page 90)

1. Ecology is a term related to the study of the relationship between organisms and the environment in which they live.
2. 104 National Parks are there in India.
3. It is located in Kerala.
4. Sunderbans Biosphere Reserve is there in West Bengal.

A. 1. (a) animals 2. (d) 1973 3. (a) Uttarakhand
4. (d) Disbalance between CO_2 and O_2 5. (b) Undangered animals
6. (c) Asiatic lion 7. (b) Red Data Book 8. (d) Wildlife conservation

B. 1. forest 2. Government 3. National Tiger Conservation Authority (NTCA)
4. 18 5. Seed banks 6. Prevented
7. Extinct 8. Revised

C. 1. Gujarat 2. Rajasthan 3. Assam 4. Uttarakhand
5. Assam 6. Himachal 7. Maharashtra 8. Gujarat
9. Tamil Nadu 10. Uttar Pradesh

D. 1. All the forms of life on the Earth which include all the animals, plants, etc., living in nature collectivey are known as Biodiversity.
2. There are 566 wildlife sanctuaries in India.
3. India's first National Park was established in 1936 as Hailey National Park, known as Jim Corbett National Park.
4. Uttarakhand.
5. Endangered.
6. Peacock, Great Indian Bustard
7. International Union for Conservation of Nature and Natural Resources (IUCN)
8. It has enlisted the names of spices which are considered to be endangered species worldwide in the red data book.

E. 1. Genuine and reasonable use of natural resources is called conservation of natural resources:
We should conserve our natural resources to such an extent that:
– The needs of human are fulfilled without exploiting them.

– They are left for the use of future generations also.

2. The term wildlife includes plants, animals and microorganisms which live in nature or are present in their wild natural habitat.

   Healthy ecosystems clean our water, purify our air, maintain our soil, regulate the climate. It is important for human's survival.

3. Wildlife sancturary is an area where plants and animals are protected. Some permanent places are kept aside for animals and birds to live and these protected and preserved areas are called wildlife sanctuaries. We have 566 wildlife sanctuaries.

   Biosphere Reserve is an area that is meant to conserve biodiversity. It includes a much larger area than a wildlife Sanctuary and National Park. There are 18 Biosphere Reserves.

4. Forests plays an important role in our lives directly or indirectly.
   – Forests protects the wildlife and helps in maintaining CO_2 and O_2 in the atmosphere.
   – Forests regulate the temperature of the Earth and keep the water cycle going on.
   – They give us wood, raw materials for many products.
   – They also give us food and medicines.

5. The species which are at the verge of extinction are known as endangered animals. Example- Rhinoceros, Leopard etc.

6. The species which can be found in a particular region or area. Such species are called endemic species. Example- Lion-tailed macaque, Great Indian Bustard, etc.

   They are not spread over a distant area and are only restricted to a place, they are more prone to extinction.

7. The organisation who work for the conservation of wildlife are:

   IUCN- International Union for Conservation of Nature and Natural Resources and UNEP- United Nations Environmental Programme.

F. 1. a. Flora constists of all the species of the plants. It provides us with food and many other useful products.

      Fauna consist of all the species of the animals. They are vital part of the ecosystem.

   b. The species which are at the verge of extinction are known as endangered animals. Eg., Leopard, Rhinoceros, etc.

      The species which are found in a particular area are known as endemic species. Eg., Great Indian Bustard, Lion tailed Macaque, etc.

2. The term 'Wildlife' includes plants, animals and microoganisms which live in nature or are present in their wild natural habitat. All the organisms are part of wildlife, so this ecosystem should be conserved. To conserve them, it is important to preserve their habitat. Government has following protected areas:

   Wildlife sanctuary is an area where plants and animals are protected. Some permanent places are kept aside for animals and birds to live and these protected and presented areas are called wildlife sanctuaries. We have 566 wildlife sanctuaries.

   National Parks protect both flora and fauna. At present, we have 104 National Park.

   Biosphere Reserve is an area that is meant to conserve biodiversity. It includes a much larger than a wildlife sanctuary and National Park.

3. a. Biosphere Reserve in an area that is meant to conserve biodiversity. In a biosphere reserve, coservation of wildlife, plant and animal resources is done. It includes a much larger area than a Wildlife Sanctuary and National Park.

   b. The places where animals and birds are protected by keeping them in special cages is known as zoo. They are mostly found in all big cities of our country.

   c. The gardens that are established to conserve rare and threatened species of plants are known as Botanical Gardens. These gardens also served as seed banks.

4. Following steps can help us in conservation of forests:

- Afforestation: The only way to protect your forest is by planting more and more trees.
- Control on overgrazing: When animals are left open in the forests for grazing they trample the new plants with the feet or eat them. This stops the growth of new plants in the forests. It should be prevented.
- Protection from fire: The fire in the forests spreads very fast. It destroys huge area in the forest. Fire in the forests is very difficult to be controlled.

5. The International Union for Conservation of Nature and Natural Resoures (IUCN) has enlisted the name of species which are considered to be endangered species worldwide in a book called Red Data Book. Each Red Data Book has information regarding specific group of animal or plants. This book is revised at different times giving changed status of the wildlife.

Scientific Thinker

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Enrichment Learning

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Hots

A. Tribals depend on forests for food and livelihood. It is not fair to prevent them from entering the forest. But on the other hand it is necessary to conserve forests also. Their symbiotic relation can be maintained by allocating areas to them under the forests. They should be allowed to a particular extent only.

B. (i) Endemic species (ii) Endangered animals (iii) Leopard
(iv) Extinct Species (v) Dinosaur

C. Deforestation

Value Based Question

The place where animals and birds are protected by keeping them in special cages is known as zoo. They are mostly found in all big cities of our country.

Wildlife sanctuaries are protected areas where fauna and flora are protected. Animals will be happy in a wildlife sanctuary only as they are free to move in their natural habitat.

Chapter-8 — Cell-Structure and Functions

Quiz Time (Page 102)

1. Robert Hook 2. Paramecium, Amoeba 3. Plasma Membrane
4. Cell wall 5. Chromoplast, Chloroplast, Leucoplast

Exercise

A. 1. b 2. d 3. d 4. b & d 5. a
6. a 7. b 8. c

B. 1. Stained 2. red blood cells 3. Cellulose 4. Cell inclusions
5. Nucleoplasm 6. Cell sap

C. 1. e 2. d 3. a 4. b 5. c

D. 1. It is a jelly-like living substance enclosed by the cell wall.
2. Cytoplasm
3. Nucleus
4. Nuclear Membrane

5. Protoplasm consists of cytoplasm and nucleus.
6. Mitochondria produces energy for the cell.
7. Lysosomes are the suicidal bags of the cell.
8. Plant cells have cell wall.

E. 1. Maximum space is occupied by cytoplasm as it is the jelly-like structure which fills the cell and includes other living substances also.
2. Nucleus is called the mastermind of the cell as it is the control centre of the nucleus. It is responsible for all the functions performed inside the cell.
3. Nucleus has all the information regarding the inheritance of organisms. Thread-like structures called chromosomes are present in the nucleoplasm. These chromosomes have all the information for the next generation of cells.
4. Mitorchondria is called the powerhouse of the cell as it produces energy for the cell. It has its own DNA and protein.
5. Plant cells have an extra covering called cell wall. It supports the plant cell and protects plant cell due to each of skeleton in plants.
6. Chloroplasts are also known as the kitchen of the plant cells as it has chlorophyll present inside it which is a necessary pigment for the process of photosynthesis.

F. 1. Robert Hooke discovered the cells in 1665 when he observed a slice of cork under the magnifying device. He found that the slice constituted of many box-shaped structure which resembled a honey comb. He called these tiny structures as cells. With passage of time and more work on living beings, he discovered that all living beings are made of cells.
2. Scientists found that cells are of different shapes and size in different living beings but their basic structure is same in all living beings. Most of the cells are so small that they can be seen under microscope only. Cells have different shapes in different organs and organisms.
For eg: Amoeba and White Blood cells keep on changing their shapes continuously. Muscle cells are thin and long. Red-Blood cells are disc-shaped. In terms of size, Ostrich egg is the largest cell and red blood cells are smallest in humans.

3. a.

Unicellular organisms	Multicellular organisms
Organisms whose bodies constitute only single cell are called unicellular organisms.	Organisms whose bodies constitute more than a single cell are called multicellular organisms.
All the functions are perfomed by single cell.	All the functions are performed by group of cells.
Eg., Amoeba	Eg., Humans

b.

