Science

5

What does "Progressive Science" series consist of?

Each lesson is supported by :

- Beautiful illustrations
- Learning objectives
- Fact to know
- Let's Recall
- Word power
- Train your Brain
- Cross Curriculum Connect
- Exercises with Revision and Model tasks
- Activity time
- HOTS
- Project time

Tasks for RTP and MTP include :

- Answer the questions in short
- Fill in the blanks
- Answer the questions
- True/False
- Multiple choice questions
- Answer in one word
- Match the columns

Published by :

Preface

The "**Science**" series, which is intended for students in grades 1 through 8, is precisely developed in accordance with the requirements and recommendations set forth in the Most Recent National Curriculum Framework appropriate for CBSE and other state board schools.

Children are inherently curious, and they begin to engage in scientific inquiry at an early age. The series emphasises learning with understanding by keeping this in mind.

A fascinating voyage into cause and effect, as well as the inspiration for all life and the universe we inhabit, is offered by science. It is a topic that has a predetermined impact on our line. Therefore, it is crucial to instil a scientific mindset in kids as early as feasible.

The book includes Model Test Paper and Revision Test Paper in accordance with the new plan.

Important details regarding the series:

- Learning objectives : which provides quick points about what students going to learn in the chapter.
- Fact to know : which provides interesting facts to extend learning beyond the curriculum.
- Let Recall : which is provided to summarise the key lessons learned.
- Word Power : In this section, difficult words' definitions are provided.
- Train your Brain : This part aims to help pupils improve their critical and creative thinking abilities.
- Cross Curricular Connect : To assess and evaluate the students on a regular basis throughout each chapter in the form of MCQs, one-word questions, columns to match, activity time, and project time in accordance with CBSE rules on the CCE pattern.
- Revision Test Paper : To test and evaluate the students on a regular basis in each chapter using MCQs, one-word questions, column-matching activities, and project time in accordance with CBSE standards on the CCE pattern.

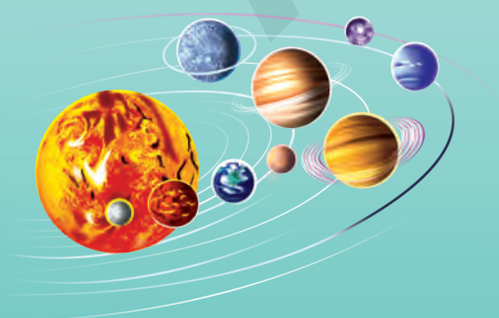
Model evaluations gauge the depth of a student's learning. It is presented in the form of questions and answers and fill-in-the-blanks in each chapter. High order thinking skills (HOTS): Difficult opportunities provided to enhance analytical abilities.

To Offer Continuous and Comprehensive Evaluation of Knowledge, Understanding, and Application of Concepts Learned.

A lot of work has gone into making the series successful. We appreciate any advice you may have to make the series better.

- High order thinking Skills (HOTS) : Difficult opportunities are provided to enhance analytical abilities.

– Publishers



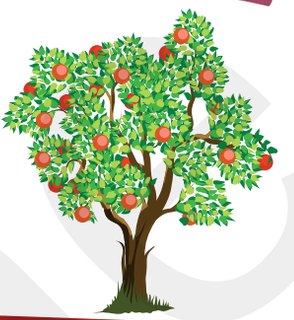
Contents

1

Reproduction in Plants

Learning Objectives

1. Plants and their various characteristics
2. Reproduction in plants by seeds
3. The structure of a flower
4. The structure of a seed and stages of seed germination
5. The features of seed dispersed by various agents
6. The various steps involved in growing crops



Let Me Answer

- Cyclic process of starting a new life, growing, and then coming back to the starting stage (reproducing) is known as what?

PARTS OF A FLOWER

- Petals
- Sepals
- Stamens
- Pistils

PLANTS ARE OUR GREEN FRIENDS.

Plants make the world a beautiful place, where we live in their presence. They are very important to us. Do you know, why ? Let us recall the characteristics common to all plants and animals.

Movement

Just like animals, plants too show movements, such as opening and closing of petals, turning face to the sun etc.

Breathing

Animals breathe in oxygen and breathe out carbon dioxide where as plants take in carbon dioxide and give out oxygen.

Sensitivity

Animals are sensitive to external changes due to the presence of sense organs. Plants too are sensitive to light and gravity. Stems grow upwards, and roots grow downwards.

Growth

Both plants and animals grow during their lifetime.

Nutrition

Animals depend on others for their food, but plants make their own food using sunlight.

Excretion

Animals give out waste, such as sweat, carbon dioxide, urine etc. Plants give out oxygen and water vapour.

Reproduction

Plants and animals reproduce more of their own kind.

You have already learnt in the earlier classes, about some of the characteristics of living things. Now you are going to learn more about growth, respiration and stimuli in living things.

In this lesson, we will be able to learn how plants reproduce. Reproduction is a process by which plants multiply to make more of their own kind. In plants, reproduction takes place by seeds, spores or by vegetative propagation.

REPRODUCTION

1. Reproduction by seeds

All flowering plants reproduce by giving rise to seeds. Seeds are produced inside fruit, which develops from a flower.

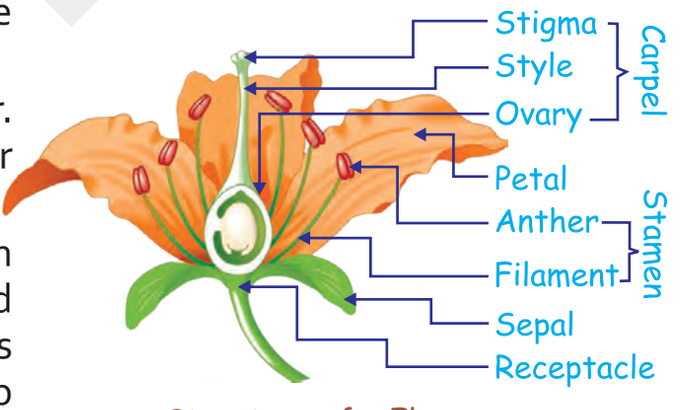
Structure of Flower

A flower has four parts – petals, sepals, stamens and pistil.

Sepals are small green , leaf like structures at the base of the flower. They protect the developing bud.

Petals are bright coloured parts of the flower. They are bright and attract insects for pollination.

Stamens are the third part of the flower from outside. A stamen has two parts : anther and filament. The anther carries pollen grains. It is generally yellow in colour. An anther is held up by a thread-like part called the filament.



Structure of a Flower

Pistil is the innermost part of the flower. The pistil has three parts : stigma, style and ovary. The stigma is the sticky surface at the top of the pistil. It traps and holds the pollen. The style is the tube-like structure that holds up the stigma. The style leads down to the ovary that contains ovule. The pollen grains formed inside the anther

move from the anther to the stigma. This process is called pollination.

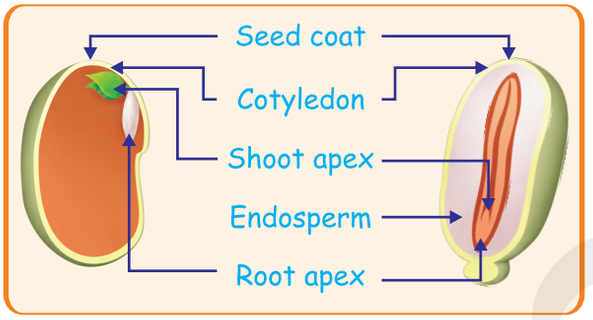
When a pollen grain lands on the stigma, a tiny tube grows from it and moves down the style into the ovary. On reaching the ovary, it fertilizes the ovule. Then the ovule becomes the seed and the ovary becomes the fruit.

Seeds of a plant differ from the seeds of other plants in their number, shape, size, texture and colour.

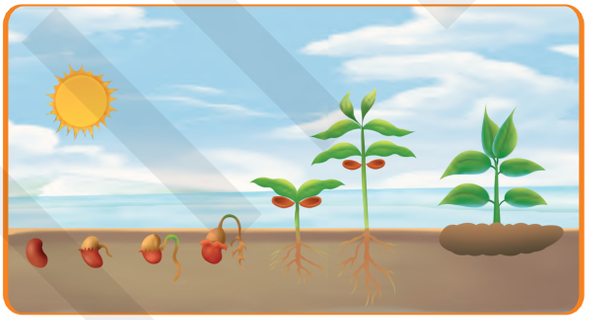
Structure of seed

Let us perform an activity to study the external and internal structure of a seed. All seeds have an external covering called the seed coat. It is of different colours in different seeds. Its function is to protect the seed.

There is a scar on one side of the seed. This is where the seed was attached to the plant. On the top of the scar, you will find a small hole. The seed absorbs water through this hole. The two parts of the seed are called seed leaves or cotyledons. They store food for the baby plant inside. The baby plant is present between the cotyledons. It develops a new root system and a shoot system, and grows into a new plant.



Structure of a Seed



Stages of seed Germination

Seeds like bean, rajma and pea have two cotyledons. They are called dicotyledonous seeds. Some seeds like rice, wheat and maize have a single cotyledon. They are called monocotyledonous seeds.

Germination of seeds

The development of a new plant from a seed is called germination. A seed needs the right amount of water, air and warmth to germinate.

Stages of seed germination

The seed first absorbs water through its hole. This softens the seed coat, so it ruptures. A small root emerges from the seed. It is called the radicle. It grows downwards. Then a small shoot emerges from the seed. It is called the plumule. It grows upwards. The seed with a small root and a small shoot is called a seedling. The growing seedling uses the food stored in the cotyledons for growth. After a few days, green leaves start appearing on the shoot. These leaves make food by the process of photosynthesis. The cotyledons dry up and fall off as all the food in them is used up. The seedling then develops into a new plant.

Seed Dispersal

The process of spreading seeds to different places is called seed dispersal. Seeds need to be dispersed because if they are not dispersed, many germinating seedlings will grow very close to the parent plant. This will result in competition among seedlings as well as with the parent plant. The competition is for light, space, water and nutrients. All of these are important for plants to grow. Seeds can be dispersed in a number of different ways. They may be carried by wind, water or animals. Some plants even shoot out their seeds explosively. The size of seed is an important factor in their dispersal.

Dispersal of seeds by wind

Seeds dispersed by the wind must be light and small in order to be carried by the wind. This means that they can be carried to greater distances. They have hairs or wings to help them get carried away by the wind. The seeds of hiptage, dandelion and cotton have tufts of hair. Sycamore seeds are winged. They spin through the air like mini-helicopters.

Dispersal of seeds by water

Plants which grow in rivers, oceans and ponds or near water bodies, use water for the dispersal of seeds. The lotus fruit has a spongy part which helps it in floating.

Have you seen a coconut ? It is hollow on the inside and is covered with hairs on the outside. This makes it light and hence it can be carried by flowing water over long distances.

Dispersal of seeds by animals and humans

Animals and humans eat fruits and throw away their seeds. Seeds of apple, mango, orange etc., are dispersed in this way. Some seeds have hooks that stick to the fur of animals or to the clothes of humans and get dispersed. Such an example is of the cocklebur seeds.

Birds swallow some seeds which come out with their droppings. Squirrels collect nuts and bury them to be used in winters. They often forget where they had buried the seeds. So when the conditions become favourable, these seeds grow into new plants. While eating fruits, some seeds get stuck on the beaks of birds. When they rub their beaks on the bark of trees, the seeds fall down and later on they grow into new plants.

Seeds of Dandelion with Tufts of Hair

The Spongy Part of a Lotus Fruit

Coconut can be dispersed by water.

Cocklebur Seeds with Hooks

Dispersal of seeds by explosive method

Some plants have pods which explode and burst open when they ripe. This scatters the seeds in all directions. Examples are balsam, pea, lady finger and tamarind.

1. New plants from spores

Some non-flowering plants do not produce flowers. But, they too need to reproduce. So, they reproduce with the help of spores. The spores are small, round and light. They can be dispersed easily in various directions to give rise to new plants. Spores are found in fungi like mushrooms and moulds.

2. Vegetative Propagation

When plants reproduce with the help of their body parts such as roots, stems and leaves and not through seeds, it is called vegetative propagation.

3. Reproduction by roots

Carrot, turnip, radish and sweet potato are the roots that store food in them. They are swollen because of stored food and are called tuberous roots. When these roots are planted in soil, they give rise to new plants.

4. Reproduction by stems

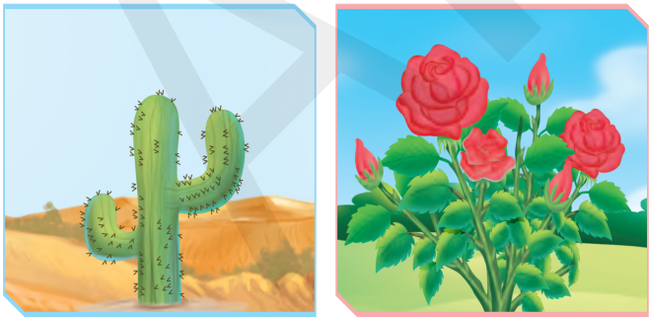
Onion, ginger and potato are underground stems. They also have stored food in them. These stems bear buds from which new plants can grow.

5. Reproduction by Leaves

Reproduction by leaves in Bryophyllum and Begonia

Some plants have leaves which develop buds on their margins. These buds develop into plantlets which later separate out from the parent plant and grow into new plants. Bryophyllum and begonia plants reproduce in this manner.

6. Reproduction by stem cuttings



Cactus and Rose are grown by stem cutting.

A small piece of a mature stem with some buds on it, is cut off from the parent plant. This piece of stem is then planted into the soil and watered regularly. After a few days, it develops roots and buds and grows into a new plant. Plants grown in this way include rose, sugarcane, bougainvillea, cactus and hibiscus.

CROPS

Crops are the plants which are grown in the fields by farmers for food or to obtain other useful products. Growing crops in the fields by farmers is called cultivation.

Some crops are grown in summers. They are called kharif crops. They include rice, maize, jowar, bajra, peanuts, jute and cotton. Some other crops are grown in winter. They are called rabi crops. They include wheat and barley.

Growing crops

Healthy crops are important because they help in feeding the people of a country. A good crop adds to the wealth of the nation. There are several things that farmers keep in mind while growing crops. The following are the different stages for growing a healthy crop.

a. Ploughing the field
b. Sowing the seeds
c. Addition of fertilizers
d. Irrigation
e. Crop protection
f. Harvesting
g. Storage

Ploughing the field

Ploughing is the first preparation for growing crops. The purpose of ploughing is to turn over the upper layer of the soil and bring the fresh nutrients to the surface. It also helps in burying the weeds and the remains of previous crops, allowing them to break down. Ploughing aerates the soil and allows it to hold moisture.

A farmer ploughing the fields

Sowing the seeds

Sowing is the process of planting healthy seeds.

A farmer adding fertilizer to crops

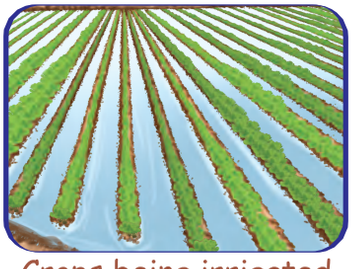
Addition of fertilizers

Farmers mix fertilizers in the soil to make it rich in minerals for the better growth of crops. There are two types of fertilizers.

- Manure is a natural fertilizer made from the remains of dead and decaying plants or from cow dung.
- Chemical fertilizers are man-made like urea, nitrates and phosphates.

Irrigation

Crops need water to grow. Farmers water their crops at the right time with the right amount of water.



Crops being irrigated

Crop protection

A farmer spraying pesticides in the field

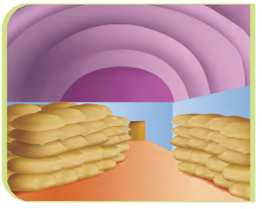
As the crop grows, it needs to be protected from herbivorous animals. This is done by creating a fence around the field. Besides this, pests like rats, mice and insects also harm the crops. Farmers use pesticides and insecticides to kill the pests. DDT and gammaxene are some common insecticides.

Harvesting

Harvesting of wheat crop

When the crop ripens, it is cut down. This is called harvesting. After harvesting, grains like wheat and rice are stored in godowns. This protects them from getting spoilt by moisture or eaten by rats, birds or insects.

Storage



Storage of crops

Vegetables and fruits cannot be stored for a long time at room temperature as they get spoilt very quickly. They are stored in cold storages.

Facts to know

- The reproduction in plants can be of two types : asexual reproduction and sexual reproduction.
- Because plants do not have the ability to move they must rely on external factors to facilitate fertilization.

LET'S RECALL

1. Plants reproduce by seeds, spores and by vegetative propagation.
2. Stamens and pistils of a flower are involved in reproduction.
3. The ovary of the flower changes into the fruit and ovules into seeds after fertilization.
4. A seed needs, air, water and warmth to germinate.
5. Wind, water, animals and humans are the agents of seed disposal.
6. Various stages and requirements are involved in growing healthy crops.

Word Power

aerate	:	to mix water with air
insecticide	:	a chemical substance used for killing insects
margins	:	the amount of space, time etc.
pesticide	:	a chemical substance used for killing crop eating insects
scar	:	a mark on the skin

Train Your Brain

Cross Curriculum Connect

1. Answer the following questions in short.

a. What is germination of seeds ?

b. What are spores ?

c. Why is ploughing done before planting seeds in a field ?

d. Why are cereals stored in godowns ?

2. Fill in the blanks.

plants anthers seed coat radicle crops

a. Pollen grains are found in the ..... .

b. A seed is protected by a ..... .

c. Water, air and warmth are needed for ..... .

d. The small shoot emerging from a germinating seed is called a ..... .

e. Plants which are grown in the fields are called ..... .

3. Answer the following questions.

a. What are the functions of sepals and petals of a flower ?

b. What is the function of a cotyledon ?

c. Why is seed dispersal important ?

d. How do animals help in seed dispersal ?

e. What are the characteristics of seeds dispersed by :

(i) wind

(ii) water

f. Define the following.

(i) Manure

(ii) Fertilizers

(iii) Pollination

(iv) Germination

Formative Assessment

4. Tick (✓) the right and cross (✗) the wrong statements.

a. The innermost part of the flower is pistil. ☐

b. Seeds dispersed by the wind must be heavy. ☐

c. Some non-flowering plants reproduce with the help of spores. ☐

d. Coconut is dispersed by air. ☐

e. Animals grow throughout their life time. ☐

5. Multiple choice questions

a. Anther is a part of the ..... .

(i) stamen ☐ (ii) filament ☐

(iii) ovary ☐ (iv) style ☐

b. The stigma is a part of the ..... .

(i) stamen ☐ (ii) filament ☐

(iii) pistil ☐ (iv) style ☐

c. After fertilization, which of the following turns into a fruit ?

(i) Stamen ☐ (ii) Ovules ☐

(iii) Style ☐ (iv) Ovary ☐

d. What is the other name for seed leaves ?

(i) Cotyledons ☐ (ii) Scar ☐

(iii) Seed coat ☐ (iv) Seedling ☐

e. The small root emerging from a germinating seed is called a ..... .

(i) plumule ☐ (ii) seed coat ☐

(iii) cotyledon ☐ (iv) radicle ☐

6. Give one word for each one of the following.

a. These are produced by flowering plants to produce new plants. : .....

b. An agent with wings and helps to disperse seeds. : .....

c. A method of growing plants from their parts other than seeds. : .....

7. Match the columns.

Column A		Column B
a. Manure	(i)	Cutting of crop
b. Reproduction by roots	(ii)	Urea
c. Reproduction by stem	(iii)	Radish
d. Harvesting	(iv)	From cow dung
e. Artificial fertilizer	(e)	Ginger

Study the structure of a flower. The teacher should show various parts of a flower to the students and ask the students to study its various parts.