Prokaryotes	Eukaryotes
The organisms which do not have well defined nucleus and nuclear membrane known as prokaryotes.	The organisms which have well organised nucleus with the nuclear membrane are known as eukaryotes.
Eg., Blue-Green Algae, Bacteria	Eg., Onion cell, cheek cell

c.

Plant cell	Animal cell
Cell wall is present.	Cell wall is absent.
They have chloroplast to perform photosynthesis.	They do not have chloroplast.
They have vacuoles of large size	They do not have vacuoles or may have vacuoles of small size.
Plastids are present.	Plastids are absent.
Bigger in size	Small in size.

4. a. Cell Membrane: It separates the external environment from inside the cell. Water, minerals and some other substances can penetrate through this membrane.
   b. Chromosomes: The chromosomes have all the information regarding reproduction of cells and to carry forward all the information to the next generation of the cells.
   c. ER: Endoplastic Reticulum is like a network of membranes enclosed in the cytoplasm. It produces proteins and lipids which are used to produce new parts of cells.
   d. Chloroplasts: These organelles are present in plant cells only. They contain a green pigment called chlorophyll in them which helps in the process of photosynthesis. This is also referred to as kitchen of the plant.
   e. Cilia and Flagella: The primary function of cilia and flagella is movement. Many of the organisms are found in aqueous environments, where they are propelled along by the beating of cilia or the whip-like action of flagella.
   f. Nucleus: It controls all the functions of the cell and also known as the mastermind of the cell. It also contains the hereditary information which is to be transferred to the next generation.

Scientific Thinker

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Enrichment Learning

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Hots

A. Cell has cell membrane also known as plasma membrane. The membrane selectively allows water, CO_2 and H_2O to move in and out of the cell. The process which allows the movement is known as diffusion.

B. Nucleoutides are molecules that are known as the basic structure of DNA and RNA. It is essential for carrying out metabolic and physiological activities.

C. A- Nuclues
B- Mitochondria
C- Cell membrane
D- Cytoplasm
E- Chromosomes

D. 1. (i) A - Eukaryotes
   (ii) B - Prokaryotes
   2. (i) Onion cell
   (ii) Blue-Green Algae

E. The statement is wrong. The correct statement is:
"Unicellular organisms do respire, multicellular organisms respire too."

F. If animals have cell wall, they would not be able to move from one place to other.

Value Based Question

a. Iodine

b. It will give the cell colour which will make it easy to study under a microscope.

c. We should be attentive during our lectures.

Chapter - 9 — Reproduction in Animals

Quiz time (Page 115)

1. Testes
2. Ovary
3. Zygote
4. External

Quiz time (Page 119)

1. embryo
2. Metamorphosis
3. Dolly, a sheep
5. True

Exercise

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

B. 1. Generation, generation 2. Shell 3. division 4. tadpole
5. adult frog 6. viviparous, oviparous 7. cloning 8. 14th February, 2003

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

D.
1. Testes are located outside the abdominal cavity in a sac-like structure called scrotal sac.
2. The mixture of sperms and reproductive gland's secretion is called semen.
3. Testes produces sperms in humans.
4. Head, midpiece and tail
5. The lower narrow part of the uterus is called cervix.
6. Male Reproductive Hormone: Testosterone female Reproductive Hormone: Estrogen and Progesterone
7. Fertilization & Cell Division
8. No.
9. In-vitro fertilization
10. Finn Dorset sheep and Scottish Blackface Ewe

E.
1. The biological process by which living organisms produce offsprings of their own kind is known as reproduction. The two modes by which animals reproduce are:
   - Asexual Reproduction
   - Sexual Reproduction
2. Hydra reproduces by asexual reproduction. The new individuals develop from the buds in Hydra. Hence, the type is known as budding.
3. The male reproductive organs constitute testes, vas deferens, urethra, penis.
   The female reproductive organs constitute ovaries, oviduct, uterus, vagina.
4. See diagram on pg 113.
5. The stage of the embryo in which all the body parts can be identified is known as foetus. In humans, this stage is reached after about eight weeks of fertilization.
6.

Asexual	Sexual
• The type of reproduction where no fusion of gamete is required.	The type of reproduction where fusion takes place.
• Single parent is required.	Two parents required.
• Eg., Hydra	Eg., Humans

7. When the sperms come in contact with an egg, one of the sperms may fuse with the egg. This fusion of the egg and the sperm is known as fertilization. There are two types of fertilization:
   - Internal fertilization: The fertilization which takes place inside the body of a female is known as internal fertilization. It occurs in human beings and in many animals like dogs, cows, etc.
   - External fertilization: The fertilization which takes place outside the body of an organism is known as external fertilization. It occurs in aquatic animals like frogs, fish, etc.
8. The animals which give birth to young ones are known as viviparous animals. Eg., Humans, Cows
   The animals which lay eggs are known as oviparous animlas like hen, frog, etc.

9. The change that takes place during the development of an animals is known as metamorphosis. In the life circle of frog, the eggs transform into a tadpole. These tadpoles get transformed into frogs. Hence, the young ones are very different from the adults.
   Egg ⟶ Embryo ⟶ Tadpole ⟶ Adult frog
   (See figure on Pg 117)

F. 1. Amoeba is a single-celled organism.The process of reproduction begins with the division of its nucleus into two nuclei. Then its body is divided into two parts. Each part receives a nucleus. finally, two amoeba are produced from one parent amoeba. This type of asexual reproduction in which an animal reproduces by dividing into two individuals is known as binary fission.
   (See figure on Pg. 112)

2. In sexual reproduction, two individuals are required. One is male and other is female. In animals, males and females have different reproductive parts or organs. The reproductive parts in animals produce gametes. The female parent produces the egg or ovuns and male parent produces sperms. When the sperm and ovum fuse with each other, they form a third cell known as zygote. The zygote develops in a new individual. This type of reproduction that takes place by the fusion of male and female gametes is known as sexual reproduction.
3. Male Reproductive system contain the following parts:
   Testes: are located outside the abdominal cavity in a sac- like structure called scrotal sac. These testes produce the male gamete known as sperms. Testes produce millions of sperms. Each sperm has three different parts namely, head, midpiece and tail. Each sperms is a single cell with all the usual cell components. Sperms are very small in size.
   Vas Deferens: The pair of ducts that connects each testes to the urethra. It carries the sperms to the urethra along with the secretion of reproductive glands. This mixture of sperms & reproductive glands. This mixture of sperms and reproductive gland's secretion is called semen.
   Urethra: The vas deferens open into urethra and pass through the penis and then outside. It carries both urine and sperms at different times.
   Penis: Urethra leads to muscular organ called penis. It is used to deliver/pass urine and also semen into vagina of the female at the time of mating.
4. When the ovum is fertilised in the oviduct, then zygote is formed. The zygote divides rapidly by mitosis as it moves down slowly in the oviduct and forms a hollow ball of hundreds of cells. This hollow ball of cells, now called an embryo, sinks into the soft and thick lining of the uterus and gets embedded in it. A special disc-like tissue develops between the uterus wall and the embryo, which is called placenta. The exchange of nutrients, oxygen and waste products between the embryo and the mother takes place through the placenta. The embryo grows and become foetus within a few weeks before birth.
5. Cloning is the process of producing similar population of genetically identical individuals that occurs in nature when organisms reproduce asexually. The cloning of animal was performed successfully for the first time by Jan Wilucut & his colleagues at the Roslin Institute in Edimburgh, Scotland. They cloned a sheep named Dolly. During the process, a cell was collected from the maneurary gland of a female finn Dorset sheep. Simultaneously, an egg was obtained from a Scottish Blackface Ew The nucleus was removed from the egg. Then, the nucleus of the cell from the finn Dorset sheep was inserted into the egg of teh Scottish Blackface Ewe. The egg thus produced was implanted into the Scottish Blackface Ewe. The development of the egg was done normally and finally Dolly was born.

Scientific Thinker

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Hots

A. It is necessary for fish and frog to lay so many eggs as they lay eggs in water. Out of those, some may float away, some may eaten by big fishes so there are only few left which were able to get fertilised.

B. Hen and frog are oviparous but they have different types of fertilisation. Internal fertilisation takes place in hen & external fertilisation takes place in frogs. They both lay eggs but fusion takes place inside the body of hen & in case of frogs, fusion takes place outside.

C. 1. (i) frog (ii) tadpole 2. metamorphosis
3. lungs 4. gills

D. 1. Oviparous Animals 2. Frog, Fish
3. Viviparous Animals 4. Human, Dogs

E. Yes, a women with a blocked oviduct can give birth to a child by In-Vitro fertilization.

F. Twin babies are born when two eggs are fertilised by separate sperms or the single zygote sphils and forms two embryos.

Value Based Questions

Do it yourself.

Chapter - 10 — Reaching the Age of Adolescene

Quiz time (Page 126)

1. It begins at the age of 10-11 years.
2. Yes, Hormones control the growth as it is the chemical substance which releases and cause changes at the time of puberty.
3. Yes, puberty leads to increased sweating which often results in body odour. The skin becomes oilier which often leads to appearance of ache pimples on the face.
4. The changes during the puberty are quite normal and one should not be anxious as these are the bodily changes or the period where reproductive organs grow.

Quiz time (Page 129)

1. Exocrine Glands are cellular sub-structure organs in a body that provide a system to secrete substances out and external to the body. These glands secrete their substances through a ductal system.
2. Insulin decreases the blood glucose level by helping body cell to transport glucose across their membranes.
3. If fertilization does not occur, the released egg and the thickened lining of the uterus along with its blood vessels are shed off. This results in discharge of blood through the vagina. This is called menstruation or period.
4. It ends at menopause.

Exercise

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

B. 1. Mammary 2. broader 3. Pituitary 4. brain
5. Thyroid 6. menarche 7. chromosomes 8. sex

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

D. 1. (b) 2. (d) 3. (e) 4. (f) 5. (c) 6. (a)

E. 1. 'Teenagers' is the other term used for adolescents.
2. The growing voice box in boys can be seen as a protecting part of the throat known as Adam's apple.
3. Over secretion of these hormones results in gigantism and its little secretion results in dwarfism.
4. Pancreas
5. Estrogen and Progesterone
6. Menarche
7. Stoppage of menstruation is termed as menopause.
8. Iodine is necessary for the thyroid gland to make thyroxine hormone which is essential for metamorphosis to take palce.

F. 1. (a) The period of life when the body undergoes changes, leading to the reproductive maturity is known as adolesence.
(b) The age at which the reproductive system becomes functional is known as puberty.
(c) Chemical substances secreted from endocrine glands initiating the growth process are known as hormones.
2. $\frac{100}{75} \times 124 = 165.34$ cm
3. (a) It makes their voice harsh and an outgrowth appears on neck known as Adam's apple.
(b) It makes their voice shrill.
4. Pimples is an impurity which appears on face of teenagers due to changes going on inside the body. In the teenage, the skin becomes oilier which often leads to appearance of acne and pimples on the face.
5. Various processes of the body are controlled by the endocrine system. The system controls these processes through chemicals called hormones which are secreted by a number of glands that make up the endocrine system, and are released directly into blood. Exocrine glands are cellular struture organs in a body that provide a system to secrete substances out and external to the body. These glands secrete their substances through a ductal system.
6. Pituitary gland lies just below the brain. It is also called the master gland because it secretes other hormones as well. Some of these are: Tropic hormones, Growth Hormones, Thyroid Stimulating Hormones, Oxytocin, etc.
7. Adrenal Glands secretes two types of hormones, adrenalin and corticoids. There hormones regulate birth rate, heart rate, blood pressure, carbohydrate metabolism and mineral balance. These hormones also help us to overcome our fear.
8. In Adolescents, the role of diet and exercise to stay healthy is quite important. Adolescents undergo any changes, therefore the importance of balance diet, personal hygiene and physical exercise become essential. The nutritional needs of the adolescents should be planned properly as adolescent is a stage of rapid growth & developent. A balanced diet should be given to them which contains all the nutrients like carbohydrates, fats, proteins, vitamins & mineral in well proportion.

G. 1. Changes in the body are as follows:

In Boys	In Girls
• Hair growth on face, chest and armpits, etc.	Hair growth under armpits and pubic areas.
• Voice become harsh.	Voice become shrill.
• Development of muscles, chest broadens.	Hip area widens, development of mammory glands.
• Penis becomes larges.	Ovarics starts releasing eggs.
• Testes starts producing sperms.	Menstruation begins.

2. Secondary sex characteristics are the changes that occur in the body at the onset of puberty. It creates a difference in between male and female. These changes occur due to release of

testosterone hormones in male and estrogen and progesterone hormone in females. The characteristics include:

- Increase in Height
- Change in Body shape
- Development of Hair
- Voice changes
- Activity of Sweat & oil glands
- Changes in behaviour and attitudes
- Sexual feelings

3. (a) Pituitary glands releases growth hormone. Its function is to control growth in humans. Also, it releases other hormones like thyoxine, adrenal, etc.

   (b) Pancreas releases insulin & glucogen. Insulin decreases the blood glucose level and glucogen increases the blood glucose level.

   (c) Ovaries of a women secrete estrogen which develops the female secondary characters. It also secretes progesterve which prepares uterus for receiving the fertilized egg & also for menstruation in the abscence of pregnancy.
4. Reproductive Phase of life is humans states the period in which they are able to reproduce. The testes of a man starts producing sperms and the ovaries of a woman starts producing ovums at the age of puberty. In females, the reproductive phase of life begins at puberty and generally rests till the age of approximately 45 to 50 years.
5. The sex of a baby is determined by the nature of gametes that fuse to form the zygote. The thread - like structure called chromosomes are present inside the nucleus of every cell. All human beings have 23 pairs of chromosomes in the nuclei of their cells. Out of these, 2 chromosomes are termed as the sex chromosomes, named as X and Y.

   A female has two X chromosomes while a male has one 'X' and one 'Y' chromosome.

   The gametes (egg & sperm) have only one set of chromosomes. The unfertilized egg always has one X chromosome. If X chromosone of man's sperm fuses with X chromosome of ovum it will result into a baby girl. If 'Y' chromosome of man's sperm fuses with 'X' of female, a baby boy will born.

Scientific Thinker

Do it yourself

Enrichment learning

Do it yourself

Hots

A. Pelvic area grows and broadens at puberty becuase they have to bear a baby in their uterus later in their life.

B. 1. (i) menstruation (ii) period
   2. at 10-11 years
   3. puberty
   4. at 45-50 years. Menarche works the stoppage of reproductive phase in women.

C. A. Pancreas
   B. Insulin
   C. Diabetes
   D. Diabtic

D. The adolescents should avoid drugs, it is emphasized in the chapter as they are more prone to get

addicted to drugs. This is the growing age where certain changes takes place inside teenagers. So, they must avoid to fall into a bad company.

Value Based Questions

Do it yourself.

Chapter - 11 — Force and Pressure

Quiz time (Page 139)

1. The push or pull is known as force. The effects of force are as follows:
   - It may change the direction of a moving body.
   - It may stops or gives motion to an object.
   - It may change the shape and size of the body.
2. No, it is not necessary. The force, must be greater than the frictional force of the static object.
3. The object will not move. Two equal forces cancel out each other.

Quiz time (Page 142)

1. Friction
2. Gravitational force
3. Weight
4. Yes, Electrostatic and Magnetic force are such forces which act when the objects are not in contact.

Quiz time (Page 145)

1. Contact forces act when two objects are in contact with one another. Eg.: Muscular force
   Non-contact forces act when two objects are not in contact with one another. Eg.: Magnetic force
2. Pressure
3. 1 pascal
4. (a) pressure guage (b) barometer

Exercise

A. 1. (d) 2. (b) 3. (d) 4. (a) 5. (a)
6. (d) 7. (c) 8. (a) 9. (a) 10. (c)

B. 1. direction 2. zero 3. Mechanical force 4. 120 m
5. lesser 6. decreases, increases

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

D. 1 — (e) 2 — (a) 3 — (d) 4 — (b) 5 — (f) 6 — (c)

E. 1. A + B
2. A – B
3. Isaac Newton
4. Magnetic force
5. SI unit of force is Newton, CGS unit of force is Dyne.
   $1 \text{ Newton} = 10^5 \text{ dyne}$
6. The Earth is surrounded by a layer of air called the atmosphere.
7. SI unit of pressure is Pascal, CGS unit of pressure is dyne per sq. cm.

$$1 \text{ Pascal} = \frac{1 \text{ dyne}}{1 \text{ cm}^2}$$

8. Yes, in all directions.
9. Yes
10. Yes, increases with depth.

F. 1. Yes, the force applied can make an object move or stop from moving.
2. Yes, force applied on a ball or balloon changes the shape.
3. Issac Newton defined the universal law of gravitation which states that every point mass in the universe attracts every other point mass with a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between them.
4. (a) it will cause to rest when stop skating due to friction.
(b) it will fall down due to gravitational force exerted by Earth.
(c) repel each other due to magnetic force.
5. Pressure is force acting per unit area. It depends on force and area.

$$P = \frac{F}{A}$$

6. It is difficult to cut vegetables with a blunt knife as the pressure is decreased due to increase in area. Hence, the vegetables will experience less pressure.
7. Case I: $F = 10N$

$A = 0.1m^2$

$P = ?$

$$P = \frac{F}{A} = \frac{10}{0.1} = 100 \text{ Pascal}$$

Case II: $F = 10$ N

$$A = \frac{0.1}{2} m^2$$

$$P = \frac{10}{0.1/2} = \frac{10 \times 2}{0.1} = 200 \text{ Pascal}$$

Pressure increases with decrease in area.