1. Saffron, the world's most costliest plant product, grows in kashmir only, not in any other part of our country like Punjab, Haryana or Madhya Pradesh. Can you tell the reason ?
2. If we put some marigold petals in soil and sprinkle some water daily. After a few days, we can observe small little plants of marigold growing in the soil. How can you justify ?

1. Take an egg shell and write 'root power' on it with a marker. Place a teaspoonful of soil in the egg shell. Then place some germinated seeds in the soil. Place the egg shell in a warm place and keep the soil moist. In less than a week, the roots will come out through the egg shell. Think about the power of roots in the field!
2. Students can collect different types of seeds and draw them in their notebook. In case a seed has special features such as spines or hairs, they should try to find out how these features help in the dispersal of these seeds.
3. Visit a field and ask the farmer about the kind of crops he grows, the kind of manure and pesticides he uses and the methods of irrigation used.

2

Amazing Animals

Learning Objectives

1. Habitats of various animals
2. Body coverings of different animals and birds
3. The peculiar feeding habits
4. Different means for breathing
5. Moving habits of several creatures

Let Me Answer

- What kind of fish is Nemo?
- What is the only animal that can't jump?

HABITAT OF ANIMALS

- Forests
- Deserts
- Polar regions
- Mountains
- Oceans
- Fresh water

HABITATS AND ANIMALS

The variety of animals on our planet is amazing! Animals are found almost everywhere : in hot places like deserts, in very cold places like polar regions, in deep oceans, on the mountain and even in the air. Animals have some special body parts that are suited for the place they live in.

Identify the place where each of these animals live.

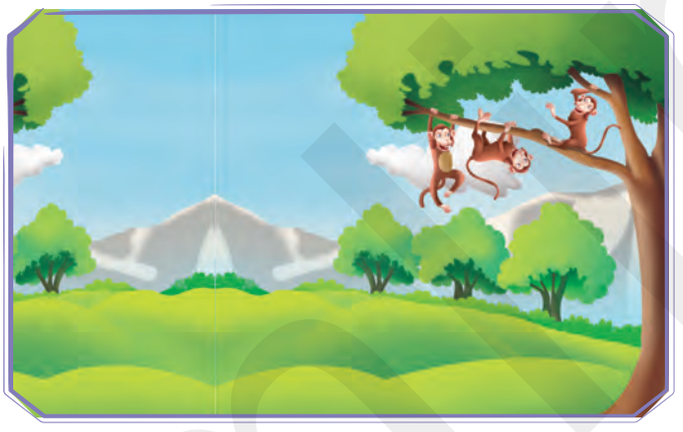
1. Types of Habitats

An area where a particular animal naturally lives is called its habitat. The animal's habitat provides it with air, water, food and shelter. The home of an animal is within its habitat. For example, a lion's home is the den and the forest is its habitat. Various animals need different conditions to live and have chosen different habitats for themselves.

There are five main habitats on our planet : forests, deserts, polar regions and mountains (snow), oceans and freshwater (river, sales, ponds etc.). Let us study each of them in detail.

Forests

A forest is a vast area that is covered with trees and plants. Forests provide shelter to a large variety of animals. Animals such as lion, tiger and bear, live in caves. Many forest animals live on trees, e.g. monkeys and birds. Several types of insects also live in the forests.

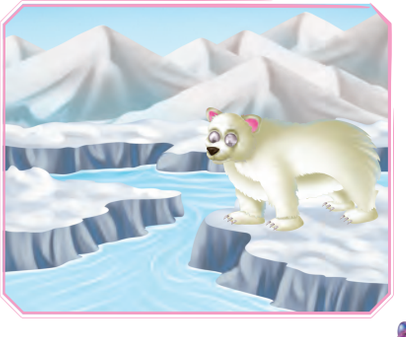


Deserts

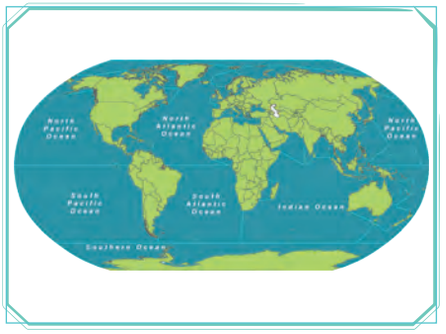
A desert is a dry, often sandy region that receives very little rainfall. Deserts are often very hot during the day and cold during the night. Animals that live in deserts have special features to withstand the hot and dry climate. Many desert animals stay cool during the day by digging underground burrows. It is very hard to find water in deserts. Many desert animals have thick skin to avoid water loss through sweating. Camels can live without water for a long time.

Polar regions and mountains

The polar regions of earth (Antarctica and Arctic) and high mountains are extremely cold regions and covered with snow. Animals that live in these regions have special features to withstand cold. For example : polar bears have thick fur. A layer of fat beneath this fur also helps in keeping them warm. Penguin, seal and walrus are found in polar regions.



Oceans



The ocean is a large, continuous body of salt water that covers two-third of the Earth's surface. It is the world's largest habitat. It is divided into the Pacific Ocean, the Atlantic Ocean, the Indian Ocean, the Arctic Ocean, and the Southern Ocean. A large variety of fishes are found in the oceans. Whale, octopus and jellyfish are some other creatures found here.

Fresh water

Rivers, lakes, ponds etc. are examples of freshwater habitat. Besides oceans, fishes are also found in freshwater. Some animals live inside water, e.g. fish and shrimp. Some animals can live both on land and in water, e.g. frog and salamander. Such animals are called amphibians.

2. Body Coverings

Several types of animals have various body coverings. An animal's body covering helps it to live in a particular habitat. Body covering of some animals are shown below.

Let us find out more about the different type of body coverings.

Scales

Fishes are covered with a layer of flexible and overlapping scales. Bodies of reptiles (e.g. snake, crocodile, and lizard) too are covered with scales. Most reptiles have horny scales that prevent water loss from their bodies. Snakes also shed their skin periodically, which is replaced by a new one.

Shell

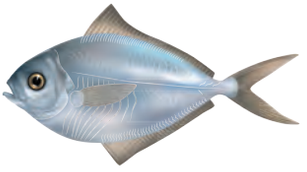
Animals such as snail, tortoise, and turtle are protected by a shell. When these animal find danger, they withdraw their head and feet into the shell! Turtle shells can be very tough.

Feathers

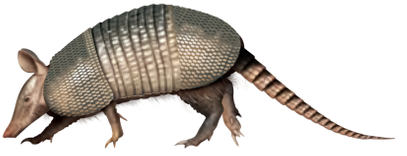
Birds are covered with feathers. Feathers help them in flight. They also protect birds from rain and cold.

Fur or wool

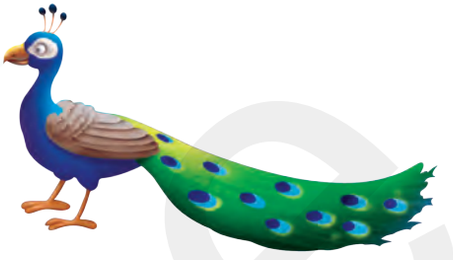
Animals such as sheep, bear and human beings are called mammals. However, unlike human beings, sheep and bear do not wear clothes. Sheep and bear have special body coverings like wool and fur respectively, that protect them from rain and cold.



While fish scales are protective, they do not hinder movement. Probably this is what inspired the ancient Romans to design their armour like fish scales! This type of armour is known as scale mail.



The armadillo's body is covered with armour like plates that protect it from enemies.



Feathers of some birds are very brightly coloured. Peacock, the national bird of India, has beautiful feathers with metallic shades of bronze, blue, green, and gold.

3. Feeding habits

Animals do not need to shop for food like we do. But if they did, what do you think different animals would buy ? See for yourself what our animal friends are buying in the following picture.

Did you notice that different animals are buying different food! Why is that ? Well, this is because different animals have different feeding habits. That is, different animals eat different type of foods. Based on their feeding habits, animals can be herbivores, carnivores or omnivores.

Herbivorous animals or herbivores are those animals that eat only plants.

Herbivores such as rabbit and squirrel are called rodents. They have a pair of sharp front teeth in each jaw.

Deer and goat have wide teeth, which help them in pulling off grass from the ground.

The giraffe's long neck enables it to eat food that is beyond the reach of most herbivores.

Carnivorous animals or carnivores are those animals that only eat the flesh of other animals.

Lions, tigers and wolves kill other animals and eat their flesh.

A frog catches insects using its long, sticky tongue. A snake gulps down a frog.

Spiders trap insects in their webs.

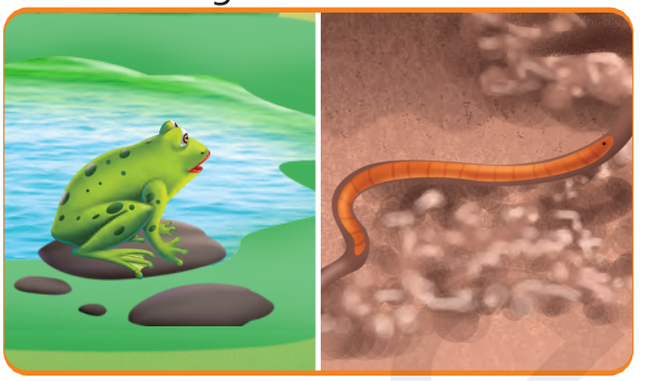
Omnivorous animals or omnivores are those animals that eat both plants and animals.

Crows, bears and human beings eat both plant and animals.

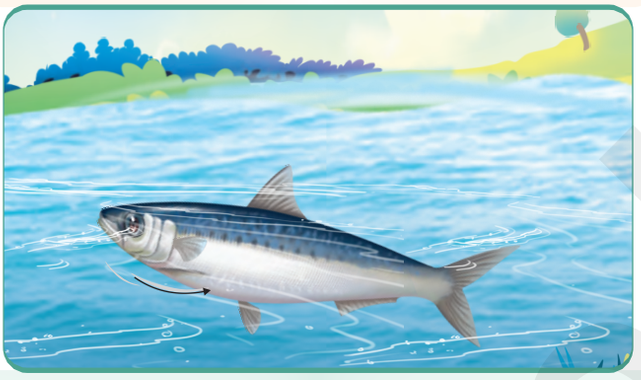
4. Breathing

Different animals have different organs for breathing.

Some animals breathe though a nose. Human beings and sheep are the examples of such animals, From the nose, air is carried to the special organs called lungs.



Frog and earthworm are the examples of animals that breathe through their moist skin. Frog also breathes through lungs when on land.



Fish breathe with the help of special organs called gills.

Insects breathe with the help of a series of tiny holes along the side of their bodies. These holes are called spiracles.

5. Movement

Different type of animals have different organs for movement.

Animals like dogs and cats move with the help of their legs.

Birds fly with the help of their wings. They also have two legs for hopping and moving about.

Most snakes move with the help of scales on the underside of their body.

Frogs hop around using their strong back legs. Their webbed feet help them in swimming.

Fish, dolphins and whales swim with the help of their fins.

Penguins and seals have flippers, which help them in swimming.

Facts to know

- A box turtle's shell can support a weight 200 times greater than the weight of the turtle.
- Ever heard of a fish that could fly? The flying fish is able to leap through the air for a long distance. It does not have wings like birds. It flies with the help of two wing-like fins attached to either side of its body.
- Killer whales sometimes, can be found peeping out of the water surface, as if spying on someone! Nobody is quite sure why they do that. Scientists call this "a strange behaviour".
- Some animals and birds move from one region to another in response to climatic migration. Arctic terns fly over 35,000 kilometres during their annual migration. This is thought to be the longest migration among birds.

LET'S RECALL

1. There are five main habitats on our planet : forests, deserts, polar regions, mountains, oceans and freshwater.
2. Scales, shell, feathers and fur are the main type of body coverings in animals.
3. Animals can be herbivores, carnivores and omnivores, based on their feeding habits.
4. Nose, skin, gills and spiracles are the main type of breathing organs in animals.
5. Animals move with the help of legs, wings, scales, fins, flippers etc.

Word Power

flexible	:	that can be bent or moved easily
migration	:	to change the place from one part of the world to another part at the same time every year
overlapping	:	part of one covering part of other
shelter	:	a safe place
withstand	:	to be too strong to break

Cross Curriculum Connect

1. Answer the following questions in short.

a. Define the following in one line :

(i) Fur (ii) Fins (iii) Scales

(iv) Gills (v) Lungs

2. Fill in the blanks.

scales fish amphibians digging burrows

a. Many desert animals stay cool during the day by ..... .

b. ..... are the animals that can live both on land and in water.

c. The body of ..... is covered with scales.

d. Most snakes moves with the help of ..... .

3. Answer the following questions.

a. What is a habitat ? What does a habitat provide an animal with ?

b. Name the five main habitats on earth.

c. What is a desert ? How do an animal living in a desert withstand the hot climate ?

d. How do polar bears withstand the cold of their habitat ?

e. What are the amphibians ? Give two examples.

f. Write short notes on the following :

(i) scales (ii) shells

(iii) fur or wool (iv) feathers

g. What is the difference between herbivores and carnivores ?

h. How do the following animals move ?

(i) Birds (ii) Snakes

(iii) Frogs (iv) Dolphins

(v) Penguins

Formative Assessment

4. Tick (✓) the right and cross (×) the wrong statements.

a. The fish breathes with the help of gills. ☐

b. The natural habitat of rabbit is a hole. ☐

c. The snake moves with the help of fins. ☐

d. An animal's habitat provides it with food only. ☐

e. A bear's body has scales on it. ☐

5. Multiple choice questions

a. Which animals moves with the help of scales?

(i) Fish ☐ (ii) Tortoise ☐

(iii) Snake ☐ (iv) Crocodile ☐

b. 'Den' is the home for which animal?

(i) Cow ☐ (ii) Lion ☐

(iii) Rabbit ☐ (iv) Dog ☐

c. Which of the following has scales on its body ?

(i) Fish ☐ (ii) Fins ☐

(iii) Wool ☐ (iv) Fur ☐

d. Who is the ship of desert?

(i) Monkey ☐ (ii) Bear ☐

(iii) Randier ☐ (iv) Camel ☐

e. The seasonal movement of some birds and animals is called ..... .

(i) Transfer ☐ (ii) Movement ☐

(iii) Migration ☐ (iv) Rotation ☐

6. Give one word for each one of the following.

a. Herbivores such as rabbit and squirrel are called : ..... .

b. Insects breathe with the help of a series of tiny holes along the sides of their body, which are called : ..... .

7. Match the columns.

Column A		Column B	
a.	Frog	(i)	Breathing through nose
b.	Carnivores	(ii)	Breathing through skin
c.	Man	(iii)	Plant eaters
d.	Spider	(iv)	Flesh eaters
e.	Herbivores	(v)	traps insets in its web

Go and visit to a nearby zoo with your parents. Record in the information on any 5 animals in the format given below :

1. A snap or drawing of the animal
2. Name of the animal
3. What does the animal look like ?
4. What is the animal's natural habitat ?
5. What kind of body covering does the animal has ?

1. Most of the birds fly in V-shape formation. What do you think could be the reason behind this?
2. A red cloth waved in front of a bull, makes it angry. But in actual, cloth of any colour say black or blue, can make the bull angry in the same way. Do you know, why?

1. Make a chart on different animals and their body coverings.
2. Make a chart on the different type of habitats of animals.
3. Make a chart on different organs of movement in animals. Collect their pictures and paste them.

3

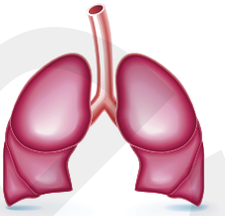
Our Respiratory System

Learning Objectives

1. The respiratory organs
2. Function of these organs
3. Spirometer

Let Me Answer

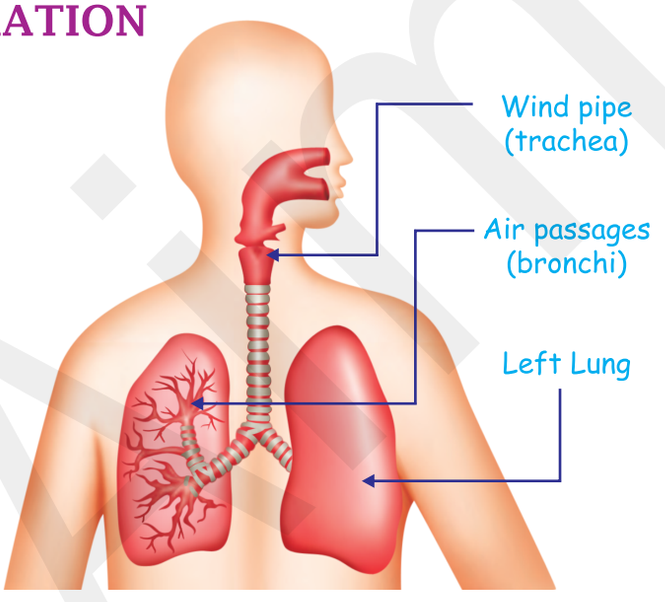
The respiratory system is the network of organs and tissues that help you breathe. It includes your airways, lungs, and blood vessels. What else do you understand about the respiratory system in the body?



BREATHING (RESPIRATORY) SYSTEMS CONSISTS OF

- Nostrils
- Nasal cavity
- Larnyx
- Trachea
- Bronchi
- Lung's alveoli

RESPIRATION

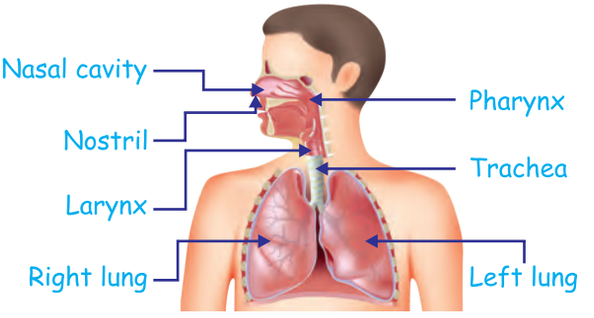


Respiratory System

Respiration in human beings is called breathing or cellular respiration. Our nose and mouth are the gateway to our respiratory system. When a human breathes through nose, the air passes through mouth and goes to the trachea. The trachea is the passageway leading to the lungs and the epiglottis guards the trachea so that food can't get down it. Every time you keep breathing in and out whether you are awake or asleep. The air we inhale, is the combination of these gases : oxygen, nitrogen, carbon dioxide, water vapours, dust and other particles.

Breathing system

Breathing is a physical movement associated with the gaseous exchange. When we breathe in, the air we inhale passes through a system of organs known as the Respiratory System. This system consists of :



Breathing System

Nostrils → Nasal cavity → Larynx → Trachea → Bronchi → Lung's → alveoli

Role of nostril

The oxygen-rich air is taken in by the nostrils. The natural air contains about 21 per cent oxygen and 0.03 per cent carbon dioxide. The amount of oxygen is more in the air we breath.

Role of nasal cavity

The important job of nasal cavity is to moistens the air as it passes through the respiratory tract lined by mucus. It also traps the fine particles of dust or of bacteria that have escaped from the fine hairs of the nasal cavity. The air from the bronchus then enters the bronchioles and then the lungs.