8. $F = 200N$

$A = 8m^2$

$$P = \frac{F}{A} = \frac{200}{8} = 25 \text{ Pascal}$$

9. $$P = \frac{F}{A} = \frac{60}{6} = 10 \text{ Pascal}$$

$\text{Area} = 26 \times 3$

$= 6m^2$

10. Sea diver wear specially designed suit so as to protect themselves from being crushed. The pressure increases with depth in sea hence special suits are designed so as to oppose the pressure exerted.

G. 1. Contact forces are the forces which act when two objects are in contact with each other. Its types are as follows:

Muscular force: The force which is exerted by the muscles of the body of lining organisms is known as muscular force. Eg.: We lift our school bag by applying muscular force.

Frictional force: The resistance to the movement of our body in relation to another body with which it is in contact is known as frictional force. Eg.: A ball stops after rolling on a surface after some time.

Mechanical force: The force which is generated with the help of machines is known as mechanical force. Eg.: Machinery

2. Non-contact forces are the forces which covers into play even when there is no physical contact in between the two objects. The type of forces are as follows:
   - Gravitational force: The force of interaction which exists between two particles due to their masses, is known as Gravitational force. Eg.: Moon revolves around Earth is a result of gravitational force.
   - Magnetic force: The force exerted by a magnet is known as magnetic force or magnetism.
   - Electrostatic force: The force exerted by a charged body on another charged or uncharged body is known as electrostatic force.
3. Pressure increases with increases in depth. The Activity is as follows:
   Aim: To show that pressure is liquid increases with depth.
   Material Required: A tin can, plasticine and water
   Method:
   - Take a tin can and make a few holes at different heights.
   - Now, cover the holes with plasticine.
   - Fill the container with water.
   - Now, remove the plasticine from all the holes at one go.

   Observations: You will observe that the pressure with which water flows out increases with the depth of the hole.
4. The pressure exerted by the air is known as atmospheric pressure. Yes, air exerts pressure. The activity is as follows;
   Aim: To show that air exerts pressure.
   Materials Required: A thin-walled tin can, bunsen burner, matchbox, normal water and cold-water.
   Method:
   - Take a thin-walled tin can with its mouth open.
   - Now, pour water in the tin can.
   - Light the bunsen burner with the matchbox.
   - Put the tin can containing water on the bunsen burner and beit the water. The steam will drive out the air.
   - Now, close the month of the can tightly with a cork.
   - Turn off the burner and cool the tin can by placing it in cold water.

   Observation: You will observe that the seam will condense into water leaving a partial vaccum in the tin can that could be crushed by the pressure of the outside air.

Scientific Thinker

Do it yourself

Enrichment learning

A. **Across**

1. Muscular force
2. Newton
3.
4. Pressure
5. decreases
6. Barometer

Down

7. Magnetic force
8. Increases
9. Drag
10. Pascal's Law

B. Do it yourself

C. Do it yourself

D. Do it yourself

Hots

A. Gravitational force cancel out each other hence we are not pulled towards each other.
B. To change the speed, we may stop the moving object by applying an opposing greater force and we may hit the object in other direction to change its direction.
C. Q > T > S > P > R
Pressure increses with increase in depth and decreases with increase in area.
D. The atmospheric pressure increases & the plane will crash.
E. Gravitational force and Mechanical force

Value Based Questions

Do it yourself.

Chapter - 12 — Friction

Quiz time (Page 155)

1. Friction is a contact force.
2. (a) it will stop after some time.
(b) we slip through the surface.
3. Spring balance is a device used for measuring force on the object.
4. No, we are able to walk due to friction. If it is eliminated, we won't be able to walk properly.

Quiz time (Page 157)

1. Objects moving in fluids must have special shapes to cut the opposing force applied by the fluid.
2. The resistance that an object encounters when it slides over a surface is called sliding friction.
3. Yes
4. Lubrication is a method to decrease the force of friction.
5. The principle that rolling friction is less than sliding friction is also made use of ball bearings.
6. No, even the smoothest surface will have little friction.
7. Friction helps us to walk and write. Also, it wears out soles of shoes and wastes energy.

Exercise

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

B. 1. motion 2. lesser 3. less 4. drag 5. streamlined 6. coarse

C. 1. false 2. false 3. true 4. false 5. false 6. true

C. 1. Rolling friction 2. Rolling friction 3. Drag 4. Rolling friction
5. Rolling friction 6. Sliding friction 7. Static friction 8. Rolling friction

E. 1. West to East 2. Static, Rolling, Sliding
3. Due to friction 4. Yes
5. Roller reduces to friction hence it is easy to carry the luggage.
6. By lubricating the machines.

F. 1. Friction can be defined as the force that acts along the two surfaces in contact which opposes the motion of our body over the other.
2. Friction is generated due to irregularities in the surface.
3. Lubrication makes the surface smooth hence reduces friction.
4. Streamlining is a shape which is narrow from the front & broad at the back. It helps to reduce drag produced by fluids.
5. Sportsman use shoes with spikes so as to have a better grip while running. It also prevents them from slipping.

6. Friction can be increased by the following methods:
   - By using a harsh substance.
   - By increasing the area of contact.
   - By increasing the irregularites.

G. 1. The factors affecting friction are as follows:
   - Friction depends upon the surface that is in contact. Roughness affects the friction by increasing the friction while smoothness decreases the friction.
   - Friction is directly proportional to the normal force. When a body is moving over a horizontal surface, it presses down aganist the surface with a force equal to its weight.
   - Force of friction does not depend on the amount of surface area in contact between th moving bodies.
   - Force of friction is self-adjusting. This means that the friction also increases when the applied force is increased.

2. The types of friction are as follows:
   It is that which exists between the two surfaces that are in contact when there is no relative motion between the surfaces.
   - Sliding friction– It is that which exists between the two surfaces that are sliding our surface on another surface.
   - Receiving friction– It is that which exists when a body rolls on the surface.

3. Following are the four situations in daily life where friction is an advantage:
   - Cars and buses are able to move safely on the road because of friction between the treaded tyres and the surface of the road.
   - It would not be possible to light a matchstick by rubbing it aganist the matchbox if there was no friction.
   - Friction also helps to write on paper and blackboard with the pen or chalk.
   - Friction causes nails & screws to hold on to walks.

4. Friction also has undesirable effects that interact with your activities & reduce their efficiency.
   - Friction causes wastage of energy. This is because when there is a relative motion of two surfaces in contact, there is frictional resistance.
   - Friction is non-conservative force. This looses energy in terms of heat and sound.
   - It is responsible for the wear & tear of various parts of machines. It also wears out material like screw, ball bearings or sales of shoes.

5. The four methods by which friction between two solid surfaces in contact can be reduced:
   - By lubrication: It is a process of converting dry friction into wet friction. Friction is decreased by lubricating substances with oil, grease or graphite. It does not allow a direct contact between the two sliding surfaces rather a thin layer of the lubricant between them.
   - By streamlining: Streamlined body with narrow head & broad back decreases the drag caused in fluids.
   - By Anti-friction Metals: when steel slides over an alloy of rod, the friction is less than when steel slides on steel because friction between unlike material is less than between substances of the same kind.
   - By polishing: polishing a rough surface smoothens the surface and reduces friction. In this process, a thin film of suitable material is deposited on the surface of the bodies.

6. Friction is a necessary unit because it has both useful as well as harmful effects:
   - We can walk easily because ground offers friction.
   - It is a difficult task to move on a wet muddy track, or wet marble floor.
   - Soles of shoes have grooves on them. Grooved soles give more friction to the ground which gives better grip when we walk.
   - Tyres of vehicles have treads for better grip over road.
   - Friction also produces heat.
   - Writing with pen is possible because of friction.