Role of larynx

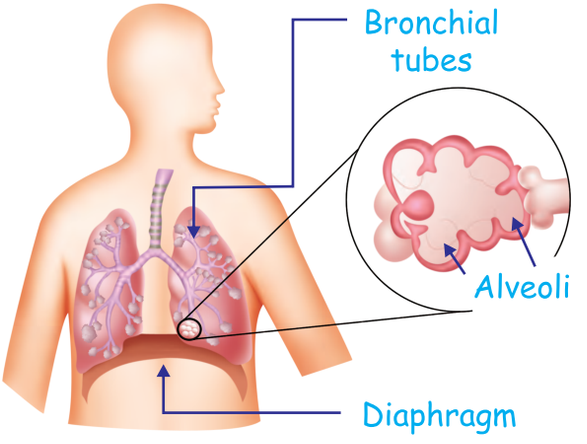
The air is filtered by the fine hairs in the nasal cavity. This cavity also has a rich supply of blood vessels that keep the air warm. This air then enters the pharynx, then the larynx and then the trachea.

Role of trachea and bronchi

The trachea and bronchi are lined with special secretory cells that secrete mucus. Mucus moistens the air as it passes through the respiratory tract and also traps any fine particles of dust and bacteria.

Role of lung's alveoli

Lungs are protected by the rib cage that helps the lungs to pump air in and out when we breathe. The right lung is bigger with three lobes and the left lung is slightly smaller as it has only two lobes. This is the pair of lungs that we have in our chest cavity. The lungs also have blood vessels that carry oxygenated and deoxygenated blood. Lungs are the spongy and elastic organs that are broad at the bottom and tapered at the top. They consist of numerous air sacs called alveoli.

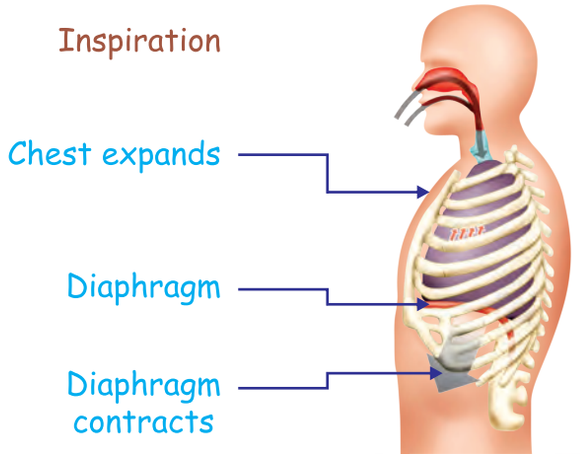


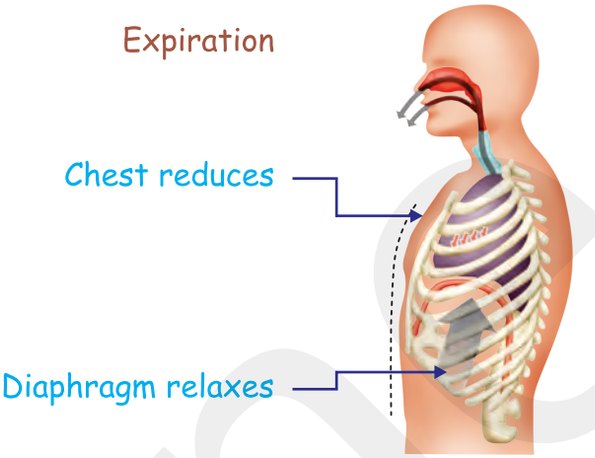
Alveoli in Lungs

There are two types of breathing that facilitate gas exchange in the lungs. Inspiration and expiration.

Inspiration is the act of breathing in.

Expiration is the act of breathing out.





On average, it takes 2 seconds for breathing in and 3 seconds for breathing out. Oxygen is absorbed by the alveoli and soon it is picked up by the blood. Haemoglobin is a red pigment of blood which combines with oxygen and carries it to the cells. On the other hand carbon dioxide is picked up from all the body parts and is transported by the blood to alveoli. During expiration, carbon dioxide rich air is given out from the alveoli.

Let us brief you about the breathing, the number of times a person breathes in a minute is called the breathing rate. An adult person's breathing rate, at rest is 15-18 times per minute. It increases during heavy exercises and slows down when you sleep.

Spirometer

The volume of air inspired and expired by the lungs, is measured by spirometer. The spirometer is use to rate the amount of air that is breathe in and out over a specific period of time. How a spirometer works ? In a spirometer test, we breath into a mouth piece that is connected to an instrument called a spirometer.

Facts to know

- The average person takes in 21,600 breaths per day.
- Sighing or yawning is a sign that you are not getting enough oxygen.
- How the body removes its waste products by percentage.

Breath 70 % Skin 20% Urine 7% Feces 3%

LET'S RECALL

1. Breathing is a physical movement associated with the gaseous exchange.
2. Respiratory system consists of : Nostrils, Nasal Cavity, Larynx , Trachea, Bronchi and Lung's alveoli.
3. Inspiration is the act of breathing in and expiration is the act of breathing out.
4. The volume of air inspired and expired by the lungs, is measured by spirometer.

Word Power

cavity	:	a hollow space
epiglottis	:	the thin elastic cartilaginous structure located at the root of the tongue
exchange	:	the act of substituting one thing in the place of another
organ	:	the internal part of our body
rib cage	:	the enclosing structure formed by the ribs and the bones

Train Your Brain

Cross Curriculum Connect

1. Answer the following questions in short.

a. Define the following in one line :

(i) Deoxygenated (ii) Bacteria

(iii) Spongy (iv) Alveoli

(v) Spirometer (iv) Haemoglobin

2. Fill in the blanks.

respiration rate haemoglobin spirometer 21 inspiration alveoli

a. The air sacs in the lungs are called ..... .

b. The volume of air that a human breathes in and out of lungs while at rest is measured by ..... .

c. The natural air contains about ..... percent oxygen.

d. The act of breathing in is known as ..... .

e. Blood has a red pigment which is known as ..... .

f. The number of times a person breathes in a minute is known as ..... .

3. Answer the following questions.

a. Which organs are associated with the process of respiration?

b. What is the breathing rate?

c. Define respiration.

d. Why are the sizes of two lungs different?

e. State the function of fine hair present in the nasal cavity.

Formative Assessment

4. Tick (✓) the right and cross (×) the wrong statements.

a. Respiration in plants is called breathing. ☐

b. Both the lungs are equal in size. ☐

c. The blood vessels are responsible for the delivery of oxygen to the tissue. ☐

d. The air from trachea enters the lungs. ☐

e. The nasal cavity is used to filter air through fine hairs. ☐

5. Multiple choice questions

a. A physical movement associated with gaseous exchange is called ..... .

(i) respiration ☐ (ii) circulatory ☐

(iii) coronary ☐ (iv) spirometer ☐

b. The total surface area of the lungs is ..... .

(i) 70 square metres ☐ (ii) 70 square metres ☐

(iii) 60 square metres ☐ (iv) 50 square metres ☐

c. The system used to measure the volume of air inspired and expired, is known as ..... .

(i) spirometer ☐ (ii) meter ☐

(iii) circulatory ☐ (iv) regulatory ☐

d. The respiratory system consists of ..... .

(i) nasal cavity ☐ (ii) the mouth ☐

(iii) circulatory system ☐ (iv) internal respiration ☐

e. The act of breathing in is called ..... .

(i) inhaling ☐ (ii) respiration ☐

(iii) exhaling ☐ (iv) circulatory ☐

6. Give one word for each one of the following.

a. The oxygen rich air taken in and out, is known as : ..... .

b. The cage used to protect lungs is known as : ..... .

7. Match the columns.

Column A		Column B
a. Right lung	(i)	Lack of oxygen
b. Expiration	(ii)	Breathing in
c. Left lung	(iii)	Bigger
d. Yawning	(iv)	Breathing out
e. Inspiration	(v)	Smaller

To prove that the water vapours are also given out during breathing. Breathe out some air from your mouth on a clean mirror. what do you observe ? Write it in your own words.

1. The high levels of activity lead to a greater demand for oxygen and increased rate of breathing, justify.
2. What is called the 'kiss of life' during an emergency ?

Record your breathing rate under different conditions.

Ask your teacher to record breathing rate by holding your wrist. Now record breathes of your two classmates and make a chart.

Now go for a 2- minutes running walk and again record your breathes. Repeat this with your two classmates also. What do you conclude ?

4

The Skeletal System

Learning Objectives

1. Our skeleton and its parts
2. Joints and ligaments
3. Muscles and their types
4. Working of muscles

Let Me Answer

- The skeletal system is your body's central framework. It consists of bones and connective tissue, including cartilage, tendons, and ligaments. What is the other name of the skeletal system?

PARTS OF THE SKELETON

- The skull
- The vertebral column
- The ribs
- The limbs
- The girdles

OUR SKELETON

We have 206 bones inside our body that are connected together to form a framework called skeleton. The bones of the skeleton are organized into a skeletal system.

The skeleton has several important functions.

- It provides support and the basic shape to the body. Without skeleton, the body would be a shapeless heap of tissues.
- It protects the soft organs of the body. The skull protects the brain and the ribs protect the heart and lungs.
- Muscles are attached to the bones. Muscles and bones work together to move the parts of the body.
- Bones also contain bone marrow, a fatty substance which forms blood.
- Bones also contain minerals like calcium and phosphorus.

Parts of the skeleton

The skeleton consists of five main parts.

The skull

The skull is made up of eight flat bones. Most of these bones are locked together like a crossword puzzle. The skull gives shape to the face. It protects the delicate brain. It also protects the organs of sight, hearing, smell and taste. The eyes fit in the eye sockets. The facial region has fourteen bones. The lower jaw is the only movable joint of the skull. This enables us to talk and eat.

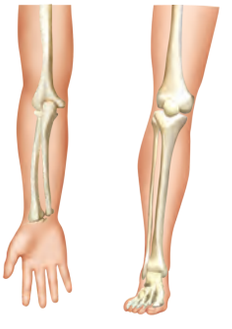
The vertebral column

The vertebral column is made up of 33 small ring-shaped bones called vertebrae. It runs from the base of the skull to the hip region. A type of tissue called cartilage is present between most of the vertebrae. It cushions the bones and acts as a shock absorber. The vertebral column encloses and protects the spinal cord. Out of 33 vertebrae, the first seven are present in the neck region.

The ribs

There are 12 pairs of ribs. They are all connected to the vertebral column at the back. Ten of these rib pairs are connected to the breast bone, called the sternum. The sternum is a flat bone in the middle of the chest. The last two pairs of ribs form a kind of cage called the rib cage. This rib cage protects the heart and lungs.

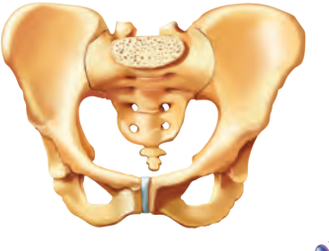
The limbs



The arms are also called forelimbs. Each forelimb has three bones. The upper arm has one bone called humerus. The lower arm has two bones called radius and ulna. The wrist and hands are made up of many small bones.

The hind limbs or the legs also have three bones each. Femur or the thigh bone is the longest bone in the body. The lower leg has two bones called tibia and fibula. The ankle and toes also have many small bones.

The girdles



The forelimbs and the hind limbs are attached to the girdles. The forelimbs or arms are attached to the pectoral girdle. Each pectoral girdle consists of a shoulder bladder and a collar bone.

The hind limbs or the legs are attached to the pelvic girdles. The kidneys and the urinary bladder are protected by the pelvic girdle.

Joints and ligaments

Most bones are connected to other bones. The place where two bones join together is called a joint. Strong bands of tissue called ligaments hold the bones together in a joint. Ligaments are strong but they can let your bones move.

Type of joints

There are two kind of joints in our body :

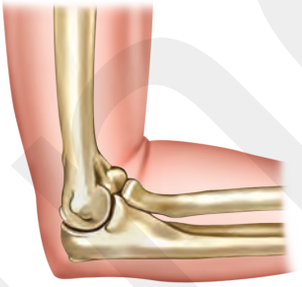
Immovable joints

These joints simply connect the bones. They do not allow the movement of bones.

Movable joints

These joints allow full movement of bones.

Immovable Joints



Movable Joints

There are four types of movable joints.

- Hinge joint
- Ball and socket joint
- Pivot joint
- Gliding joint

Hinge joint

A hinge joint allows bones to move in one direction only. Knees and elbows are formed of hinge joints. The movement of hinge joints in similar to the movement of a door that opens on its hinges. Where else in your body do you find hinge joints ?

Ball and socket joint

In this type of joint, one end of the bone is round like a ball. This round end fits into another bone which is like a socket. The round bone can rotate in the socket. It allows movement in almost all directions. This joint is found in our hips and shoulders.

Pivot joint

The pivot joint is between the first and the second vertebrae of the backbone. The skull is connected to the first two vertebrae of the vertebral column with a pivot joint. It allows the rotating movement from side to side.

Gliding joint

This joint is found between the small bones of the wrist and ankles.

It allows sliding movements. The movement allowed is a simple gliding back and forth or sideways.

Muscles

Bones in the body cannot move on their own. They move with the help of muscles. The human body has more than 600 different muscles. Most of them are attached to the bones with strong fibers called tendons. The tendons help the muscles in moving the bones.

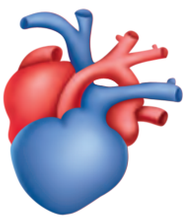
Types of Muscles

Voluntary muscles

These are the muscles that are under our control. They are attached to the bones. You can control the muscles in your arms and legs when you run, walk, jump or swim.

Involuntary muscles

These muscles are not under our control. They work without our conscious thought. Our stomach and heart have involuntary muscles.



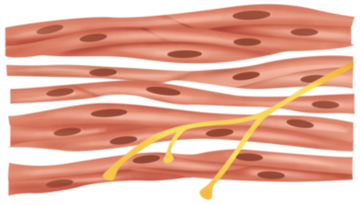
Types of Muscle Fibres

Muscles are made up of cells called muscle fibres. There are three types of muscle fibres.

Striated muscle fibres

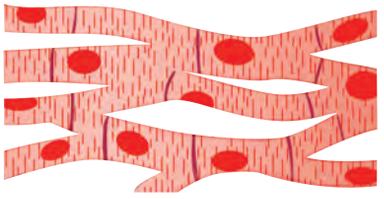
All voluntary muscles attached to the bones are made up of the striated muscle fibres. These are also called the skeletal muscles. They have dark bands running across the muscles.

Smooth muscle fibres



Most involuntary muscles have smooth muscle fibres which are long and narrow at the ends. These muscles do not have bands. Organs of the respiratory and circulatory systems are lines with the smooth muscles. The smooth muscles can work for a long time without getting tired.

Cardiac muscle fibres



The heart is made up of the cardiac muscle fibres. They have bands similar to those found in the striated muscle fibres. Like the striated muscles, they work quickly and are powerful. These muscles do not get tired. This is why your heart keeps working day and night.

How do muscles work ?

The body moves because of the action of muscles which are made up of muscle cells. The muscle cells are unique because they are the only cells in the body that can contract or shorten and relax or lengthen. When a muscle cell relaxes, it returns to its original size. This ability of the muscle cells to contract and relax causes movements in the body.

These muscles work in pairs to cause movement. We can keep our muscles strong and active by regular exercises and a balanced diet.

Facts to know

- Your bones consist of 50% water and 50% solid matter.
- When you were born you had over 300 bones. As you grew, some of these bones began to fuse together and now you have 206 bones.

LET'S RECALL

1. The skeletal system gives shape and support to the body.
2. The meeting point of two bones is called a joint.
3. The muscles attached to the bones make the movement of the bones possible.
4. Voluntary muscles are under our control whereas involuntary muscles work on their own.

Word Power

bone marrow	:	soft fatty substance found inside long bones
pelvic girdle	:	an anatomical structure found in human
pectoral girdle	:	the set of bones which connects the upper limb to the axial skelton on each side
socket	:	circular movement of the joint
unique	:	being the only one of its kind

Cross Curriculum Connect

1. Answer the following questions in short.

a. Define the following in one line :

(i) Manure (ii) Skeleton

(iii) Joint (iv) Floating ribs

(v) Tendon (vi) Skull

2. Fill in the blanks.

bone marrow pivot false ligament eight

a. Bones are held together at a joint by a tissue called ..... .

b. A fatty substance ..... is present inside certain bones.

c. Ribs not joined to the breast bone are called ..... ribs.

d. The skull is made up of ..... flat bones.

e. ..... joints allows the rotating movement from side to side.

3. Answer the following questions.

a. What are the functions of the skeletal system ?

b. Differentiate between voluntary and involuntary muscles ?

c. What is a joint ? Explain different joints present in the body.

d. Differentiate between ligament and tendon.

e. Differentiate between three types of muscles fibres.

4. Tick (✓) the right and cross (×) the wrong statements.

a. The biggest bone in the body in thigh bone. ☐

b. The skeletal system gives shape and support to the body. ☐

c. The meeting point of two bones is call a joint. ☐

d. Our body has 309 bones. ☐

e. The ribs form a kind of cage, called rib cage. ☐

5. Multiple choice questions

a. The hinge joint allows bones to move in ..... .

(i) one direction ☐ (ii) two directions ☐

(iii) three directions ☐ (iv) four directions ☐

b. The skull is made of bones ..... .

(i) 6 ☐ (ii) 5 ☐

(iii) 9 ☐ (iv) 8 ☐

c. A soft fatty substance found in side long bones is called ..... .

(i) white blood cells ☐ (ii) pus ☐

(iii) bone marrow ☐ (iv) none ☐

d. The vertebrae contains how many bones ?

(i) 24 ☐ (ii) 34 ☐

(iii) 33 ☐ (iv) 30 ☐

e. The skeleton consists of how many parts ?

(i) 4 ☐ (ii) 5 ☐

(iii) 6 ☐ (iv) 3 ☐

6. Give one word for each one of the following.

a. Arm, legs and fingers have which type of muscles? : .....

b. Heart and stomach have which type of muscles? : .....

7. Match the columns.

Column A		Column B	
a.	Involuntary muscles	(i)	206 bones
b.	Total Muscles	(ii)	Under our control
c.	Movable Joint	(iii)	600

Make the following parts of your body and locate the joints :

1. Knee, forward and backward- hinge joint
2. Neck, side ways-pivot joint

1. Your have a skeleton inside your body. But some animals have the skeleton outside their body. What is it called ? How is it different from the skeleton inside the body ? Name some animals that have this kind of skeleton.
2. Why 'walnut' is considered to be an excellent brain booster ?
3. What would happen if your limbs have ball and socket joint ?

Visit your biology laboratory and request the teacher to show a human skeleton. See the skeleton and draw it on a chart. Label its various parts.

5

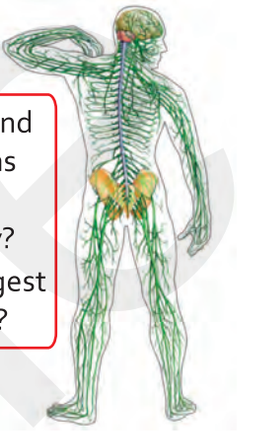
Nerves and Senses

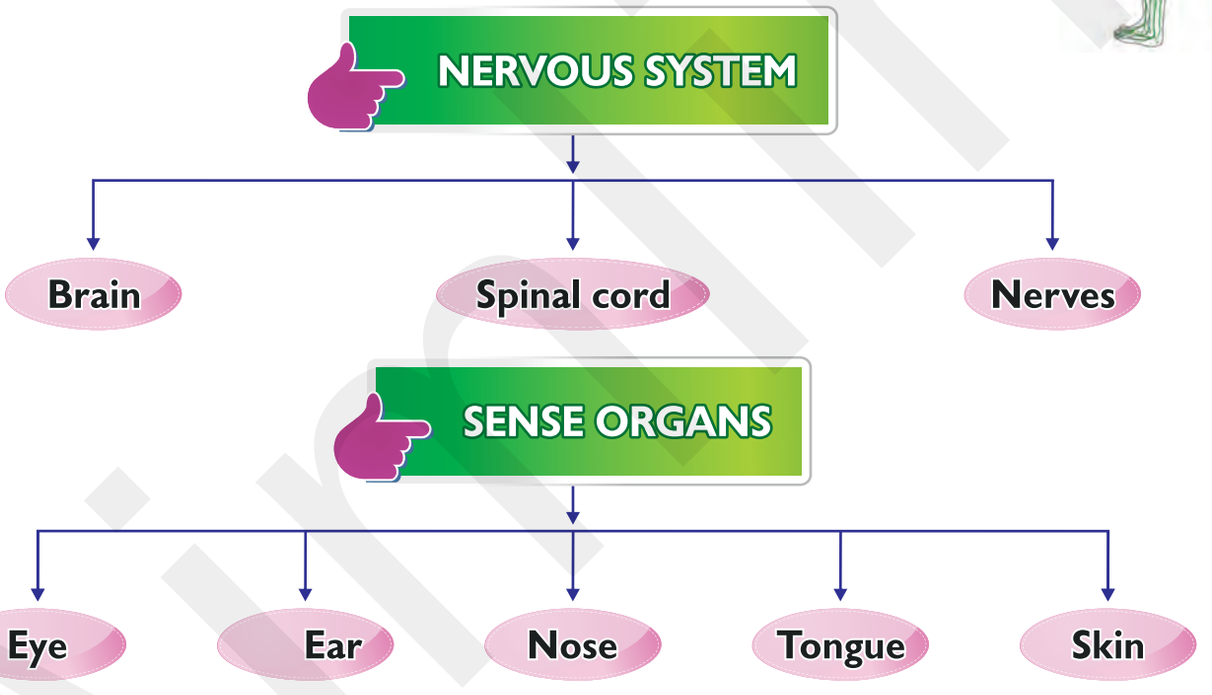
Learning Objectives

1. Functions of the various parts of nervous system
2. The structure of a nerve cell
3. The spinal cord and how it travels up to our brain
4. Reflex action
5. The structure of sense organs and their care

Let Me Answer

- How are nerves and other body organs connected to function properly?
- What is the largest nerve in the body?





You have learnt in the previous class that a cell is the smallest living part of our body. Cells working together in groups are called tissues. Each kind of tissue does a certain job. Tissues working together and forming body parts, are called organs. Several organs, working together to do one job, make up an organ system. Several systems work together as a team in the human body. How is this possible ?

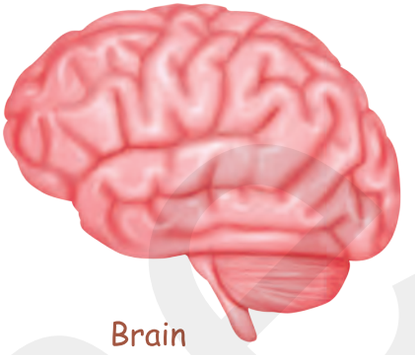
How are you able to see, hear, smell, feel, think and learn? All this is possible because of the nervous system. It is a very important system of the body. It makes us aware of our surroundings. It coordinates and controls other systems of the body.

THE NERVOUS SYSTEM

The nervous system is made up of three main parts : brain, spinal cord and nerves.

The Brain

The brain is the control centre of the nervous system. It is divided into three major parts : cerebrum, cerebellum and medulla (brain stem). Each of these parts controls different activities of the body.



Brain

Cerebrum is that biggest part of the brain. It has many grooves and folds on its surface. It is the part that controls our ability to think, learn, decide, remember, dream and feel. It also receives and interprets information from our sense organs.

Cerebellum controls and coordinates our voluntary movements like walking, running, dancing, painting etc. It coordinates muscular activities and is also responsible for balancing the body.

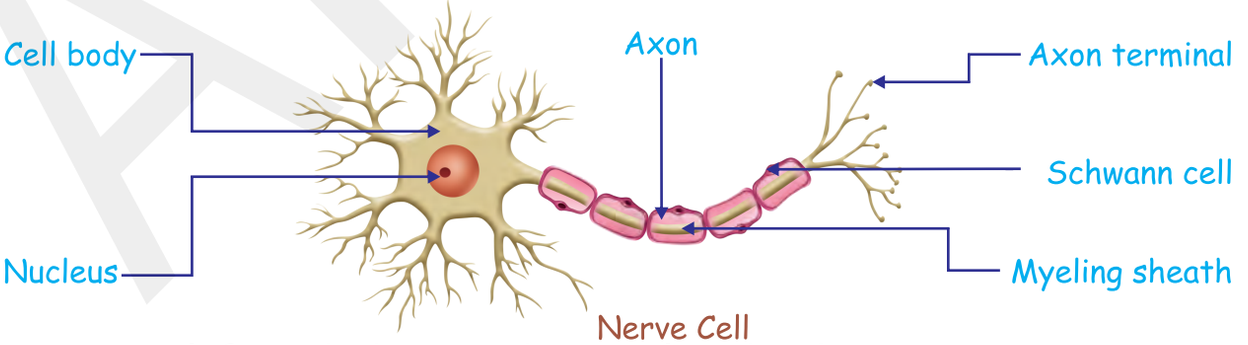
Medulla or brain stem joins the spinal cord to the brain. It controls all our involuntary actions like breathing, heartbeat and muscle movements in the digestive system.

The Spinal cord

The spinal cord is a cylinder of nervous tissues. It is protected by the vertebrae of the vertebral column. Messages travel from the brain to the spinal cord and then to all the parts of our body. Similarly, incoming messages enter the spinal cord from all parts of our body and then travel up to our brain.

The Nerves

Nerves are the bundles of nerve cells spread throughout the body. All the parts of the nervous system contain certain cells called nerve cells or neurons. Each nerve cell has a cell body. Small fibres called dendrites come out from the cell body. A long fibre called axon extends from one end of the cell body.



Nerves carry signals from the brain to the spinal cord and vice versa.

Types of nerves

Nerves are of three types : sensory nerves, motor nerves and connecting nerves.

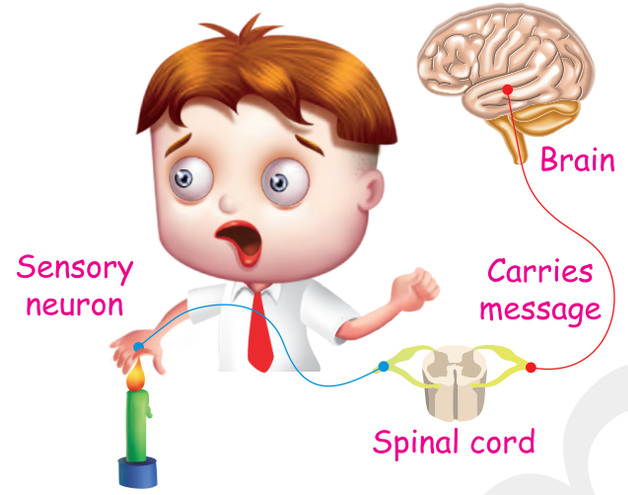
Sensory nerves carry signals from the sense organs to the spinal cord and then to the brain. These signals include temperature, smell, colour etc.

Motor nerves carry messages from the brain and spinal cord to the muscles and glands. These messages instruct the muscles and glands an what to do.

Connecting nerves pass the messages between sensory nerve cells and motor nerve cells.

Reflex action

What do you do if you accidently touch a very hot cup of tea ? You withdraw your hand immediately without even thinking. Such actions that happen automatically without our thinking are called reflex actions.



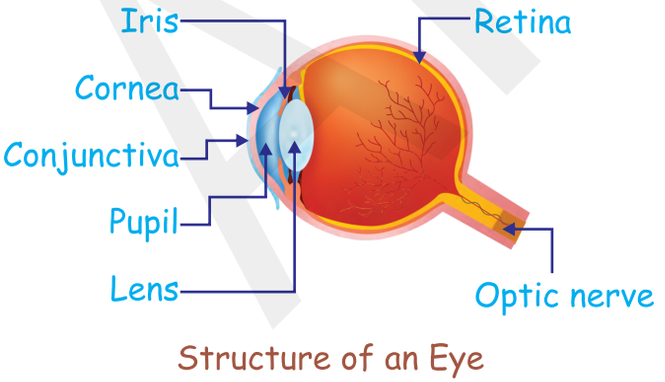
In reflex action, the brain has no role; only the spinal cord is involved. When you touch a hot object, the sensory nerves convey the signal of the high temperature (hotness) to the spinal cord. This signal is then passed to the motor nerves through the connecting nerves. The motor nerves carry the instruction to the muscle of the hand to withdraw the hand.

Blinking of eyes and withdrawing the foot when you step on a sharp object accidentally, are other examples of reflex action. Can you think of some more examples?

THE SENSE ORGANS

The eyes, ears, nose, tongue and skin are our sense organs.

Eyes – the organs of sight



Structure of an Eye

Eyes are the organs of sight. The eyelids and the eyelashes protect them from dust and dirt. The black spot in the centre of eye is called the pupil. The coloured circle is called the iris. The amount of light that passes through the pupil is controlled by the iris. The pigmentation of the iris gives colour to eyes. The optic nerve carries messages from the eye to the brain.

Care for the eyes :

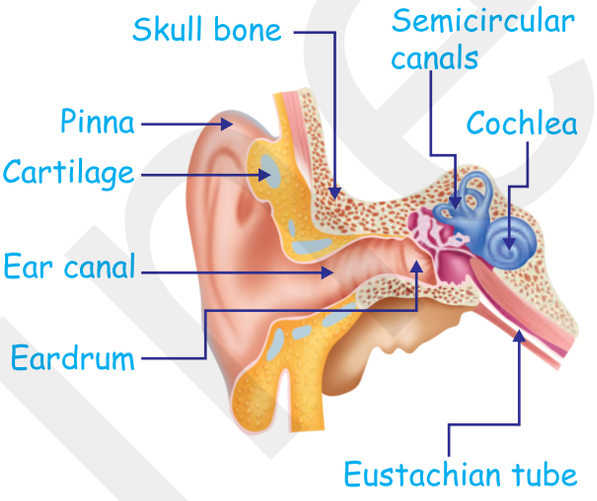
- Clean your eyes regularly.
- Do not read in a moving car or bus.
- Do not read in dim or very bright light.
- Do not watch television for long, and sit at least six feet away from it.
- Do not rub your eyes with dirty hands.

Ears – the organs of hearing

Ears are the organs of hearing. They also help us to keep our body balance.

An ear has three main parts : external ear, middle ear and internal ear.

The external ear consists of the pinna and the auditory canal. The sound waves, collected by the pinna, travel through the auditory canal and strike the ear drum. The eardrum is connected to the middle ear which has three tiny bones. These bones carry the sound waves to the cochlea of the internal ear. From the cochlea, the sound waves are carried to the brain by the auditory nerve.



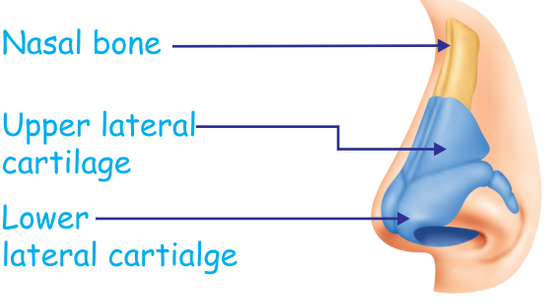
Structure of an Ear

Care for the ears :

- Never hear loud music.
- Never use a matchstick/hairpin to clean your ears.
- You must consult a doctor in case of an earache.

Nose – the organ of smell

Nose is the organ of smell. Dust particles enter our nose along with the air we breathe in. The inner lining of the nose has small hair which trap dust particles and filter the air. The upper part of the nose has nerve cells which form the olfactory nerve. The olfactory nerve carries messages from the nose to the brain.

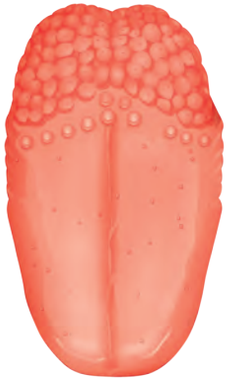


Structure of a Nose

Care for the nose :

- You should keep your nose clean. The hairs in your nose filter dirt, so always breathe through your nose.
- You should not prick your nose.
- You should not use a dirty hanky to wipe your nose as it may cause infection.

Tongue–the organ of taste



Taste buds on the Tongue

Tongue is the organ of taste. It has thousands of tiny taste buds. There are different taste buds for sweet, bitter, salty and sour tastes. These buds have nerve endings that carry the message to the brain which help us to taste various food items.

Care for the tongue :

- Avoid eating very spicy food.
- Use a tongue cleaner to clean the tongue.
- Avoid drinking very hot beverages.

Skin–the organ of touch and feel

Skin is the organ of touch and feel. Millions of nerve endings connected to the skin, helping us to feel heat, pain, pressure and cold. The skin has tiny pores through which waste comes out in the form of sweat. Sweat is a mixture of water and salt.

Care for the skin :

- The dirt and sweat should be removed from the skin regularly.
- An antiseptic should be applied to a cut or scratch to avoid infection.

Facts to know

- There are millions of nerve cells in the human body. This number even exceeds the number of stars in the Milky Way.
- In humans, the right side of the brain controls the left side of the body, while the left side of the brain controls the right side.
- The weight of the brain in average adult males is 1375 grams, while in females it is 1275 grams.

LET'S RECALL

1. The basic unit of the nervous system is a nerve cell.
2. The brain, the spinal cord and the nerves, make up the nervous system.
3. The nervous system controls all the systems of the body.
4. The brain has three main parts — cerebrum, cerebellum and medulla.
5. The nerves carry messages to and from the brain throughout the body.
6. There are five sense organs which help us to respond to our surroundings.
7. It is important to take care of our sense organs.

Word Power

beverages	:	a special drink, other than water
antiseptic	:	a substance that prevents the growth of disease-causing micro organisms
olfactory nerve	:	the first cranial nerve
auditory canal	:	either of the passages in the outer ear from the auricle to the tympanic membrane

Train Your Brain

Cross Curriculum Connect

1. Answer the following questions in short.

a. Define the following in one line :

(i) The nervous system (ii) Sensory nerves

(iii) Motor nerves (iv) Reflex action

2. Fill in the blanks.

electrically	processes	central nervous system
motor	cerebrum	retina

a. ..... is the biggest part of the brain.

b. ..... controls our voluntary movements.

c. A nerve cell is an ..... excitable cell that ..... and transmits the information.

d. The black spot in the centre of eye is called ..... .

e. The ..... nerves carry messages from the brain to the muscles.

3. Answer the following questions.

a. What is the functions of cerebrum?

b. Describe a neuron.

c. Give two examples of reflex actions.

d. How should you take care of your skin?

Formative Assessment

4. Tick (✓) the right and cross (×) the wrong statements.

a. The brain is the control centre of the nervous system. ☐

b. Medulla does not join the spinal cord to the brain. ☐

c. The eyes, ears, nose, tongue and skin are our sense organs. ☐

d. The eyes are not the organs of sight. ☐

e. The hairs in our nose filter dirt. ☐

5. Multiple choice questions

a. The nervous system consists of ..... .

(i) brain ☐ (ii) spinal cord ☐

(iii) nerves ☐ (iv) all ☐

b. Which are the components of brain ?

(i) Cerebrum ☐ (ii) Cerebellum ☐

(iii) Medulla ☐ (iv) all of these ☐

c. Which is the wrong statement ?

(i) Clean your eyes regularly. ☐

(ii) Do not read in a moving car and bus. ☐

(iii) Watching television for long hours is good for eyes. ☐

(iv) Do not rub your eyes with dirty hands. ☐

6. Give one word for each one of the following.

a. Coloured part of the eye opening from where light enters the eye. : .....

b. The part of the brain which coordinates all the voluntary movements. : .....

c. The largest part of the brain responsible for thinking. : .....

d. The automatic actions controlled by the spinal cord. : .....

e. A part of eye through which light enters the eye. : .....

f. A nerve which carries messages from the eye to the brain. : .....

g. The coloured part of the eye. : .....

h. Small bones that protect spinal cord. : .....

7. Match the columns.

Column A		Column B
a. Tongue	(i)	Vision
b. Sweat	(ii)	Brain stem
c. Medulla	(iii)	Never hear loud music
d. Ears	(iv)	Salty
e. Eyes	(v)	taste buds

Ask the students to form a single line by joining hands. Explain that each student represents a nerve cell and the whole line represents a nerve. Tell the students to pass along a hand squeeze, when a signal is given to begin the activity. When the squeeze reaches the last student, he or she should shout ''Got it!'' Explain that messages traveling through a body pass from one nerve cell to another in a similar manner.

1. What could be the cause of the difference in intelligence levels in people ?
2. Which part of the brain will help a motorcycle rider, who is driving his bike in a zig-zag manner, to maintain his balance ?

1. Pat your head with your right hand and make a circular motion on your stomach with the left hand. Find out why the combined motion is difficult.
2. Use different objects to stimulate different sense organs and discuss the process. How do you feel these objects ?
3. Cover your eyes with a piece of cloth so that you cannot see. Now touch your friends one by one and see if you can recognize your friends.

6

Food and Health

Learning Objectives

1. Nutrients present in the food
2. Balanced diet
3. Communicable and non-communicable diseases
4. Exercise and rest
5. Very important role of water in our life

Let Me Answer

- Nutrients are the nourishing substances in food that are essential for the growth, development, and maintenance of body functions.

TYPES OF FOOD

- Food rich in Carbohydrates
- Food rich in fats
- Food rich in proteins
- Food rich in minerals

FOOD

We cannot live without food for even a day, as we will feel weak and tired. Food is essential for our body. Food builds and repairs our body. Food provides us energy to work. It helps us to recover quickly when we are ill. As food plays such an important role in our life, it is also important to know what our food contains and how it helps us. Food contains nutrients that we need to live. Nutrients are useful substances that give us energy to grow and to do our day-to-day activities. The essential nutrients are proteins, carbohydrates, fats, minerals and vitamins. Water and roughage are also essential for our body. Most food stuffs contain more than one nutrient. Nutrients, taken in the right amount, help us to live a long and healthy life. Otherwise, we may suffer from diseases.

Nutrients or food groups

Proteins

Proteins help us to grow and are used to build and repair worn out cells in our body.

Proteins are present in almost all food-stuffs, but foods like beans, meat, dairy products, fish, eggs, nuts and pulses are very rich in proteins. Proteins are called body-building food.

Carbohydrates

Another important nutrient is carbohydrates. Sugar and starch are the simplest form of carbohydrates. They are the easiest to digest. Their digestion begins in our mouth by the action of saliva on food. Carbohydrates are the main source of energy. So, a large part of our daily food should contain carbohydrates. Carbohydrates are present in whole grains, breads, cereals, corn, beans, peas, potatoes, grapes etc. They are energy-giving food.

Fats

Fats make our food tasty. They are energy-giving food, suppling us with double the energy of carbohydrates. Extra fat gets stored in the body. Excessive fat can lead to overweight and obesity.

Fats also help to absorb certain vitamins. They cover the delicate body parts and protect them from injury. That is why fat people are less likely to suffer from broken bones after a fall as compared to the thin people. Fats also keep the body warm. Most oils, butter and ghee are rich in fats.

Minerals

Plants take minerals from the soil. These minerals enter our body through the food we eat. Minerals help the nervous system to pass messages to different body parts. They help the muscles to contract. Minerals are needed in a very small amount. Different minerals are present in different foods like milk and milk products, fish, green leafy vegetables, soyabean and nuts.