Enrichment learning

A. Do it yourself

B. Do it yourself

C. Do it yourself

D. Crossword

Across

1. Streamlined
2. Drag
3. Rolling
4. Friction

Down

5. Roughness
6. Adhesion
7. Decrease
8. Lubricating

Hots

A. When we rub our hands, friction generates heat which is a result of rubbing the surfaces. Hence, they become warm.

B. Q. Greater the friction, lesser it will travel.

C. (1) sliding friction
(2) limiting friction
(3) rolling friction

D. Friction is necessary evil. Examples are as follows:

- It wears out soles of shoes but we are able to walk because of friction.
- It wears out tyres but we are able to stop due to friction.

Value Based Questions

Do it yourself.

Chapter - 13 — Sound

Quiz time (Page 165)

1. The maximum displacement of a vibrating body on either side of the mean position is called its amplitude.
2. Hertz
3. High frequency is required for higher pitch.
4. The frequency of a woman's voice is higher.

Quiz time (Page 170)

1. Stapes
2. No, there is no medium for sound to travel from moon to Earth.
3. Steel
4. Light, lightning causes first than the sound.

Exercise

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

B. 1. Sound 2. vaccum 3. hertz (Hz) 4. frequency
5. 20 Hz 6. wind 7. Noise 8. noise pollution

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

D. 1. Sound is an energy which is produced by rapid to-and-fro movements, called vibrations.
2. It is produced by vibrations.
3. Tuning fork is used in laboratories to produce sound for experiments.
4. The time taken by the body to complete one vibration is called the time period of the body.
5. auditory nerve.
6. It is from 20 Hz to 20 KHz.
7. (a) woman (b) woman
8. voices of men, women & children are different becuase of the difference in size of their vocal cords.
9. (a) Guitar (b) Shehenai
(c) Tabla (d) Cymbals
10. Noise

E. 1. Loudness of the sound produced by a vibrating object depends on the amplitude of the vibration. Loudness is proportional to the square of the amplitude. If the amplitude is increased by three times, loudness is increased by nine times.
2. We can hear an echo if we are standing at least 17 m away from the wall. Only then, the ears are able to separate the voice going and coming back. Therefore, we cannot hear the echo if we stand 14 m away from the wall.
3. Sound of an approaching train can be heard even if the train is far away as when we put our ear on the railway line. Sounds travels fastest in solid as compared to air.
4. The voice box of our body is known as larynx. Larynx has two vocal cords which vibrate to produce sound. vocal cords are stretched across the larynx in such a way that it leaves a narrow slit between them for the passage of air. when you speak, air passes through the opening. Hence, sound is produced.
5. (a) 20 KHz
(b) Bat
(c) Dogs, Dolphins
6. Sound having frequency more than 20,000 Hz are call ultrasonic. Sound having frequency less than 20 Hz are called infrasonics.
7. The three types of musical instruments are:
Stringed Instrument– They use vibrations in metal wires to produce sound. Eg.: Sitar, Guitar
Wind Instrument– They use vibrations in air column to produce sound. Eg.: Flute, Shehnai
Percussion Instrument– They have a stretched string whose vibrations produce sound. Eg.: Drum, Tabla.
8. When the environment is disturbed by un-desirable, loud & harsh sound, it is called noise pollution. Major sources of noise pollution are—
   - Road, air and Rail traffic
   - Domestic noise
   - Loud music during parties & functions, etc.

F. 1. Sound produced by a vibrating object reaches our ear through medium. It can be solid, liquid or gas. As soon as the vibrations reaches our ears, it vibrates and strikes the ear drum. Going from

the middle ear to inner ear. The vibrations are amplified & sent to brain with the help of auditory nerve. Brain interprets the sound & hence we are able to hear & understand.

2. **Aim:** Sound can travel through liquids.

   Material Required: Bath tub, ringing bell

   Method: Take a bath tub filled with water.

   - Dip the bell into the bath tub. Make sure that the bell is not touching the bath tub.
   - Now ring the bell inside the water.
   - Can you hear the bell?

   Observation: You will be able to hear the sound of bell clearly from the surface of water which shows that sound can travel through liquids.

3. **Aim:** Sound cannot travel through vaccum.

   Material Required: An electric bell, bell jar, flat disk

   Method: Take a bell jar & suspend an electric bell in it

   - Complete the circuit to connect the electric wires through an air tight cork to a battery with a switch.
   - Keep the bell jar over a flat disk and connect a vaccum pump.
   - Now press the switch & start the vaccum pumps notice what happens?

   Observation: In the first situation when vaccum pump is off, you can hear the voice of electric bell. But when you start the vaccum pump, voice becomes dim till it becomes inaudible even though the bell is ringing. This activity shows that sound cannot travel through vaccum.

4. Human ear are sensory organs that help to hear sound. It has three important parts– outer ear, middle ear and inner ear.

   Outer Ear: It's shape is like a funnel. It consists of pinna & ear tube. The outer ear collects the sound waves and directs it into the ear canal. eardrum is a tightly stretched membrane that separates the outer ear from the middle ear.

   Middle Ear: It consists of three tiny interlocked bones. The innermost bone separates the middle ear from the inner ear. It picks up the vibrations from the eardrum & amplifies the sound and transfers it to the inner ear.

   Inner Ear: It consist of a coiled organ of hearing, semi circular canals and auditory nerve. Semi-circular canals make the balance of body. In the inner ear, the vibrations pass through the fluid in the cochlea. This motion of the vibration is converted into electrical impulses by the nerve cells. these electrical impulses are transmitted to the brain's auditory nerve where it is processed as sound. This way you can hear the sound.

   (for Diag., see Page 166)

5. Harmful effects of Noise pullution are:

   - Exposure to sudden high noise level can cause permanent hearing loss due to rupture of eardrum.
   - Prolonged exposure to noise can cause gradual hearing loss, and can even lead to permanent hearng loss.
   - High noise levels can also lead to nervous tension and increase blood pressure.
   - People experiencing high noise levels experience sleep depriviation and increased number of headaches, and therefore show inceased reliance on sedatives and sleeping pills.

   To control noise pollution:

   - Heavy vehicles and factories should not be allowed near the residential areas.
   - Control over recreational noise, such as use of loudspeakers.

- All machinaries, automobiles, electric generators, etc. should be designed in a way that they produce less sound.

Scientific Thinker

Do it yourself

Enrichment learning

Do it yourself

Hots

1. A sonic boom is the sound associated with the shock waves created by an object travelling through the air faster than the speed of sound.
2. Bats produces ultrasounds at night, it reflects back after striking an object. They listen to the refection of sound and make their way.

1. A– ultrasound B– Infrasonics
   C– Normal range of hearing for humans
   (20 Hz to 20000 Hz)

Value Based Questions

Do it yourself.

Chapter - 14 — Chemical Effects of Current

Quiz time (Page 180)

1. Conductor conducts electricity & Insulator does not conducts electricity.
2. It has no salts to conduct elecricity. 3. Electrolysis

Quiz time (Page 183)

1. In electroplating, same metal electrodes are used which take part in electroysis. These metal electrodes are called active electrodes.
2. Electrolyte used in $CuSO_4$
   Anode is metal used
   Cathode is copper
3. Electroplating is the method of depositing one metal over another in the presence of a metal salt.