Have a look at what some minerals do for us :

Minerals	Functions	Sources	Deficiency/ Diseases
Calcium	builds bones and teeth, strengthens gums and helps the body to use vitamin C	milk/cheese/ almonds	weak bones
Iodine	helps in proper growth of the body	sea food, iodized salt	goitre
Iron	builds red blood cells and helps us to be active	cashew nuts, sesame seeds	anaemia
Phosphorus	improves appetite and helps in growth	peas, beans, green and leafy vegetables	weak bones and teeth

Vitamins

The world 'vita' means life. Vitamins are not a source of energy. They are an important nutrient because they help different body systems to function properly. They are protective food as they help our body to fight diseases. Fresh fruits and vegetables are a rich source of vitamins. Vitamins, like minerals, are needed in very small amounts.

Some of the vitamins and their sources are given in the table below :

S.No	Nutrients	Deficiency/disease	Food rich in nutrients
1.	Carbohydrates	marasmus	sugar, rice, potatoes, wheat, maize, honey, cereals
2.	Proteins	kwashiorkor	fish, meat, eggs, cereals, pulses, milk, cheese, paneer, soyabean
3.	Calcium and Phosphorus	improper development of bones and teeth	milk, green leafy vegetables, pulses, nuts, meat, fish
4.	Iodine	goitre	fish, sea-food, iodized salt
5.	Iron	anaemia	pulses, spinach, green leafy vegetables, cereals, eggs
6.	Vitamin A	night blindness	butter, milk, carrot, spinach, green leafy vegetables
7.	Vitamin B	beri-beri	milk, meat, eggs, green leafy vegetables
8.	Vitamin C	scurvy	citrus fruits like lemon, oranges, tomatoes, lime, sprouted grains
9.	Vitamin D	rickets	milky, fish, eggs, cooking oil, sunlight

Water

There is a lot of water present is our body. Our body has 70% water. Why is there so much water in our body? Here are the reasons :

- Water helps the food to move through the digestive and excretory systems.
- It is a major part of blood.
- It surrounds and protects the delicate body parts like the eyes, brain and the spinal cord.
- It maintains body temperature by distributing the heat through the body and losing excess of it in the form of sweat.
- It keeps our eyes bright, skin soft and hair shining.
- It helps the body to digest nutrients.

When you feel thirsty, it is your body's way of telling you to drink water and fulfil its (the body's) need of water. The body loses water in the form of sweat, urine and as vapours while exhaling. The amount of water needed by the body depends on one's age, outside temperature, humidity etc. Usually, we need to drink 8 to 10 glasses of water everyday.

Roughage

Roughage is the fibre present in the food. It helps the body to get rid of wastes. Thus, it prevents us from being constipated. Green leafy vegetables, fibrous fruits like orange, papaya etc., are rich sources of roughage. We must include roughage in our diet.

Balance diet

A diet that contains all the nutrients, roughage and water in the right proportion is called a balanced diet. A balanced diet is essential to stay healthy and grow well.

TYPE OF DISEASES

Disease is a condition that does not allow the body to work properly. When we suffer from a disease, food does not taste good, we do not feel energetic to work and we feel sick and lazy.

Communicable diseases

Communicable diseases are diseases that can spread from one person to another. These diseases are caused by germs present in the air, food, water etc. Micro-organisms that cause these diseases are called germs. Germs are of the following kinds :

Bacteria : They cause typhoid, plague, tuberculosis etc.

Viruses : They cause measles, chicken pox, AIDS etc.

Protozoa : They cause malaria, dysentery etc.

Spread of communicable diseases

Communicable diseases spread in different ways. They are :

Direct and indirect contact

Direct contact with an infected person or animal can give you a disease. When you have a cold, you can pass it on to another person through sneezing and coughing. Open sores, boils or saliva of an infected person also contain germs that spread infection.

Air

Germs remain in the air for quite sometime. Tuberculosis, chickenpox, mumps and measles are some diseases that spread through air.

Insects

Just as flowers uses the insects to carry their pollens to other flowers, germs use insects like mosquitoes and flies to enter our body. These insects are called factors. When they bite, germs enter our body. Malaria and sleeping sickness are some of the diseases spread by insects.

Food and water

Food can spread germs if it is not stored or cooked properly. Vegetables and fruits need to be washed before eating. Water is a carrier of many diseases. Food poisoning, diarrhoea and jaundice are some of the diseases caused by contaminated food and water.

Prevention of communicable diseases

A few simple ways to prevent diseases from spreading are :

Personal hygiene

It is important to keep our body free from diseases.

We should not share our toothbrush, comb, handkerchief, towel, soap and other personal things.

Hands should be washed before and after meals.

we should have a bath everyday and wear clean clothes.

General hygiene

Diseases spread easily in dirty places.

All public areas should be regularly cleaned. This prevent germs from settling down on the surface and breeding.

Floors, kitchen platforms, toilets and sinks are some of the places that should also be regularly cleaned. Utensils used for cutting, cooking and storing food should be kept clean.Mosquitoes and flies spread diseases. We should prevent their breeding in and around our homes.Fresh air and strong sunlight kills germs. Our houses should be airy and should allow enough sunlight to enter.Things used by the patients should be kept separately. Their room should be made germ-free by spraying a disinfectant on the floors and walls.

Non-communicable diseases

Non-communicable diseases are the diseases that do not spread from one person to another. They are caused due to deficiency of a nutrient (vitamins, mineral etc.) or due to the malfunctioning of a body part like the liver, kidney etc. We have already read about the diseases caused due to deficiency of some vitamins and minerals.

Malnutrition

Lack of proteins and carbohydrates, over a long period of time, causes

malnutrition. It is common in children. In case of malnutrition, there are signs of improper or stunted growth. Thin legs and hands, swollen stomach, patchy skin and dull, reddish hairs are some common symptoms.

This condition can be avoided by eating food rich in proteins and carbohydrates like banana, potato, milk, cereals etc.

Vaccines

Vaccine is a substance that is injected into the blood to protect the body from a disease. This process is called vaccination. Vaccination develops immunity against a disease in our body.

Vaccination by Oral Drops

Vaccination by Injection

Common vaccines that are given to us at childhood are : Polio vaccine, DTP vaccine (prevents diphtheria, tetanus and pertussis) and MMR vaccine (prevents measles, mumps and rubella).

S.No	Name of the vaccine	Age	Diseases protected from
1.	BCG and OPV (0)	at birth	polio and tuberculosis
2.	DPT-1 and OPV (1)	6 weeks	polio, tuberculosis, diphtheria, pertussis and tetanus
3.	DPT-2 and OPV (2)	10 weeks	polio, tetanus, diphtheria and pertussis
4.	DPT-3 and OPV (3)	14 weeks	polio, tetanus, diphtheria and pertussis
5.	Measles and chickenpox	9 months	measles and chickenpox
6.	MMR	15 months	measles, mumps and rubella
7.	DPT and OPV (booster dose)	18 months	polio, tetanus, diphtheria and pertussis
8.	DT	5 years	tetanus and diphtheria
9.	TT	10-15 years	tetanus

PASTEURIZATION

Pasteurization is a method of killing harmful bacteria in milk by boiling it for at least 30 minutes and then cooling it quickly. The milk, we get in packets, is pasturized.

EXERCISE

Physical exercise makes our body strong and healthy. It develops our muscles and increases our stamina. Exercise makes our heart beat faster, thereby improving blood circulation. Cycling, swimming and jogging are also good exercises.

REST

After the day's work and play, our body needs rest. A good sleep helps to refresh a tired body. When we rest, our muscles relax and our breathing and heart beat slow down. A good sleep also gives our body the time for growth and repair of its cells.

Facts to know

- Apples are more efficient than caffeine for waking you up in the morning. Apples are part of the rose family.
- Strawberries are the only fruit which has seeds on the outside.

LET'S RECALL

1. Nutrients present in food are proteins, carbohydrates, fats, vitamins and minerals.
2. Water and roughage are essential for the body.
3. Proteins help in growth and repair of the body cells.
4. Fats protect body parts, maintain body temperature and give energy.
5. Carbohydrates are the main energy source for the body and are easy to digest.
6. Vitamins and minerals are required in small quantities and help the functioning of different body systems.
7. Water helps the various body systems to work. It helps smooth joint movements, maintains body temperature, protects delicate body parts, fights diseases and is important for the skin, hair and eyes.
8. Roughage helps the body to get rid of wastes.
9. Disease is an illness that affects the health of a person. Diseases can be communicable and non-communicable.
10. Germs like virus, bacteria, parasite and fungi cause infectious diseases.
11. Diseases can spread through physical contact with the infected person and also through air, water, food and insects.
12. Diseases can be prevented or controlled by maintaining personal and general hygiene, vaccinations and medicines.
13. Exercise and rest are important for our body.

Word Power

obese : very fat, in a way that is not healthy
humidity : the amount of water in the air
hygiene : the practice of keeping yourself clean in order to prevent illness
constipated : unable to ged rid of waste material from the bowels easily

Train Your Brain

Cross Curriculum Connect

1. Answer the following questions in short.

a. Define the following in one line :

(i) Immunity (ii) Proteins
(iii) Carbohydrates (iv) Vitamins

2. Fill in the blanks.

night blindness Fats Food poisoning; jaundice Typhoid; tuberculosis
vitamin C anemia Sugar Vitamins iodine

a. ..... is the simplest forms of carbohydrates.

b. ..... are not a source of energy but help the different body systems to function properly.

c. ..... cover the delicate parts and protect our body from injury.

d. ..... and ..... are diseases caused by bacteria.

e Deficiency of vitamin A causes ..... .

f. Scurvy is a disease caused by deficiency of ..... .

g. Deficiency of ..... causes goiter.

h. Deficiency of iron causes ..... .

i. ..... and ..... diseases are caused by food and water.

3. Answer the following questions.

a. Why do we need food? Name the essential nutrients presents in the food.

b. Why are proteins important for us?

c. Name some foods that are rich in carbohydrates and fats. Why are carbohydrates and fats important?

d. What is roughage? Why is it important?

e. Why are vitamins and minerals essential? Name a few of them.

f. What is a balanced diet?

g. What is malnutrition? Give any two symptoms of malnutrition.

h. Distinguish between communicable and non-communicable diseases.

Formative Assessment

4. Tick (✓) the right and cross (×) the wrong statements.

a. We eat food because it contains nutrients that we need to stay healthy. ☐

b. Most food items contain only one nutrient. ☐

c. Minerals are needed in very small amounts. ☐

d. Sugar and starch are difficult to digest. ☐

e. Taking rest is not important for the body. ☐

f. Rickets is a communicable diseases. ☐

g. Water is a major part of the blood. ☐

h. Fats are the main source of energy. ☐

i. All germs cause diseases. ☐

j. Pasteurization is only the cooling of milk to kill germs. ☐

k. Mosquitoes and flies do not spread diseases. ☐

l. Contact with an infected person can spread diseases. ☐

5. Multiple choice questions

a. Which statement is wrong ?

(i) Milk, cheese, almond are the sources of calcium. ☐

(ii) Deficiency of calcium is the cause of weak bones. ☐

(iii) Proteins are used to build and repair worn out cells in our body. ☐

(iv) Carbohydrates are not important nutrients. ☐

b. Deficiency of which vitamin causes night blindness ?

(i) Vitamin A ☐ (ii) Vitamin B ☐

(iii) Scurvy ☐ (iv) Rickets ☐

6. Give one word for each one of the following.

a. Lack of proteins and carbohydrates over a long period of time : ..... .

b. Injecting substance into the blood to protect the body from a disease : ..... .

c. Capacity to fight against a disease : ..... .

Take one tablet each of Vitamins A, B and C and three test tubes. Pour some water in each test tube. Then put one tablet in each test tube and shake them well. What do you observe ? Which tablets get dissolved in water?

1. Is it advisable to clean your face, hands and feet before going to the bed? Why?
2. 'Prevention is better than cure', justify.

1. Make posters to show that how communicable diseases are caused and can be prevented.
2. Conduct a survey in your locality and find out if all the children in your area have been vaccinated against diseases like measles, diphtheria etc. This way, you can spread awareness about various diseases.

7

Solids, Liquids and Gases

Learning Objectives

1. Atoms & molecules
2. Arrangement of molecules in solids, liquids and gases
3. Solutions
4. Type of solutions

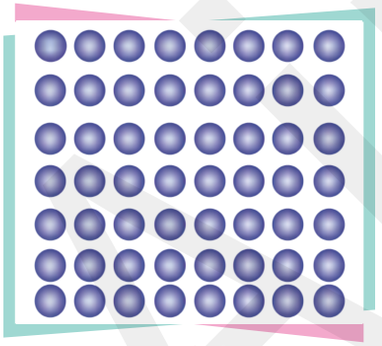
Let Me Answer

- Have you ever noticed solids in your environment?

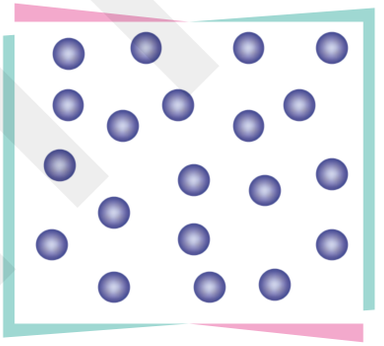
TYPES OF MATTERS

- Solid
- Liquid
- Gas

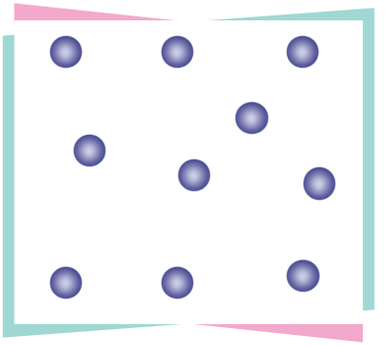
MATTER



Solid
(closely packed molecules)



Liquid
(not very close molecules)



Gas
(loosely packed molecules)

We see many things in this world, like plants, animals, human beings, air, water, soil, plastic, metals, wood, paper etc. All these things are made of matter. Everything that occupies space and has weight is matter. There are three types of matter : Solids, liquids and Gases

Molecules

Matter is made up of very tiny particles called molecules.

Take some grains of sugar. Crush it with the help of a rolling pin. The sugar grains become powder. Observe this powder through a magnifying glass. You will see that this powder is made of even tinier particles. These particles are made up of sugar molecules.

Properties of molecules

1. Molecules cannot be seen.
2. Molecules of various substances have different weight, shape and size.
3. Molecules in various substances are arranged differently.
4. Molecules can be broken into smaller units which are called atoms.

How substances differ from each other?

Let us compare a cricket ball and a basket ball.

How are they alike?

- They both have a circular shape.
- They both occupy space.
- They both have weight.

Cricketball

Basketball

How are they different ?

- The cricket ball is smaller than the basketball.
- A cricket ball is made of leather whereas the basketball is made of rubber.
- A cricket ball has red and white colours but a basketball is brown in colour.

We can find out likeness and differences between objects by comparing their shapes, sizes, colour etc. The objects differ from each other because they are made of different molecules.

An object can be made of more than one type of molecules. Sharpen your pencil and look at the pencil shavings. What do you notice? you will see brown coloured wood particles and black coloured graphite particles. A pencil is made of two different matters : wood and graphite. The pencil point you write with, is made of a material called graphite.

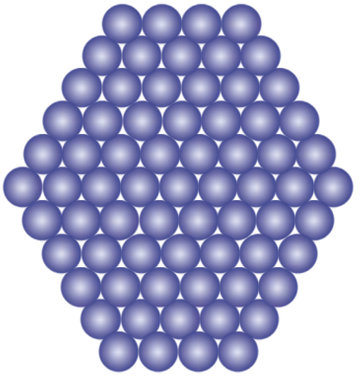
Take an apple cut it into small pieces. Now, eat them. Do these pieces differ in taste when you eat a whole apple? No, these have the same taste. Taste some sugar grains and some sugar powder. They taste the same.

Collect some saw dust and a piece of wood. The tiny particles of saw dust are particles of wood. All the examples discussed above show that molecules that make up a substances are the same whether the substance is big or small.

Arrangement of molecules in solid, liquid and gas

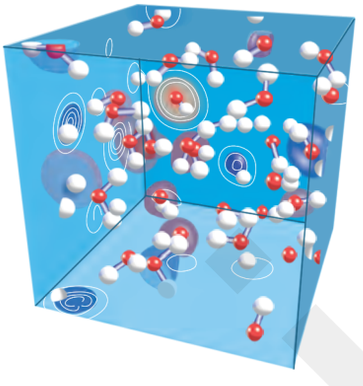
We have learnt that there are three forms of matter, i.e. solid, liquid and gas. How are molecules in solid, liquid and gas arranged ?

Molecules in a solid



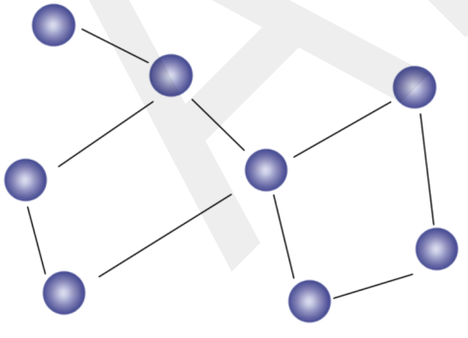
- are arranged in a pattern.
- are very close to each other.
- are held together by a strong pull.
- have a fixed shape and volume.
- have no inter-molecular spaces (space between molecules), so they cannot move.

Molecules in a liquid



- are not arranged in any particular pattern.
- are not very close to each other.
- are held together by a weaker pull.
- have a fixed volume but no fixed shape.
- have small inter-molecular spaces which make the structure mobile.

Molecules in a gas



- are arranged in any particular pattern.
- are loosely packed and keep moving.
- are far apart with large inter-molecular spaces.
- move at a great speed in all directions.
- exert a weak pull on each other.

SOLUTIONS

A simple solution is basically comprised of two substances that are mixed together. One of them is called the solute. A solute is the substance to be dissolved (e.g. : sugar). The other is a solvent. The solvent is the substance in which the solute dissolves (e.g. : water).

A solution is a homogeneous mixture in which the molecules of the solute are distributed uniformly throughout the solvent. There is another type of mixture called heterogenous mixture. In this type of mixture, there is no blending of the substances. The substances of the mixture are distinctly visible.

Let us consider an example. Take two transparent glasses. Fill them with water. Mark the level of water in both the glasses. Add 3 spoons of salt in one of the glass and 3 spoons of sand in the other and stir. The salt dissolves in the water and spread throughout in the glass of water. The sand does not dissolve and sinks to the bottom. In this case, the salt-water is a solution whereas the sand-water is not a solution.

Now, look at the marks you had put in both the glasses. You will notice that water level has gone up in the glass where sand was added, whereas the water level is same in salt-water solution. Why did it happen ?

The salt particles got dissolved in the water. The salt molecules occupy the inter-molecular spaces between the water particles and therefore there is no increase in the volume of the solution.

Salt-water Solution

Sand-water Mixture

How is a solution saturated?

What happens if we continue to add salt to a salt-water solution ? If we keep on adding salt to water and keep on stirring, after sometime, no more salt would dissolve because the solution is saturated (filled up). The water gets saturated with salt because all its inter-molecular spaces are occupied.

TYPE OF SOLUTIONS

Generally solutions are solids dissolved in liquids. They could also be gases dissolved in liquids. They can also be a combination of gases and liquids. If you mix things up and they stay at an even distribution, it is a solution.

You have learnt about many liquid-solid solutions. Let's look at some other type of solutions :

Liquid-liquid Solution

Liquids that dissolve in water are called miscible liquids.

Liquids that do not dissolve in water are called immiscible liquids.

Miscible liquids dissolved in water make a liquid-liquid solution.

Liquid-gas Solution

What happens when we boil water? When we boil water, bubbles form on the sides of the vessel. These are bubbles of the gases that are dissolved in water. So, water is an example of a liquid-gas solution. Carbon-dioxide is added to aerated drinks to give it a fizz.