Exercise

A.	1. (d)	2. (c)	3. (a)	4. (a)
	5. (b)	6. (c)	7. (d)	8. (c)
B.	1. Conductors	2. Chemical	3. longer	4. acids, salts
	5. hydrogen, oxygen	6. cathode	7. Cathode	8. shiny
C.	1. True	2. True	3. False	4. False
	5. False	6. False	7. False	8. False

D. 1— (e) 2— (d) 3— (a) 4— (b) 5— (f) 6— (c)

E. 1. By generating electricity & it is transported through wires & power stations.
2. Chemical effect, Magnetic effect and Heating effect.
3. Lensulators does not conduct electricity. Eg.: plastic
4. By passing electric current

5. At anode we get H^+ ions and at cathode we get OH^- ions.
6. Tap water, it has dissolved salts.
7. By using a tester.
8. Light Emitting Diode
9. LED

F. 1. When an electrolyte such as copper sulphate is dissolved in water, it breaks up into positively & negatively charged particles called ions. Positively charged ions are called cations while negatively charged particles are called anions.
2. The two rods or plates dipped in solution and connected to the battery are called electrodes.
3. We use a tester to conduct whether electricity passes or not. Connect the object with wires to a LED, complete the circuit with a battery. Check whether the bulb glows or not. This is how one can check for the conduction.
4. When electricity is passed through water, oxygen bubbles formed on the electrode connected to the positive terminal of the battery & hydrogen bubbles formed on the cathode connectd to the negative terminal of the battery.
5. When electric current is passed through $CuSO_4$ solutions, copper sulphate dissociates into copper and sulphate. The free copper gets drawn to the electrode connected to the negative terminal of the battery & gets deposited on it.
6. (a) A substance which conducts electricity in the liquid state or when dissolved in water and breaks up chemically during the process is called an electrolyte.
   (b) The process breaking up of an electrolyte chemically on passing an electric current through it.
   (c) Electroplating: The process of coating a metal object with a thin layer of another metal by means of electrolysis.
7. Chromium is a shiny metal that never corrodes and also resists scratches. Therefore, it is electroplated on iron to make it scratch-resistant & free from corrosion.
8. Chromium is an expensive metal hence it is not economical to make the object of chromium hence it is electroplated.

G. 1. (a) Light Emitting diode (LED) is used as to test conductivity of liquids. LED glows even when a weak electric current flows through it. There are two wires (called leads) attached to an LED. One lead is slightly longer than the other. While connecting to a circuit, the longer lead is always connected to the positive terminal of the battery and the shorter lead is connected to the negative terminal of the battery.
   (b) We can use compass needle as a tester by wrapping electric wire around it 4-5 times. Gently place a small compass neddle inside it. Join one end of the wire & the other end of the wire is left free. Now, the other end is joined with the other terminal of the battery. As soon as, the electric current flows through the wire, it will show deflection. this happens because of magnetic effect of electric current.
2. Electrolysis of water is carried out in the following way:
   - Fill a beaker with water.
   - Take two iron strip, dip it into the water.
   - Join one strip with positive terminal of a battery.
   - Join the other with negative terminal using wires.
   - Pass eletric current through it.
   - Gas bubbles appear near the electrodes (iron strips). This is known as eletrolysis.

   The is how electrolysis takes place. Water is made up of hydrogen and oxygen. Hence, the gas collected at the negative terminal is hydrogen and at the positive terminal is oxygen.

3. **Aim:** To electroplate a metal spoon with copper.

   Material Required: A glass beaker, a thick copper wire, a metal spoon, a battery cell, a solution of copper sulphate, conneting wires & a switch.

   Method: Half fill the given beaker with the copper sulphate solution.
   - Hammer the copper wire to flatten it and connect it to the positive terminal of the battery.
   - Place a spoon in the beaker & connect it to the negative terminal through a switch.
   - Immerse both of them in the copper sulphate solution & complete the circuit.
   - Put on the switch and let the current pass through the solution for 10 minutes.
   - Switch off the current & take the spoon out from the solution.

   Observation: You will observe that while the flattened copper wire becomes smaller, the metal spoon is coated with a layer of copper.

4. Do it yourself.

5. Three uses of electroplating are:
   - Tableware, trays, decorative pieces and jewellery are plated with gold or silver to make them more attractive.
   - Chromium is a shiny metal that does not corrode & resists scratches. It is deposited on other cheaper metals such as iron to make car parts, both taps, kitchen gas burners, wheel rims & many others.
   - Iron used in bridges is also coated with zinc to protect it from rusting.

6. The pollutants from the electroplating industries are hazardous, as the effluents contaminate air, water & soil. Some of the polluting agents, like cadmium, lead, nickel, etc. have injurious effect on human health. The environmental contaminants in electroplating industry mainly include waste water, hydroxide sludge & sulphuric acid the untreated rinsing water has a lot of waste that needs to be treated.

Scientific Thinker

Do it yourself

Enrichment learning

Do it yourself

Hots

A. Rainwater contains particles mixed from air. Hence, conducts electricity.

B. Iron will get plated on the copper. Ions always move from cathode to anode.

C. LED, as it generates less heat.

D. Electroplating of expensive metals can be easily done. Hence, it prevents monetary loss.

E. 1. Greenish-Blue 2. Positive, i.e., Cathode
   3. Chemical effect

Value Based Questions

Do it yourself.

Chapter - 15 — Some Natural Phenomena

Quiz time (Page 192)

1. The two kinds of charges are positive and negative. They both attract each other.
2. The repulsion alone is a sure test of whether a body is charged or not.

3. Electroscope

Quiz time (Page 197)

1. The science that deals with the seismic waves is called seismology.
2. 10 times
3. The boundaries of the electronic plates are the weak zones. some areas of South India also fall in the earthquake prone zone.

Exercise

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

B. 1. lightning 2. conduction 3. Lightning conductor 4. Richter scale, seismic
5. epicenter 6. tsunami

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

D.
1. Lightning, earthquake
2. Lightning
3. Repel
4. Like charges repel each other whereas unlike charges attract each other.
5. Benjamin franklin
6. the electroscope is used for detecting, measuring and finding the nature of charge.
7. earthing is a process of transferring charge from one charged body to the Earth.
8. A lightning conductor is used to prevent damage caused by lightning to buildings.
9. The science that deals with the seismic waves is called seismology and the scientists are known as seismologists.
10. Mercalli scale and Richter Scale.

E.
1. When the metal top of an electroscope is touched with a charged plastic comb. The charges travel down the metal strip hence the strips expands or repel. This is because of the same charge and like charges repel each other.
2. A charged body attracts another body with an opposite charge. A charged body can also attract an uncharged body. Therefore, to test if a body is charged or not, bring it near a positively charged body and a negatively charged body one by one.
3. When a very heavy charge passes through the air in a very short time, it is accompanied by heat & light. This phenomenan is called Electric Discharge.
4. (a) It is made up of metal.
   (b) It has spikes at the top & end is buried inside Earth.
5. Lightening conductor is a device used to protect buildings from the effect of lightning. It consists of a metal rod ending in spikes at the top. The lower end of rod is attacked to a copper plate buried deep in the Earth. If lightning strikes the building, it flows harmlessly to the Earth through the metal rod without causing any damange to the building.
6. Safety measures to save ourselves from lightning strike during a thunderstorm:
   - Never take shelter under a tree.
   - Squat down on floor on feets if you are in open.
   - All electrical devices should be switched off.
   - Carrying umbrella is not safe during lightning.
7. Any sudden disturbances below the Earth's surface may produce vibrations or tremor's in the Earth's crust. The vibrations or shakings are known as Earthquakes. Most Earthquakes result from the movement of one rock mass to another in response to tectonic forces. This results in vibrations, and are felt as earthquakes.

8. The scales used to measure earthquake is known as Richter Scale. It is not a linear scale which means each one unit on this increase in the Earthquake strength.

F 1. Repulsion is a sure test of whether a body is charged or not as if we bring charged bodies together:
   - If they attracts, it has no charge.
   - repelled by the positive charge, the body is positively charged.
   - repelled by a negative charged body, it is negatively charged.

2. Different ways to charge a body are as follows:
   Friction: The process of rubbing objects together has friction hence charges a body.
   Conduction: A body can also be charged by touching it to a charged body. The uncharged body on being charged acquires the same charge as of the charged body.
   Induction: An uncharged body also gets charged by bringing a charged body near it but not touching it.

3. The gold leaf electroscope consists of a metal disc to which a metal rod is attached. At the bottom of the metal rod are mounted two thin strips of metal which are made of copper, brass or gold. this electroscope is used to detect & measure charge. The amount of divergence of the leaves is a measure of the amount of charge on the body. Electroscope also finds the nature of the charge whether a body has positive or negative charge. If the divergence of the leave increases, the body has similar charge, i.e., negative. If the divergence of the leaves decreases, the body has opp. charge i.e., it is positive.

   (for diag., see Pg 192 & 193)

4. The simplest form of a seismograph is a simple pendulum. When the ground shakes, the base and frame of the seismo-meter move with it, but the pendulum bob remains in place. Thus, there is relative motion between the bob & the shaking ground. A pen below the bob records this motion on a paper that is moved by a rotating drum. The recording is the seismogram.

   (See pg. 195 for diagram)

5. Preventive measures during Earthquake
   - In highly seismic areas, people should construct the houses of wood or timber.
   - Stay away from tall & heavy object.
   - Try to move to an open place.
   - Take stairs, avoid lift or escalators.
   - If you are at bed or in house, take the corner & cover your head with a pillow.

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A. Because of friction

B. (1) Glass Rod, Rubber Balloon (2) Silk cloth, Woollen cloth.

C. (1) divergence decreases (2) divergence increases

D. It may struck by lightning & may cause fire.

Value Based Questions

Do it yourself.

Chapter - 16 — Light

Quiz time (Page 206)

1. (a) Regular (b) Irregular
2. 65°

Quiz time (Page 208)

1. Virtual
2. It cannot be obtained on a screen.
3. Infinite

Quiz time (Page 210)

1. 7
2. (a) bent towars the normal (b) bent away from the normal
3. Violet, Indigo, Blue, Green, Yellow, Orange, Red [VIBGYOR]

Quiz time (Page 214)

1. Concave lens
2. Iris
3. convex lens
4. Louis Braille. For codes, see Page 213

Exercise

A. 1. (b) 2. (b) 3. (b) 4. (b) 5. (c)
6. (d) 7. (d) 8. (c) 9. (a) 10. (d)

B. 1. reflection 2. incidence 3. multiple reflection 4. Mirror
5. large 6. bright light 7. 25 8. A, C, E

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

D.
1. Luminous object, Sun
2. Regular
3. 55°
4. Sir Isaac Newton
5. Prism
6. Iris
7. convex
8. Blind spot
9. infinity
10. 64

E.
1. The returning of a ray of right when it strikes a polished or rough surface in accordance with the laws of reflection. The law of reflection are as follows:
   - The incident ray, reflected & the normal ray all lie in the same plane.
   - Angle of Incidence is equal to the angle of reflection.

   $$\angle i = \angle r$$
2. A phenomena caused by mirror which shows left as right & right as left is known as lateral inversion.
3. Glass, because it is denser than water.
4. (a) 2 (b) 7 (c) 1 (d) 5 (e) Infinite
5. (a) Iris (b) lens (c) retina (d) optic nerve (e) ciliary muscles
6. Ciliary muscles are responsible for the change of focal length. When we focus on a distant object, the ciliary muscles get relaxed and become thin at the centre. On the other hand, when we focus on objects near the eye, the ciliary muscles get tensed & become thick at the centre.
7. After removal of an object in front of our eye, the image does not disappear at the same time but it persists on the retina for about one-sixteenth of a second. This is known as persistences of vision.

8. Ability of our to focus on nearby & distant objects is called accomodation of eye. Our both eyes have certain angle of vision which is different for both the eyes. Our brain interprets & makes us see only on object rather than two.
9. Contract can be treated surgically by removing the eye lens & inserting in its place a new artificial lens.
10. We can take care of our eyes by the following points:
    - You must wash and clean your eyes atleast twice a day.
    - do not read or write on moving vehicles or in dim light.
    - Atleast read, write and watch from a proper distance.
    - You must blink eyes from time to time & must do exercise of eyes.

G
1. The main characteristics of the image formed by a plane mirror are as follows:
    - The image formed is of same size.
    - The image formed is at same distance.
    - The image formed is the exact copy of object.
    - The image is virtual & erect.
    - The image is laterally inverted.
2. Do it yourself.
3. Refraction of light is bending of light as it passes from one medium to another. There effects of refraction are as follows:
    - A swimming pool appears to be less deep than it actually is, when seen from above the surface of water.
    - When a pencil is dipped obliquely in water, it appears to be bent at the surface of water.
    - Lemon appears to be raised and slightly bigger when kept in glass of water.

    (a) for diag., see page 209. (b) for diag., see page 210
4. Do it yourself.
5. Do it yourself.
6. (a) The surface of a mirror is very smooth, therefore, the entire beam is reflected in only one direction. This is caller regular reflection.

    When the entire beam of light strikes a rough surface, it scatters & moves to different direction. This is called irregular or diffused reflection.

    (b) A converging lens is thick in the middle & becomes thinner at the edges. It converges light. A diverging lens is thin in the middle & thicker at the edges. It diverges light.

    (c) A person suffering from myopia can only see near objects clearly. The distant objects appear to be blurred. It can be corrected by using concave lens.

    A person suffering from hypermetropia can only see distant objects clearly. The nearby objects appear to be blurred. It can be corrected by using convex lens.

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Hots

A. Some parts may not be visible as light only falls on same objects.

B. Do it yourself

Value Based Questions

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Chapter - 17 — Stars and Solar System

Quiz time (Page 223)

1. Telescope
2. Moon, Star, Meteors
3. Milky Way Galaxy
4. light years, Astronomical Unit

Quiz time (Page 226)

1. Jupiter
2. It is cold
3. Major factors are: Atmosphere, Right temperature & distance from the sun.
4. Jupiter, Staurn, Uranus, Neptune

Quiz time (Page 227)

1. Ceres
2. Meteors are small objects made up mainly of stones present in space. When a meteor enters Earths surface it is known as a meteorite.
3. No, it is a meteorite which is falling under Earth's gravity.
4. Hallye's comet

Exercise

A. 1. ( ) 2. (d) 3. (c) 4. (a) 5. (d)
6. (b) 7. (d) 8. (a) 9. (a) 10. (d)

B. 1. hydrogen, helium 2. Sirius 3. Polaris, Dhruv Tara 4. West, East
5. Phobos, Deimos 6. Greater 7. Shooting star 8. Mars and Jupiter

C. 1. False 2. False 3. True 4. False 5. False 6. True 7. True

D. 1— (e) 2— (d) 3— (a) 4— (f) 5— (c) 6— (b)

E. 1. Astronomers
2. About 150 million kms.
3. Distance travelled by light in one year is 1 light year.
4. It means that the sunlight takes exactly 8.3 minutes to reach the surface of the Earth.
5. A group of stars forming same recognised shape is constellation. Pole star is a part of Ursa minor.
6. Venus
7. Mars
8. Mercury & Venus
9. Satellite
10. Remote Sensing
11. INSAT stands for Indian National Satellite
12. Aryabhata spacecraft was the first satellite sent first into space by India.

F. 1. Stars twinkle and planets do not twinkle. When we observe a star, we will see the stars twinkle and the light may appear to change colors.
2. Polaris looks at a fixed position when the axis of rotation of the Earth meets the imaginary celestial sphere. Before the magnetic compass was invented, sailors used Pole star to find the north direction.
3. Book pg 222, Diagram of Ursa Major and Orion
4. We can locate the Pole star with the help of Ursa Major. Pole star never changes its position. Its straight line drawn through the two pointers of Ursa Major passes through the pole star.
5. The sun, eight planets, their moons and other celestial objects that revolve around the Sun form the Solar system.
6. Inner Planets recieve substantial amount of solar radiation. These are Mercury, Venus, Earth and Mars. The other four planets that very far away from the Sun are outer planets. These are: Jupiter, Saturn, Uranus and Neptune.

7. Distinctive feature of Saturn is series of wide rings that revolve around it.
8. Asteroids are rohy worlds revolving around the Sun that are too small to be called planets.
9. When two asteroids collide with each other, there is a small piece that breaks off these asteroids. These pieces from asteroids after collision are called meterorite while meteros are small object made up of stones present in space.
10. A comet's long tail of dust and gases extends into space for million of kilo metres. The tail reflects sunlight which make it visible.
11. The surface of the Moon is covered with several craters and mountains. It has a diameter of about one-fourth that of the Earth. It is about 3,84,400 km away from the Earth.
12. The advantages of artifiial satellitis are:
    (i) Communication
    (ii) Weather monitoring
    (iii) Remote sensing

G 1.
- The sun is the nearest star made up of hot glowing gases.
- The Sun is about 1.4 million kilometres in diameter.
- The temperature at the surface of the sun is about 6000°C
- Temperature in the sun rises up to 15 million°C due to nuclear fission.
- The Sun also rotates on its own axis.

2. (a) Ursa Major – Seven stars. Three form the handle of the dipper and four form its bowl.
   (b) Orion – It has seven bright stars. Four bright stars mark the shoulder and legs of the hunter and three mark its belt.
   (c) Cassiopeia – This has five prominent stars
   (d) Scorpion – It contains seven bright and several faint stars.
   (Diagram in Book)
3. The period of rotation is the time taken by a planet to complete one rotation about its axis.

   The period of revolution is the time taken by a planet to orbit the sun.