Solid-solid Solution

Solid-solid solutions are not easy to prepare. They start off as solid-liquid/gas-liquid solutions and then hardened at room temperature to form solids. Various type of metals are melted together and then hardened to make alloys (steel). These are examples of solid-solid solutions.

Facts to know

- Plasma is known as the fourth state of matter.
- One can distinguish among solids, liquids, and gases on two levels: the macroscopic and submicroscopic.

LET'S RECALL

1. Matter is made up of very tiny particles called molecules.
2. Molecules are themselves made up of smaller parts called atoms.
3. The smallest part of an element is an atom.
4. Matter exists in three states : solid, liquid, and gas.
5. Molecules are arranged most closely and tightly together in a solid, more loosely in a liquid and float freely in a gas.
6. Some solids like salt and sugar dissolve in liquids to form a solution.
7. Solvent is the liquid which dissolves the other substance, called the solute.
8. Gases can dissolve in water.

Word Power

blending : the process of mixing things together
fizz : a hissing or bubbling sound or effervescence
magnifying : enlarging something only in appearance, not in physical size

Train Your Brain

Cross Curriculum Connect

1. Answer the following questions in short.

a. Which liquid is used as a fuel?
b. Name the solid which is used as a fuel.
c. Name is the solid that burns very easily?
d. Give the name of a solid that meets on heating.
e. Which gas is used in aerated drinks?

2. Fill in the blanks.

kerosene molecules solvent largest paper

a. ..... is used as a fuel.
b. A solid which burns easily can be a piece of ..... .
c. Matter is made up of ..... .
d. Gases have the ..... inter-molecular shapes.
e. The ..... is the substance in which the solute dissolves.

3. Answer the following questions.

a. How can you find out the likeness and difference between objects?
b. How are liquids and solids alike?
c. How are liquids and solids different?
d. What is the difference between liquids and molecules?
e. What is a chemical change? How is it different from a physical change?
f. What is the difference between :
   (i) sugar in water and pebbles in water?
   (ii) oil in water and milk in water?

4. Tick (✓) the right and cross (×) the wrong statements.

a. Gases have fixed shape and volume. ☐

b. Cooked rice can dissolve in water and are soluble in it. ☐

c. Matter exists in three states : solids, liquids, and gas. ☐

d. Milk is miscible in water, but cheese is not. ☐

e. The smallest part of matter is molecule. ☐

5. Multiple choice questions

a. Matter is made up of tiny particles called ..... .

(i) atoms ☐ (ii) molecules ☐

(iii) electrons ☐ (iv) electrical ☐

b. The smallest part of an element is ..... .

(i) an atom ☐ (ii) an electron ☐

(iii) a proton ☐ (iv) liquid ☐

c. Matter exists in ..... states.

(i) two ☐ (ii) three ☐

(iii) four ☐ (iv) five ☐

d. The substance that dissolves in a solvent is called ..... .

(i) solution ☐ (ii) solute ☐

(iii) soluble ☐ (iv) mixture ☐

e. The inter-molecular spaces in the gases are ..... .

(i) smallest ☐ (ii) largest ☐

(iii) medium ☐ (iv) none ☐

6. Give one word for each one of the following.

a. A liquid that is used as fuel : ..... .

b. A solid that burns easily : ..... .

c. A solid used as fuel : ..... .

d. A solid that breaks easily : ..... .

e. A solid that melts : ..... .

f. A gas that is used in aerated drinks : ..... .

7. Match the columns.

Column A		Column B	
a.	Solute	(i)	water, milk, kerosene
b.	Solid	(ii)	which dissolves some thing in it
c.	Solvent	(iii)	oxygen, carbon dioxide
d.	Liquid	(iv)	wood, glass, plastic
e.	Gas	(v)	that dissolves in some thing

To know the solubility of liquids.

Material required : 5 glasses, glycerin, lemon juice, water, milk, kerosene and oil

Method : Take some water in each glass. Add a drop of glycerin to the first glass, lemon juice to the second, milk to the third glass, kerosene to the fourth and oil to the fifth glass. Which of these drops mixes with the water ?

Observation : Lemon juice and milk mix well with water but glycerin, kerosene and oil are immiscible with water.

Conclusion : This shows that out of given four liquids, only lemon juice and milk make a miscible solution with water.

1. Mohit took a glass and poured some water into it. He marked the level. Then, he added 5 teaspoons of salt to the water, stirred it and checked the level again. What happened to the water level in the glass ? Why ?
2. An egg, when put in a bowl of water, sinks but the egg floats when put in a salty water bowl. Why ?
3. What happens to liquid coconut oil in winters ?

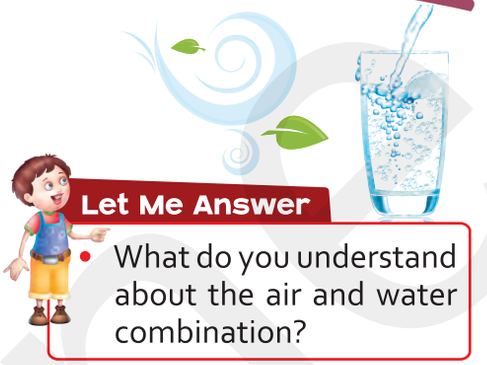
1. Bring different substances to the class (like chalk powder, sugar, coffee, salt) in small packets. Show these packets to your classmates and ask them to identify whether they are solids or liquids. These then could be dissolved in water one-by-one to find out whether they are soluble or not.
2. Discuss with your teacher about the effect of temperature and stirring in reference to dissolution of solutes.

8

Air and Water

Learning Objectives

1. Composition of air
2. Atmosphere
3. Properties of air
4. Water : removing insoluble and soluble impurities
5. Water supply to our homes



Let Me Answer

What do you understand about the air and water combination?

STEPS OF PURIFICATION OF WATER

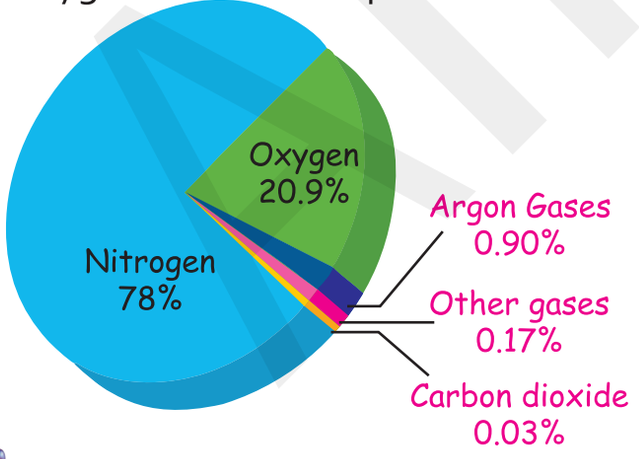
- Sedimentation
- Filteration
- Chlorination
- Storage

AIR

Every living thing needs air to breathe. Animals and plants cannot live without it. Air also holds aeroplanes and kites in the air and is used to inflate tyres, balloons, footballs etc.

Composition of air

Air contains a mixture of gases. Nitrogen and oxygen are the main component of air. Oxygen is used for respiration and for burning.



Nitrogen is not required for burning but is consumed by plants to make their food.

In addition to nitrogen and oxygen, air consists of small amounts of some other gases including argon, carbon dioxide, neon, helium and methane.

Besides gases, air also contains water vapours, dust, pollens and bacteria. The water vapours in air are the source of rain and snow.

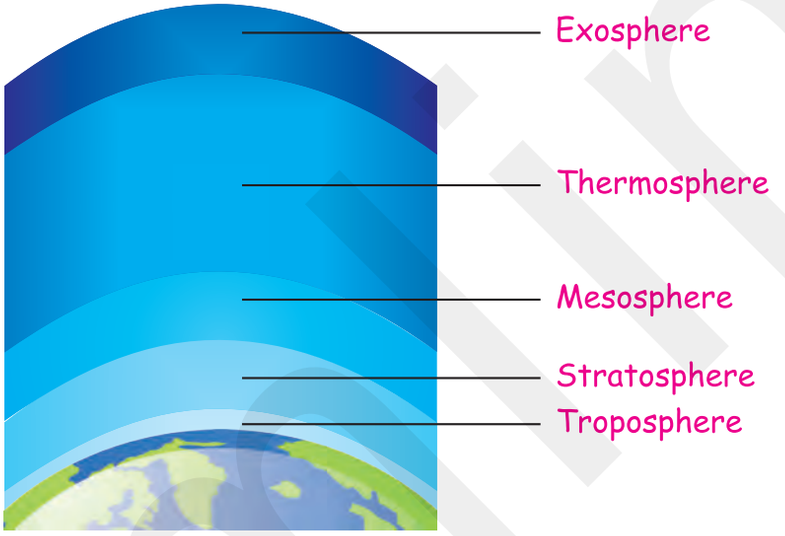
Atmosphere

The earth is surrounded by a layer of air. This blanket of air surrounding the earth is called the earth's atmosphere. It is held by the gravity of earth and provides the right supports which help life to survive.

- It saves the earth from becoming very hot by screening a large part of the sun's heat from reaching the earth.
- At night, it prevents the heat of earth to escape. If there was no atmosphere, earth would have been a cold freezing place at night.
- The ozone layer in the atmosphere prevents the harmful ultraviolet rays of the sun to reach the earth.

Layers of the atmosphere

Scientists have divided the atmosphere into five layers.



Troposphere : It is the first layer of the earth's surface. The wind and most clouds exist in this region.

Stratosphere : Many aircrafts fly in this layer. Here, the ozone layer absorbs harmful rays from the sun.

Mesosphere : Meteors or rock fragments are burnt up in the mesosphere.

Thermosphere : The space shuttle orbits in the thermosphere.

Exosphere : The exosphere is the uppermost limit of our atmosphere. It is the highest and thinnest portion of the earth's atmosphere.

Properties of air

Air has three main properties.

- It occupies space.
- It carries pressure.
- It exerts pressure.

Air contains oxygen which is consumed by living beings for respiration. oxygen is also essential for burning.

How air pressure is useful ?

We use air pressure to drink juice from a straw. When we suck in through the straw, the air is drawn out and no air is left in the straw. The pressure inside the straw becomes lower than the pressure in the air outside the straw. It forces the liquid into the straw and the juice comes into your mouth. A medicine dropper works on the same principle.

What happens when we go on filling air into a balloon ? It bursts with a bang. Why does it burst ? The extra air exerts pressure on the walls of the balloon. When the pressure becomes more, the balloon bursts. Air is inflated into smaller spaces. Tyres filled with compressed air can support bicycles, cars, buses, trucks and even aircraft.

WATER

Water is the most important substance on earth. All plants and animals need water to live. People have many uses of water besides drinking. They use it for washing and cooking. They use it to irrigate crops and gardens, to clean streets and to operate air cooler. They also use the power of flowing water to generate the electricity.

Water is found on 75 per cent of earth's surface in the form of oceans, rivers and lakes but very little of this water is fit for use. People throw garbage and sewage into these water bodies. Factories also release oils, poisonous chemicals and other wastes into the water. These substances, which make the water dirty, are called pollutants.

Water impurities

We find two types of water impurities.

- **Soluble impurities** : These are soluble in water, e.g. salt, many chemicals etc.
- **Insoluble impurities** : These are insoluble in water, e.g. mud, oil etc.

Removing insoluble impurities

Insoluble impurities can be separated from water by three methods : sedimentation, decantation and filtration.

Sedimentation

Water with insoluble impurities is kept undisturbed. After some time, the insoluble impurities settle down at the bottom. This process is called sedimentation.

Decantation

In sedimentation, the impurities settle down at the bottom and you can get clean water above. This clean water is slowly poured into another container. This process is known as decantation.

Filtration

Here the impure liquid is passed through a filter paper. The filter paper works like a sieve which is used to filter tea leaves from tea at home.

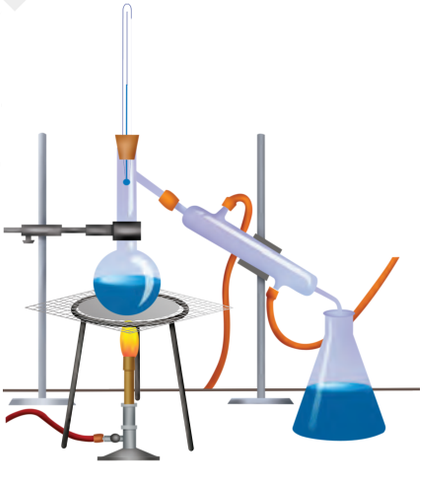
Removing soluble impurities

How can we separate soluble substance from water? Soluble impurities can be separated by evaporation and distillation.

Evaporation

It is the process of changing water into vapours on heating. When water evaporates, it leaves all the dissolved impurities at the bottom.

Distillation



Distillation is the process by which we get pure water, free from all minerals, salts, and other impurities. By evaporation and condensation, we get pure distilled water. Water is first heated and then it evaporates. The water vapours are cooled and they condense into water which is collected in another flask.

Distilled water is used :

- in batteries, cars and inverters.
- in science laboratories.
- to make medicines.

Journey of water to our homes

We drink water when we feel thirsty. Water not only quenches our thirst but is essential for other body functions. It removes waste and toxins, in the form of sweat and urine from our body. Before supplying the clean water in our taps, the water is first treated to make it fit for drinking.

The municipality of a town treats the contaminated water consisting germs which cause diseases like jaundice, cholera and typhoid. Water is treated by sedimentation, filtration and chlorination before it reaches our homes.

1. **Sedimentation** : The water is pumped from the river and stored into a tank. In order to remove the impurities, chemicals are added which help insoluble impurities to settle down.
2. **Filtration** : After the process of sedimentation, the water is collected in another tank and passed through sand, gravel and charcoal to remove suspended insoluble impurities.
3. **Chlorination** : The filtered water is taken into a third tank where chlorine is added to kill harmful bacteria which cause water-borne diseases.
4. **Storage** : Finally the clean chlorinated water is stored in huge tanks and supplied to the city.

While the clean water passes through the pipes, it may get contaminated. To make sure that the water is germ-free, we can boil it or use water filters at our homes, to kill the germs.

Water is precious, we should not waste it.

Facts to know

- Tyres filled with air are called pneumatic tyres. Dunlop was the first man to make pneumatic tyres.
- Oxygen therapy is used as a common medical treatment.
- A dripping tap can waste up to 6 litres of water in a day.

LET'S RECALL

1. Air contains oxygen, nitrogen, carbon dioxide, dust, smoke and germs.
2. An atmosphere is the thick layer of air that surrounds the earth and is held by the earth's gravity.
3. The five layers of the atmosphere are troposphere, stratosphere, mesosphere, thermosphere and exosphere.
4. Air occupies space, has weight, is required for burning and exerts pressure.
5. Insoluble impurities of water can be separated by sedimentation, decantation and filtration.
6. Soluble impurities can be separated by evaporation and distillation.

Word Power

atmosphere : a layer of air surrounding the earth
impurities : substances in water which make it unfit for drinking
filtration : liquid is allowed to pass through a filter to separate insoluble impurities

Train Your Brain

Cross Curriculum Connect

1. Answer the following questions in short.

a. Which gas is used in chlorination to kill germs
b. What are the major components of air?
c. What is decantation?
d. Which atmosphere layer contains the ozone layer?

2. Fill in the blanks.

nitrogen oxygen troposphere distilled water carbon-dioxide

a. Fisher breathe in dissolved ..... in water.
b. Air contains 78% of ..... .
c. The gas used in aerated drinks is called ..... .
d. The purest form of water is ..... .
e. The first layer of atmosphere is called ..... .

3. Answer the following questions.

a. Name the gases present air.
b. How does the atmosphere help us?
c. How is air pressure used in our daily lives?
d. How are soluble impurities removed from water?
e. How water is made safe for drinking before being supplied to our house?

4. Tick (✓) the right and cross (×) the wrong statements.

a. Air contains 78% nitrogen. ☐

b. We have only two layers of the atmosphere. ☐

c. The passing of water through sand, gravel and charcoal to remove impurities is called sedimentation. ☐

d. We can be healthy and happy even if the air around us is dirty and giving bad smell. ☐

e. We can get distilled water by evaporation and condensation. ☐

5. Multiple choice questions

a. We need ..... to breathe in.

(i) fresh air ☐ (ii) nitrogen ☐

(iii) polluted air ☐ (iv) carbondioxide ☐

b. We have ..... layers of atmosphere.

(i) two ☐ (ii) four ☐

(iii) five ☐ (iv) three ☐

c. The ..... layer prevents the ultraviolet rays of sun from reaching the earth.

(i) oxygen ☐ (ii) nitrogen ☐

(iii) helium ☐ (iv) ozone ☐

d. How many type of water impurities are there?

(i) Three ☐ (ii) Four ☐

(iii) Six ☐ (iv) Two ☐

e. We have ..... of water on the earth.

(i) 50% ☐ (ii) 60% ☐

(iii) 75% ☐ (iv) 80% ☐

6. Give one word for each one of the following.

a. In which layer of atmosphere does life exist ?

b. Name the method of getting pure water by evaporation and condensation.

c. Name the farther most layer of atmosphere.

7. Match the columns.

Column A		Column B
a. Nitrogen	(i)	Pure water
b. Oxygen	(ii)	21%
c. Distilled water	(iii)	78 %
d. Chlorination	(iv)	atmosphere
e. A layer of air around the earth	(v)	cleaning water by passing chlorine through it

To get the pure drinking water.

Material required : a heating pot, water from a hand pump and stove

Method : Heat the water upto the boiling point and cool it. Let the sediments settle down on the bottom. Collect the upper layer of water which is safe for drinking.

1. Why does not soap remove easily from the body, when we take a bath with water in hilly area ?
2. A soda water bottle can burst if it is put in a freezer for a long time. Why ?
3. Mrs. Khanna opened a tin of oil. She tried to pour the oil into another container and the oil came out slowly but when she made a hole in the tin, it flowed easily. What may be the reason ?

1. Take an empty plastic can. With an adult's help, punch 5 to 10 small holes in the bottom. Fill half the can with sand. Pour some muddy water in it. Collect the water that comes out of the holes. Observe the water. Is it still muddy ?
2. You can perform the activities with your friends to demonstrate the properties of air.
3. Discuss the reasons for air and water pollution, in your class and come up with simple ideas of their prevention.

9 Soil Erosion and Conservation

Learning Objectives

1. The role of soil in supporting life
2. The process of soil formation
3. Soil erosion
4. Soil conservation
5. Soil pollution

Let Me Answer

- Soil conservation is the practice of minimizing soil loss while maximizing agricultural production. Suggest a few ways to soil conversation.

SOIL EROSION

- Erosion by wind
- Erosion by water
- Erosion by human activities

SOIL

The soil is the topmost layer of the earth's crust. It consists of a mixture of minute particles of rocks, minerals, dust and remains of dead plants and animals. It also contains air and water.

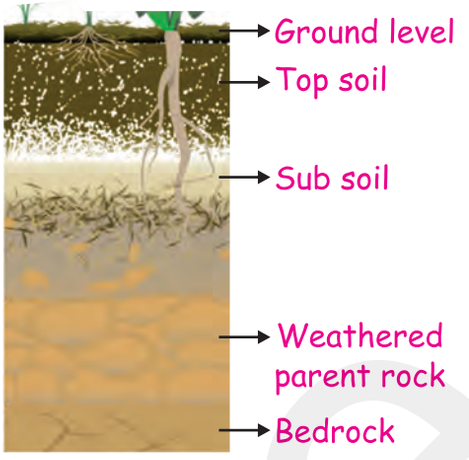
Soil is very useful for all living things. In fact, life on land depends on soil. It supports the growth of plants. We all are dependent on plants for our basic needs like food, clothing and shelter. Soil is also the home for many organisms like bacteria, fungi, worms and insects.