Planet	No. of Moons	Time taken to orbit Sun	Time of rotation
Mercury	0	88 days	0
Venus	0	225 days	0
Earth	1	365¼ days	1
Mars	2	687 days	2
Jupiter	79	12 years	79
Saturn	82	28½ years	82
Uranus	27	84 years	7
Neptune	14	165 years	14

4. **Venus**
- It is of same size as of the Earth.
- It is very hot, hotter than Mercury.
- Venus appears as the brightest planet in the morning or evening sky.
- It is visible without a telescope.
- It rotates from East to West.

Jupiter

- It is the largest planet.
- Its diameter is 11 times than that of Earth.
- It is the second biggest planet of the solar system.
- It rotates faster than any other planet.
- One day on Jupiter is less than 10 hours.

5. Comets are space objects made of minerals, dust, gases and ice particles that orbits the Sun. They look like the fuzzy stars. A comet consists of a head and a tail. The head contains most of the Mater of the comet. A comet is long tail of dust and gases extends into space for millions of kilometer.
6. Moon changes its shape day by day because of the changes in the position of the Earth. When the moon is in between the Earth and the Sun, we do not see moon at all. It is called new moon. Two or three days after this we can see only a part of the moon. This is called crescent moon. After a week, we can see half of the moon. This is called first quarter. When we see more than half of the moon, it is called gibbons moon. Gradually the moon becomes bigger and on fifteenth day, we see full moon. These are called phases of the moon.

   (Diagram from book page 228)
7. **Geostationary Satellite:** A geostationary satellite remains fixed with respect to a particular point on the Earth. The time period of revolution around the Earth is the same as time period of rotation of the Earth about its axis.

   Sun-Synchronous Satellite: This satellite orbits if its position, with respect to a particular location on the Earth always remain in tune with the position of the Sun over that location.

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A. A light year is the distance travelled by light in a year so if a star explodes 80 light years away, it would take 80 years to reach Earth. Therefore it is highly unlikely that we will be able to see the explosion.

B. Venus rotates backwards therefore the Sun rises in the West and sets in East on the sets in East on the Venus.

C.
1. Constellation
2. Ursa Major, Orion
3. No
4. Seven
5. Pole Star.

Value Based Questions

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Chapter - 18 — Pollution of Air and Water

Quiz time (Page 240)

1. Suspended Particulate Matter, these are minute solid particles released in air from factories & exhaust from vehicles.

2. Nitrogen Dioxide, Sulphur dioxide
3. CO_2 is known as the greenhouse gas and considered a pollutant because of their role in propagating climate change, not because of any direct health effects.
4. Large scale melting of polar ice caps & climatic changes.

Quiz time (Page 243)

1. Discharge of petroleum products into the sea during loading & unloading of tankers or drilling oil wells is caused oil spills.
2. Cholera
3. Minamata caused a crippling and fatal diseases called Minamata disease in a group of fishermen in Japan.
4. (GAP) Ganga Action Plan was launched in 1985. It aimed to reduce the pollution levels in the river.

Exercise

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

B. 1. smoke, carbon 2. ozone 3. global warming
4. hyacinth, aquatic weed 5. Minamata disease 6. Chlorination

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

D. 1— (e) 2— (d) 3— (f) 4— (b) 5— (a) 6— (c)

E. 1. Undesirable change in the physical, chemical or biological characteristics of air, water or land is called pollution.
2. When smoke combines with fog, smog is formed. It causes eye irritation and is harmful for living beings.
3. Aldrin and DDT
4. Carbon dioxide is mainly responsible for global warming.
5. Chlorofluorocarbons deplete ozone layer which protect us from ultra-violet rays.
6. Acid, Mercury
7. Lead
8. Water which is suitable for drinking is called potable water. It must be colourless, odourless and germfree.

F. 1. (a) Sulphur Dioxide
Source – factories
Harmful effect – It causes respiratory diseases.
(b) Nitrogen Oxides
Source – smoke released by vehicles
Harmful effect – eye irritation
(c) Carbon Monoxide – smoke released by vehicles
Harmful effect – causes many diseases and also eye irritation
(d) Chlorofluorocarbons
Source – Refrigerators, Airconditioner
Harmful effect – Deplete Ozone Layer

2. Three natural causes of air pollution are:
- Powerful wind or storm puts dust particles into the air and pollute the air.

- Ash and smoke released by Volcanic eruption causes air pollution.
- Forest fire also release smoke and carbon particles causing air pollution.

3. On burning of fossil fuels like coal or petroleum, nitrogen dioxide and sulphur dioxide are produced. These gases combine with atmospheric water and form nitric acid and sulphuric acid respectively. When it rains these gases get dissolved in rainwater and produce acid rain.
4. Due to deforestation, the amount of CO_2 is increasing in the atmosphere. Since CO_2 traps the heat of the atmosphere, the temperature rises on the Earth's surface causing global warming.

   The harmful effects of global warming are:
   - It causes climate change.
   - It affects rain patterns.
   - It affects agriculture, forests, plants and animals.
5. Green house effect can cause large scale melting of ice in the polar region and also expension of ocean water. These factors can lead to flooding of coastal areas by sea water. Besides, it is also expected to cause climate changes, affecting rain patterns, agriculture, forests, plants and animals.
6. The three effects of water pollution are:
   - Disposal of domestic wastes into the water bodies give rise to microorganisms such as bacteria which can cause diarrhoea, dysentry, cholera etc.
   - The untreated toxic waste discharged by industries may cause death of animals or may damage our liver, kidneys, reproductive system.
   - Thermal power plants discharge very hot water in the water bodies which affect aquatic life.
7. The enrichment of water by nutrients leads to excessive plant growth and depletion of oxygen. This is called eutrophication. It affects water plants and animals.
8. (a) Water which is suitable for drinking is called potable water. Water can be made safe for drinking in following ways:
   - If there are germs present in water, we should boil it for about 15-20 minutes.
   - Chlorination is a chemical method for purifying water.

   (b) We can conserve water in homes by:
   - closing the taps when not required.
   - by using rainwater wherever we can.

G 1. Man-made sources of air pollution are:
   (i) SPM– Minute solid particles suspended in air are known as SPM. They are released from thermal power plants in the form of ash or unburnt carbon particles.
   (ii) Harmful gases– The major air pollutants include carbon monoxide, sulphur oxide, hydrogen sulphite etc. These are released from factories, automobiles and thermal pawer plants.
   (iii) Pesticides– Farmers use pesticides to kill pests and to protect crops. But excessive use of pesticides cause water pollution.
   (iv) Smoke– Smoke released from automobiles and factories cause respiratory diseases. It contains gases such as carbon monoxide, nitrogen dioxide which are very harmful for living beings.
   (v) Chlorofluorocarbons– These are compounds in refrigerators, air conditioners and aerosol sprayers. If CFCs are released in atomosphere, deplete Ozone layer which protect us from UV rays.

2. Preventive measures for air pollution are:
   - Promoting unleaded petrol and diesel.
   - Using smokeless fuels like CNG.
   - Correction the engine design to improve combustion.
   - Filters should be used in vehicles to capture and recycle the escaped gases from the engine.
3. Important sources of water pollution are:
   (i) Sewage– Domestic wastes include human excreta, animal waste etc. These wastes when discharged in water bodies, make them polluted.
   (ii) Industrial Effluents– Many industries produce waste materials which are after discharged into rivers. These pollutants include acids, alkalis, fluorides etc.
   (iii) Thermal pollution– Warm water is discharged into water bodies which effect aquatic life.
   (iv) Agricultural discharge– Excessive use of chemical fertilizer, pesticides, herbioides are responsible for water pollution.
   (v) Oil spills– The leakage of petroleum in the sea during drilling and shipping pollutes sea water.
4. Water is said to be polluted if it contains impurities that are harmful to humans, animals, plants and environment. The substances that pollute water are known as water pollutants.

   Water pollution can be controlled by:

   - Construction of septic tanks, oxidation ponds filter bids, waste treatment plants and municipal sewage plants should be sincerly promoted for the removal of pollutants from the sewage before it is released into water bodies.
   - People should not dump any kind of waste material into the rivers, lakes, ponds or seas.
   - Animal excreta should not be allowed to be washed away into the water bodies. It can be used in gas plants to produce gas for lighting and cooking.
   - Industrial effluents must be treated properly before they are discharged into water bodies.

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A. Yes, CNG gives out less smoke and reduce air pollution. CNG is a clean fuel CNG burns completely leaving no harmful residue.

B. No, Potable water is not pure water, it is just safe to drink. It can be used as there is less risk of it causing harm.

Value Based Questions

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