Formation of soil

The formation of soil happens over a very long period of time. The process by which soil formation takes place is called weathering. Weathering is a very slow and gradual process during which the parent rock breaks down into fine particles. The large rocks are initially broken down into smaller pieces by natural events like earthquakes. The process of weathering is carried further by other agents like temperature changes, frost, water, wind and living organisms. It takes 200 to 400 years for the formation of just 1 cm of topsoil.

Soil is composed of three layers

The uppermost layer of soil is called the topsoil. It is dark in colour as it is rich in humus. It is the most fertile layer. Humus is formed by the dead and decaying parts of plants and animals. Just below the topsoil is a light coloured layer called the subsoil. It contains less humus. Below the subsoil, there is a layer of lumps of parent rock. Below this is non-porous, unweathered bedrock.

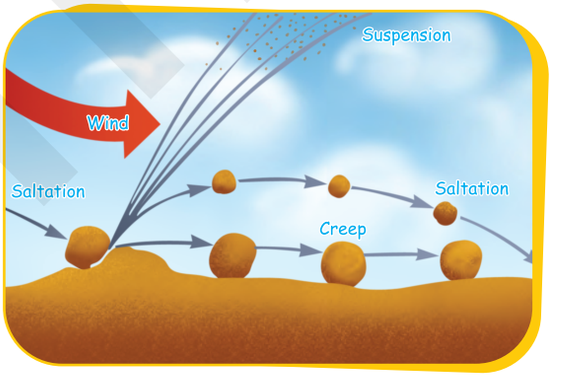


Soil erosion

Soil erosion takes place when the uppermost layer of the soil gets carried away by natural agents like wind, rains and floods. This carrying away of the topsoil from one place to another by natural agents is called soil erosion. Deforestation is the major cause of soil erosion. When the fertile topsoil is eroded, the less fertile subsoil comes to the surface which leads to a fall in crop production. Gradually, the land loses its fertility and becomes barren. Activities like deforestation and overgrazing by animals also contribute towards soil erosion.

Erosion by wind

Topsoil is easily carried away by strong winds. Erosion due to wind is greatest in areas where there is less vegetation. Plantation restricts soil erosion by wind.



Erosion by water

Heavy rain or running water washes away the topsoil causing soil erosion. Heavy soil erosion occurs in hilly areas because river water flows faster on the slopes and washes away the fertile soil. As the river reaches the plains, its flow slows down, causing the deposited soil to settle at the rivers bottom.This is called silting. If the erosion in the hilly areas continues for a longer period, the amount of soil-spread in the plains over the years will be substantial. This can cause the river to change its course.

Soil erosion causes water pollution. It can also lead to landslides. A landslide is moving of loose rocks down a slope of a hill or mountain. This results in

Soil Erosion by Water

Erosion due to human activities

- We need wood for many purposes and to meet the demand humans have been cutting down trees in the forests. The process of cutting down all the trees in an area is called deforestation. Which is a major cause of soil erosion. When trees are cut down, soil becomes loose and is easily carried away.
- Over grazing by animals in a particular area makes the land barren. This too results in soil erosion.
- Ploughing of farmland also loosens the soil. Wind or water can easily carry this loosened soil away.
- Some time, soil is left bare for a long time after harvesting. This unprotected soil can be easily blown away.

Deforestation leads to soil erosion.

Ploughing of Land

Soil conservation

Soil erosion reduces the soil fertility. Therefore, it is important to protect the topsoil from erosion. The protection of soil from erosion is called soil conservation. Conservation means the steps taken to protect our natural environment. Different methods adopted to protect the soil from erosion are as follows :

Planting trees or afforestation

Afforestation

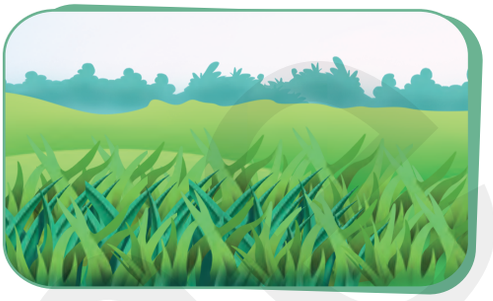
Afforestation is an effective method to prevent soil erosion. Roots of the plants hold the soil particles together and thus protect the soil from being carried away by wind or water. Trees, bushes, grasses and hedges along the boundaries of farmlands shield the topsoil and prevent soil erosion.

Terrace farming

On hill slopes, farming is done by cutting steps and terraces to reduce soil erosion. This reduces the speed of water with which the soil flows downhill.

By growing grass

When the land is not being used for farming, it is good to grow grass or some other creepers on it. The grass has spreading roots. It covers the topsoil and holds it firmly.



Constructing dams and embankments

During a flood, running water washes away a large part of the topsoil. Dams and embankments are built on rivers to check soil erosion by floods.

Soil pollution

Soil pollution is caused due to a number of human activities. The main cause of soil pollution is dumping of solid non-biodegradable wastes on land. The polluted land becomes less fertile. Excessive use of pesticides and chemical fertilizers by farmers also pollutes the soil. The soil pollution ultimately makes the land barren.

Prevention of soil pollution

- Plant grass and ground cover in vast expansive gardens and fields.
- Never leave embankments bare and exposed.
- Adopt a small piece of land outside your property as your own for plantation and cleanliness.
- Construct a retaining wall or fence around your vacant property.
- Proper solid waste management should be done.
- Laws should be created for prevention of soil pollution.

- Improve agricultural techniques and reduction of use of chemical fertilizers and pesticides should be practised.

Facts to know

- The estimated that total global soil erosion costs agriculture hundreds of billions of US dollars every year.
- Supporting organic farming by purchasing organic foods and encouraging your local retailer to stock organic products, can help in conservation.

LET'S RECALL

1. Soil is formed by breaking up of rocks into very smaller particles. This is called weathering.
2. Soil consists of three layers – topsoil, subsoil and bedrock.
3. The process of carrying away of topsoil from one place to another by wind, rain or flowing water is called soil erosion.
4. Deforestation, ploughing and overgrazing by animals increase soil erosion.
5. Soil can be conserved by afforestation, growing trees and grasses, terrace farming on hill slopes and by constructing dams across the rivers.
6. Various human activities cause soil pollution.

Word Power

afforestation : the conversion of land into forest, especially for commercial use
barren : two poor to produce any vegetation
earth quake : a sudden and violet shaking of the ground
embankment : a structure of earth, raised to prevent water from overflowing
humus : the organic component of soil
overgrazing : grazed grassland so heavily that the vegetation is damaged and the ground become liable to erosion
ploughing : turn up earth with the flow
vegetation : an act or process of growing plants

Train Your Brain

Cross Curriculum Connect

1. Answer the following questions in short.

a. Define the following in one line :

(i) Weathering

(ii) Topsoil

(iii) Soil erosion

(iv) Deforestation

(v) Soil conservation

2. Fill in the blanks.

terrace farming vegetation insecticides; pesticides soil erosion rock

a. Breaking up of ..... into tiny pieces forms soil.

b. Carrying away of the topsoil by wind, rain or flowing water is called ..... .

c. Soil erosion due to wind is greatest in areas where there is less ..... .

d. On hill slopes, soil erosion is prevented by ..... .

e. The excessive use of ..... and ..... in fields causes soil pollution.

3. Answer the following questions.

a. What is weathering of rocks? How do rocks break and wear away?

b. What is soil erosion? Name the factors that cause soil erosion.

c. Name the different layers of soil.

d. What is soil conservation? In what ways can soil be conserved?

e. How is soil polluted?

Formative Assessment

4. Tick (✓) the right and cross (×) the wrong statements.

a. Deforestation causes soil erosion. ☐

b. The protection of soil against erosion is called weathering. ☐

c. Soil erosion increases fertility of the soil. ☐

d. Wind does not cause soil erosion. ☐

e. Cutting down of trees increases soil erosion. ☐

5. Multiple choice questions

a. Soil erosion can be controlled by ..... .

(i) overgrazing. ☐

(ii) keeping the land barren. ☐

(iii) dumping the waste material. ☐

(iv) growing grass. ☐

b. The soil erosion ..... .

(i) increases the fertility of the soil. ☐

(ii) reduces the fertility of the soil. ☐

(iii) may increase or decrease the fertility. ☐

(iv) does not affect the fertility of the soil. ☐

c. The removal of the topsoil by water or wind is called ..... .

(i) soil erosion. ☐

(ii) terrace farming. ☐

(iii) silting. ☐

(iv) soil conservation. ☐

d. Which statement is not true?

(i) Soil erosion does not cause water pollution. ☐

(ii) Deforestation is the major cause of soil erosion. ☐

(iii) Soil erosion reduces soil fertility. ☐

(iv) Planting trees or afforestation is an effective method to prevent soil erosion. ☐

6. Give one word for each one of the following.

a. The uppermost layer of the soil is called ..... .

b. The layer of soil with lumps of rocks is called ..... .

c. Planting trees in large numbers is known as ..... .

d. Farming on hill slopes is called ..... .

e. Settling of soil at the bottom of rivers is called ..... .

7. Match the columns.

Column A		Column B	
a.	Afforestation	(i)	Fertile
b.	Soil erosion	(ii)	Weathering
c.	Humus	(iii)	Felling trees
d.	Deforestation	(iv)	low soil fertility
e.	Soil formation	(v)	Planting tree

Examine carefully some soil samples taken from different places and list your observations in the table given below.

S No.	Soil source	Colour	Presence of living organisms	Presence of dead and decaying organisms
1.	Garden soil			
2.	Roadside soil			
3.	Farmland soil			

1. Why grazing by animals on the same land for a long time should not be allowed?
2. How can you prevent soil erosion in your immediate surroundings?

1. Ask your parents to get some saplings from a nursery. Plant them in your garden or in a park near your home. Water these plants regularly and see them grow. You can also put your name on a cardboard and place it near your plant. Take care of the plant just as plants take care of you.

10 Volcano, Earthquake and Tidal Waves

Learning Objectives

1. Volcanoes and their characteristics
2. Earthquakes and their effects on earth
3. Measuring an earthquake
4. Tidal waves and their proper utility
5. About tsunami

Let Me Answer

- Can you suggest a few ways to stop or prevent such destructions caused by Tsunami?

TYPES OF VOLCANOES

- Active
- Dormant
- Extinct

The earth is usually a peaceful place, but sometimes natural disasters can upset our life. We have no control over these calamities, but we can take precautionary measures to protect ourselves from these disasters. Some of these calamities are volcanic eruptions, earthquakes and tidal waves. These happen due to disturbances within the earth. The pictures shown below will give you an idea.

Tidal waves are a result of earthquakes under oceans. Huge walls of water dash against a coast in a tidal wave, cause great damage and loss of life.

Earthquakes happen when parts of the crust (uppermost layer of the earth) move against each other. This can cause buildings to shake and even disintegrate!

Volcanoes burst in the mountains that throw up hot liquid rocks (magma) from inside the earth.

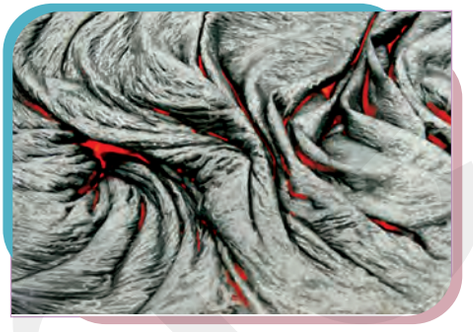
Can you judge a common result of all these mentioned phenomena?
All of these cause great damage and loss of human and animal life.

VOLCANOES

Volcanoes are leakages in the earth's crust, out of which molten magma comes out. This magma comes from the mantle of the earth and reaches the crust through cracks. Volcanoes are usually in the form of conical mountains.

Volcano erupting

Hot lava flowing out



Solidifying lava

A lot of underground pressure pushes up the molten rock. The molten rock rushes out through a vertical tunnel called a vent and fills a hollow crater at the top. This hot magma, upon reaching the earth's surface, is known as lava. As lava cools, it solidifies and forms rocks.

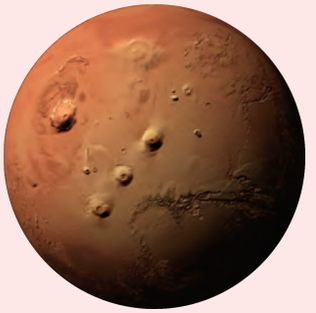
According to the nature of their eruption, there are three types of volcanoes: active, dormant, and extinct.

Active volcanoes are those that may erupt at any time or have erupted in the recent past. But we must remember that in geology 'recent' can mean thousands of years! Many active volcanoes are found around the Pacific Ocean, giving rise to the name 'Pacific ring of fire'.

Mount Vesuvius, Mount Fuji, and Mount Erebus are some well-known active volcanoes.

Dormant volcanoes are those which have not erupted since a long time but may erupt in the future.

Extinct volcanoes are those which have stopped erupting. Some islands have been formed by the eruption of undersea volcanoes. As recently in 1995, one such island was formed in the Kingdom of Tonga.



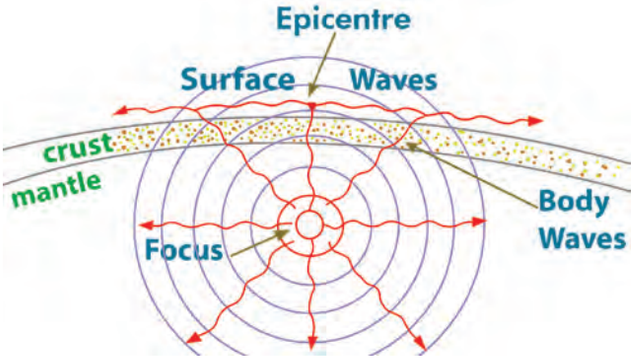
Olympus Mons

Volcanoes on other celestial bodies

There are volcanoes on other planets and satellites too. Venus is believed to have active volcanoes. Mars has extinct volcanoes. In fact, it has the biggest crater in the solar system, called the **Olympus Mons**.

EARTHQUAKES

An earthquake is a sudden vibration of a part of the earth's surface. It is caused by severe shock waves that travel through solid rocks from underground to the surface.



The point under the ground where the earthquake begins is called the focus and the corresponding spot on the surface is called the epicentre.

During the Gujarat earthquake of 2001, Bhuj was the epicentre. After the first big quake, smaller quakes or tremors may happen. These are called aftershocks. This occurs when rocks that have been moved out of their place, start falling back into the place. In Kashmir, after the earthquake of 2005, the aftershocks were felt for many days. The 2011 Sikkim earthquake was centered within the Kanchenjunga Conservation Area, near the border of Nepal and the Indian state of Sikkim, on Sunday, 18 September 2011. The earthquake was felt across northeastern India, Nepal, Bhutan, Bangladesh and southern Tibet. So many people were killed in the earthquake. Most of the deaths occurred in Sikkim, with reports of fatalities in and near Singtam in the East Sikkim district. Several buildings collapsed in Gangtok.

Earthquakes can also happen under the sea.

Measuring an earthquake

The intensity of the quake is determined using an instrument called a seismograph. It measures the intensity, direction, and duration of the earthquakes. There are many scales used for this. But the most common is the Richter scale.

Effects of an earthquake

- An earthquake, especially a strong one, always causes destruction to the property. Buildings may develop cracks or even fall down. Roads and bridges get damaged. Trees get uprooted. Many lose their lives too by getting trapped under heavy slabs, roofs etc., that have fallen.
- An earthquake, especially an undersea one, can cause other disasters like tidal waves.
- Earthquakes can also cause landslides and fires.

TIDAL WAVES

Tidal wave is the common name for a tsunami. Tsunami is a Japanese word meaning 'harbour wave'. Tidal waves are caused by undersea earthquakes, volcanic eruptions, landslides etc. In a tidal wave, large amounts of water move. The water moves at a great speed and as the waves reach the land, they swell up into gigantic waves. If one happens to look at the sea when a tsunami is approaching, one feels as if the sea level has risen a lot.

Facts to know

- A fault is an area of stress in the earth where broken rocks slide past each other.
- The Earth's crust is made up of huge slabs called plates, which fit together like a jigsaw puzzle.
- Tides are caused by gravitational influences of the moon, sun and planets while tsunamis are mainly caused by earthquakes, landslides and volcanic eruptions.

LET'S RECALL

1. Volcanoes are the cracks in the earth's crust through which molten magma comes out as lava.
2. Volcanoes may be active, dormant or extinct.
3. An earthquake is a sudden movement of a part of the earth's surface.
4. Tidal waves are caused by undersea earthquakes, volcanic eruptions etc. Tidal waves are huge and cause far-spread destruction.

Word Power

calamity / disaster	:	a natural catastrophe, that causes great damage or loss of life
intensity	:	high level or degree, the property of being intense
massive earthquake	:	earthquake in an unpopulated area
magma	:	hot fluid or semifluid material with in the earth

Train Your Brain

Cross Curriculum Connect

1. Answer the following questions in short.

a. Define the following in one line :

(i) Shock waves

(ii) Dormant volcano

(iii) Aftershocks

(iv) Magma

(v) Crater

2. Fill in the blanks.

extinct cracks Richter scale tidal wave epicentre

a. Volcanoes are the ..... in the earth's crust.

b. ..... volcanoes are those that have stopped erupting.

c. The centre of the earthquake is called ..... .

d. The most common scale to measure an earthquake is called ..... .

e. ..... is the common name for a Tsunami

3. Answer the following questions.

a. Name the three types of volcanoes. Give three examples of active volcanoes.

b. What are focus, epicentre and aftershocks? Give one example of epicentre and aftershock.

c. What are the effects of an earthquake?

d. What are the tidal waves? How are they caused?

Formative Assessment

4. Tick (✓) the right and cross (×) the wrong statements.

a. Volcanoes are usually in the form of cylindrical mountains. ☐

b. Mount Erebus is an extinct volcano. ☐

c. As lava cools, it solidifies and forms rocks. ☐

d. Earthquakes can also happen under the sea. ☐

e. A scale used to measure the intensity of an earthquake is called Richter scale. ☐

5. Multiple choice questions

a. A volcano which frequently releases magma is called ..... .

(i) active ☐ (ii) extinct ☐ (iii) dormant ☐

b. An earthquake can disrupt ..... .

(i) Sunlight ☐ (ii) air ☐

(iii) water and electricity in cities ☐

c. Tsunami is caused due to ..... .

(i) tidal waves ☐ (ii) hot climate ☐

(iii) under water earthquake ☐

d. The hollow shape formed at the mouth of a volcano is called ..... .

(i) Magma ☐ (ii) Crater ☐ (iii) Pool ☐

e. Which of the following is predictable .....?

(i) Volcano ☐ (ii) Earth quake ☐ (iii) Tidal waves ☐

6. Give one word for each one of the following.

a. A sea wave 5 to 10 metres high is called : .....

b. A volcano no more active is called : .....

c. What comes out from the mantle of the earth when a volcano is active : .....

d. What is called the hat magma reaching the earth surface? : .....

7. Match the columns.

Column A		Column B
a. Active Volcano	(i)	Richter scale
b. Tidal waves	(ii)	Lava
c. Hot magma on the earth	(iii)	Mount Free bus
d. Olympus Mouns	(iv)	Due to earthquakes oceans
e. Intensity of Earthquake	(v)	Biggest crate in the solar system.

Make a chart in which three calamities are explained with their precautionary measures to get minimum possible damage to life and material.

1. With the help of your teacher, collect information about Gujarat earthquake 2001 ?
2. After any natural disaster, diseases spread . Why ?
3. Make a list of safety measures, which one should take during an earthquake.

Find out some safety measures to be followed during an earthquake. Create a chart based on information gathered from newspapers, books, magazines, television and the internet.

11

Energy

Learning Objectives

1. Meaning of energy
2. Types of energy
3. Sources of energy
4. Conservation of energy

Let Me Answer

- What are Renewable energy sources that can be easily replenished?

TYPES OF ENERGY

- Solar energy
- Hydroelectric energy
- Wind energy
- Biogas energy

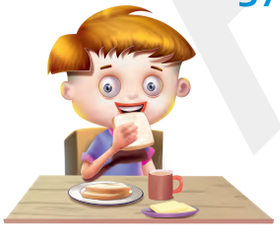
ENERGY

The capacity to do any work is called energy. Energy is consumed whenever any work is done. We need energy for doing different works. Without energy we can't do any work. Machines get energy from the fuel they consume or use some other forms of energy for doing work. Trucks and buses use diesel. Steam engines and thermal power stations use coal. Electrical appliances use electricity to do work. We too need energy to do work. Our body gets energy from food. Do you know that all machines work using some form of energy.

Forms of energy

Energy is found in various forms :

Chemical energy



Chemical energy is a form of potential energy and it is possessed by things such as food, fuels and batteries. Food stored inside the body is a form of chemical energy. Chemical energy is changed into muscular energy to do work.

Muscular energy

Muscular energy is the thing that powers all your actions. Muscular energy is used to do work.

Mechanical energy

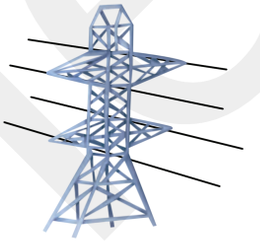
Energy that produces push and pull and therefore makes things move, is called mechanical energy.

Wind energy

The energy of wind or moving air is used in windmills to pump out water or for grinding wheat. Do you know that small amount of electricity is produced if windmills are connected with a turbine.

Electrical energy

Electricity is a different form of energy. All electrical appliances start working when the current passes through them, such as cooler, fan, iron, mixer etc. Electrical energy can be changed into mechanical energy, heat energy or light energy.



Water energy

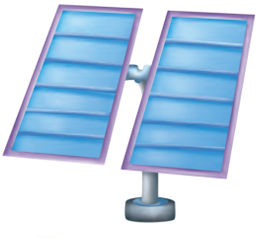
The electricity produced by using the energy of falling water is called water energy or hydroelectricity.

Heat energy

The motion of atoms and molecules creates a form of energy called heat or thermal energy. Heat energy can change the state of matter.

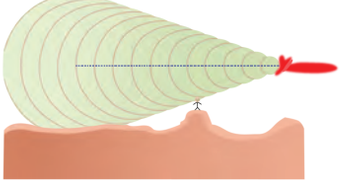
Solar energy

The sun is the most vital source of energy. Energy from the sun is called solar energy. Food can be cooked in solar cookers by using heat from the sun. Light from the sun can be changed into electricity through special kind of cells.



Sound energy

Sound energy is the energy produced by sound vibrations as they travel through a specific medium. Sound energy is produced by vibrations.



Atomic energy

The atoms of certain radioactive elements like uranium, thorium etc., on reactions, produce atomic energy which is used to produce electrical energy. Atomic bombs are prepared by making use of atomic energy.

Sources of energy

Sources of energy can be divided into two :

(a) renewable sources and (b) non-renewable sources.

Renewable sources

Renewable sources are those sources which are available in a large amount in nature and are infact inexhaustible. Examples of such sources are wind energy, solar energy, hydro power energy, biogas energy etc. These sources of energy are also called alternative sources of energy.

Solar energy : Energy from the sun is called solar energy. The sun is the most important source of heat energy. Solar energy is one of the most useful forms of energy.

Hydroelectric energy : The electricity produced by using the energy of falling water is called hydroelectricity.

Biogas / gobar gas : Biogas / gobar gas is a form of bio-energy made from organic waste matter after it is decomposed. Biogas is smokeless and does not causes pollution.

Wind energy : A windmill uses moving air or wind to produce wind energy.

Above sources of energy are present in plenty in nature. We must utilize more of these energy sources to meet our energy demands. We don't have to pay for these sources of energy. The best part or quality is that these forms of energy don't cause any pollution.

Non-renewable sources

Non-renewable sources are those sources which are present in definite quantities in nature. Once they are used, they can't be reproduced or take a very long period of time in reproducing. Petroleum, coal and other natural gases are non-renewable sources and are called fossil fuels.

Petroleum is the most common source of energy. It is used to produce fuels like petrol, kerosene, diesel etc. It is also a source of many other useful products. Coal is also used extensively as a source of energy and heat. It is used to create steam to produce electricity or to drive machinery. Natural gas is used as a fuel for cooking and heating.

We should try to prevent the useless waste of these non-renewable sources

Conservation of energy

The economical use of sources of energy is called energy conservation. The amount of energy remains constant and energy is neither created nor destroyed. Energy can be converted from one form to another (potential energy can be converted to kinetic energy) but the total energy within the domain remains same.

Facts to know

- All of our energy sources originate from the sun's energy.
- Almost all energy transformations involve the production of heat, which is considered the lowest form of energy.

LET'S RECALL

1. The capacity to do any work is called energy.
2. Energy is found in various forms.
3. The sun is the most important source of energy. Energy from sun is called the solar energy.
4. Sources of energy can be divided into (a) renewable sources and (b) non-renewable sources.
5. Wind energy, solar energy, hydroelectric energy etc. are form of renewable energy.
6. Petroleum, coal and natural gases are forms of non-renewable energy.
7. The economical use of sources of energy is called energy conservation.

Word Power

organic waste	:	waste, typically originated from plant or animal sources
extensively	:	large in extent, range or amount
fuel	:	the source of energy to run a system
thermal power	:	the power obtained from heat
inexhaustible	:	unable to be used up due to its existence in abundance.

Train Your Brain

Cross Curriculum Connect

1. Answer the following questions in short.

a. Define the following in one line :

(i) Manure (ii) Solar energy

(iii) Wind energy (iv) Non-renewable sources of energy

2. Fill in the blanks.

water thermal non-renewable atomic renewable

a. Solar energy is the ..... source of energy.

b. The energy produced with the help of atoms is called ..... energy.

c. Petroleum is the ..... source of energy.

d. Coal is source of ..... energy.

e. In hydroelectric power plants, electricity is produced with the help of ..... energy.

3. Answer the following questions.

a. What is energy? Why do we need energy?

b. What are chemical and mechanical energies?

c. What is hydroelectricity?

d. What do you mean by renewable source of energy?

e. What do you mean by conservation of energy?

Formative Assessment

4. Tick (✓) the right and cross (×) the wrong statements.

a. Trucks and buses use diesel for energy. ☐

b. Food stored inside the body is a form of mechanical energy. ☐

c. Heat energy can change the state of matter. ☐

d. Renewable source of energy is also called the alternative source of energy. ☐

e. Petroleum is used to create steam to produce electricity. ☐

5. Multiple choice questions

a. Petrol is the most common source of .....

(i) energy ☐ (ii) inactivity ☐

(iii) power ☐ (iv) efficacy ☐

b. Biogas is smokeless and does not causes ..... .

(i) pollution ☐ (ii) impurity ☐

(iii) fouling ☐ (iv) dirtying ☐

c. Food stored inside the body is a form of ..... .

(i) chemical energy ☐ (ii) mechanical energy ☐

(iii) energy ☐ (iv) muscular energy ☐

d. The main source of energy for our body is ..... .

(i) food ☐ (ii) food and water ☐

(iii) both of these ☐ (iv) none of these ☐

e. The energy we get from sun is ..... .

(i) plumule ☐ (ii) seed coat ☐

(iii) cotyledon ☐ (iv) radicle ☐

6. Give one word for each one of the following.

a. To protect and preserve energy is called : ..... .

b. The energy produced by falling of water is called : ..... .

7. Match the columns.

Column A	Column B
a. Sun	(i) Atomic energy
b. Gobar	(ii) Non-renewable resource
c. Petroleum	(iii) Biomass energy
d. Wind energy	(iv) Solar energy
e. Uranium	(v) Free of cost

Count various non-conventional sources of energy and draw them on a chart. Now explain them to your neighbours about their necessity and importance in our daily life.

1. Make a list of some situations like swimming, running, sleeping etc. and note down whether work is done or not during these situations.
2. How is sun energy more eco-friendly than heat energy ?

Find out some safety measures to be followed during an earthquake. Create a chart based on the information gathered from newspapers, books, magazines, television and the internet.

Revision Test Paper - I

(Based on Chapters 1 to 4) Max. Marks : 10

1. Multiple Choice Questions (MCQs) 2

Tick (✓) the correct option.

a. Which of the following is an underground stem?

(i) Tomato ☐ (ii) Potato ☐

(iii) Carrot ☐ (iv) Radish ☐

b. The respiratory system consists of ..... .

(i) nasal cavity ☐ (ii) mouth ☐

(iii) circulatory system ☐ (iv) all of these ☐

2. Give one word for each one of the following. 2

a. An agent with wings and helps to disperse seeds .....

b. The cage used to protect lungs is known as .....

3. Tick (✓) the right and cross (×) the wrong statements. 3

a. The development of a new plant from a seed is called germination. ☐

b. The snake moves with the help of fins. ☐

c. Expiration is the act of breathing out. ☐

4. Match the columns. 3

Column A	Column B
a. Yawning	(i) Breathing through skin
b. Frog	(ii) Cow dung
c. Manure	(iii) Lack of oxygen

Revision Test Paper - II

(Based on Chapters 5 to 7) Max. Marks : 10

1. Multiple Choice Questions (MCQs) 2

Tick (✓) the correct option.

a. Deficiency of which vitamin causes the night blindness?

(i) Vitamin A (ii) Vitamin C

(iii) Vitamin B12 (iv) Vitamin E

b. The smallest part of an atom is ?

(i) An atom.

(ii) An electron.

(iii) A proton.

(iv) Liquid.

2. Give one word for each one of the following. 2

a. A gas that is used in aerated drinks .....

b. A nerve which carries messages from the eyes to the brain .....

3. Tick (✓) the right and cross (×) the wrong statements. 3

a. The hair in our nose filter dirt.

b. Gases have fixed shape and volume.

c. Fats are the main source of energy.

4. Match the columns. 3

Column A	Column B
a. Tongue	(i) Dustbin
b. Banana peels	(ii) Wood, glass, plastic
c. Solid	(iii) Taste buds

Revision Test Paper - III

(Based on Chapters 8 to 11) Max. Marks : 10

1. Multiple Choice Questions (MCQs) 2

Tick (✓) the correct option.

a. Food stored inside a body is a form of ..... .

(i) chemical energy (ii) mechanical energy

(iii) energy (iv) muscular energy

b. The removal of the topsoil by water or wind is called ..... .

(i) soil erosion (ii) terrace farming

(iii) silting (iv) soil conservation

2. Give one word for each one of the following. 2

a. Planting trees in large numbers .....

b. The layer of atmosphere in which life exists .....

3. Tick (✓) the right and cross (×) the wrong statements. 3

a. Trucks and buses use diesel energy.

b. Wind does not cause soil erosion.

c. Earthquakes can also happen under the sea.

4. Match the columns. 3

Column A	Column B
a. Sun	(i) 78%
b. Nitrogen	(ii) Planting trees
c. Afforestation	(iii) Solar energy

Model Test Paper-I

(Based on Chapters 1 to 6) Max. Marks : 25

1. Answer the following questions in short. 5

a. What is germination of seeds?

b. What are gills?

c. Define nervous system.

d. Define the following in one line.

(i) Spogy (ii) Spores

2. Fill in the blanks. 5

a. A seed is protected by a ..... .

b. The body of ..... is covered with scales.

c. Bones are held together at a joint by a tissue called ..... .

d. The black spot in the centre of eye is called ..... .

e. The natural air contains about ..... persent oxygen.

3. Answer the following questions. 15

a. What is the function of a cotyledon?

b. Name the five main habitat on the Earth.

c. What is the breathing rate?

d. What is the functions of cerebrum?

e. What is a joint? Explain different joints present in the body.

Model Test Paper-II

(Based on Chapters 7 to 11) Max. Marks : 25

1. Answer the following questions in short. **5**

a. What is solar energy?

b. What are the major components of air?

c. Define weathering.

d. What is magma?

e. Name the solid that burns very easily.

2. Fill in the blanks. **5**

a. ..... is used as a fuel.

b. Air contains 21% of ..... .

c. Breaking up of ..... into tiny pieces forms soil.

d. The centre of the earthquake is called ..... .

e. On hill slopes, soil erosion is prevented by ..... .

3. Answer the following questions. **15**

a. How are soluble impurities removed from water ?

b. How does the atmosphere help us?

c. What is soil erosion? Name the factors that cause soil erosion.

d. What are the effects of an earthquake?

e. What is the chemical change? How is it different from a physical change ?

ACTIVITY-1

Let's experiment that air has pressure.

Materials required : One jar, one rubber band , string and a strong plastic bag

Procedure :

1. Fill the bag with air.
2. Tie the air-filled bag upside down to the jar, with its mouth overing the opening of the jar.
3. Wrap a string (tightly) around the bag and jar several times without crossing the jars ridges then tie it with a bow knot.
4. Press down the bag, lean on it and rest objects on top of it.

Observation : The objects don't go down.

Conclusion : Air pressure has great force.

ACTIVITY-2

To study the structures present on leaf through an experiment.

Materials required : a bottle, leaf, plastic sheet and clay

Procedure :

1. Fill a bottle with water below 1 inch from the top.
2. Take a freshly cut leaf with stem, wrap plastic around the stem and place it into the bottle.
3. Cover the mouth of the bottle with clay. Make sure that the clay fits snugly around the mouth of the bottle.
4. Poke a hole through the clay and insert a straw.
5. Press the clay around the straw and bottle opening so that no air can escape.
6. The straw should not touch the water.
7. Stand in front of a mirror and suck the air out of the bottle with the straw.

Observation : The leaf and stem act as a straw for the plant. As you drew air out of the plant, more air is drawn into the bottle through the stomata and xylem. This is the same system that plants use, to move water around.

Conclusion : There are holes in the leaf, called stomata and tiny tubes called xylem which run down the stem.

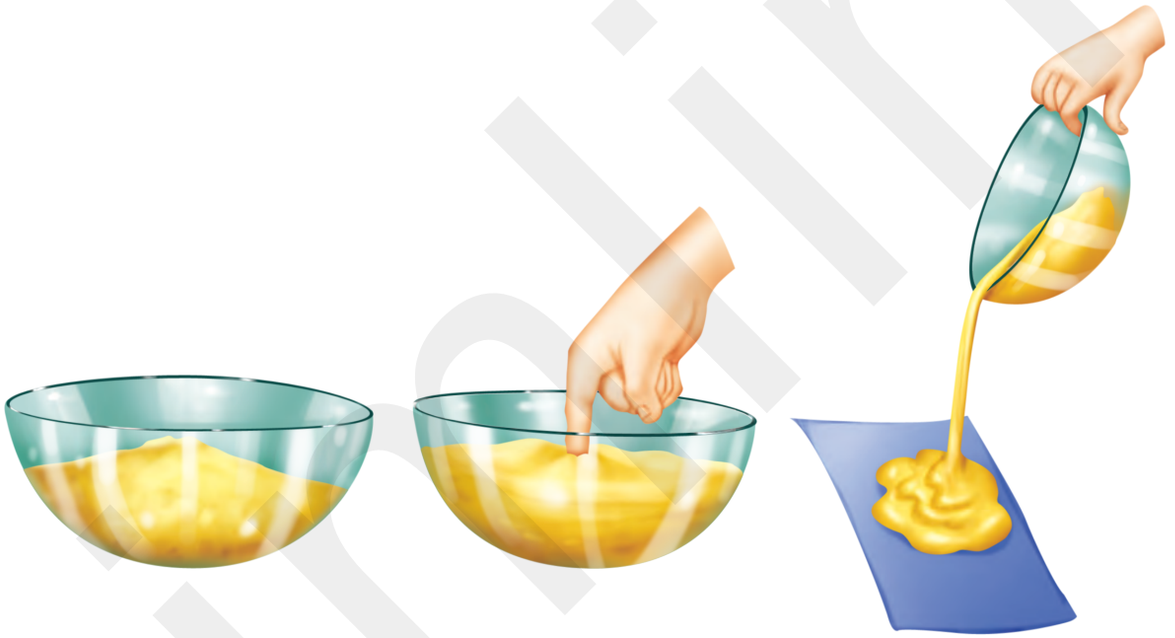
ACTIVITY-3

To study the strange behaviour of matter.

Materials required : Corn flour, bowl, two cups, water and rubber sheet

Procedure :

1. Mix one and a half cups of corn flour with one cup of water in a bowl.
2. Slowly dip your finger into the gooey mixture; then try slapping it hard with your hand or a heavy spoon.
3. Then try letting some of the gooey flow across a piece of rubber sheet.
4. Stretch the rubber slowly then stretch it fast.



Observation : When you stretch the surface quickly, molecules get tangled in each other and this stops them from splattering. In this way, the mixture behaves more like a solid. If you move them slowly or let them flow, they can run fast so, the starch behaves like a liquid.

Conclusion : The molecules in the starch are much larger compared to molecules of water.

Protect Your Environment

SAVE THE EARTH

The Earth : Neat and Clean

We all are responsible to save our Earth. We should follow some disciplines to keep our Earth neat and clean.

- Pick up bits of paper from the floor and throw them into the dustbin.
- Place a bucket under a tap which drips, you can collect water and use that collected water. In this way, you save the water.
- Share a room with others, while reading or playing at home. In this way, you can save the electricity as you'll only use the fan and lights of one room. Remember to switch off the light and fan while leaving the room empty.

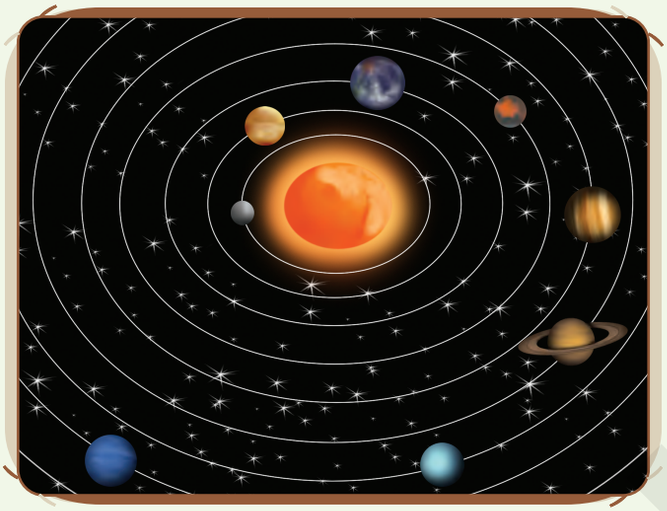
If your surroundings are neat and clean and you save water, you will contribute to keep the Earth green.

Fact File of the Earth

Our Earth is the third planet in the solar system. It was formed many years ago. It is believed that the Earth was very hot when it was newly formed. There were no plants or animals on it. Later, there were rains and thunderstorms. This cooled down the Earth's surface.

Slowly, living forms started appearing on the Earth. This is how life started on the Earth. Dinosaurs were one of the earliest animals to have appeared on the Earth.

Earlier, people used to think that our Earth is flat like a book. Later scientist found out that our Earth looks like a huge ball.



The Earth : A Living Planet

Our Earth is the only planet to have plants and animals on it. It has land, air and water which makes the Earth a very special planet. Being at the right distance from the Sun, the temperature of the Earth is also perfect for living things.

To Save the Earth : Few Simple Things to Do

- You should separate garbage, like cans, glass, paper, plastic, synthetic fabrics and rubber and drop everything off at the recycling centre.
- Use only as much water as is necessary. Do not waste even a single drop of water.
- Save energy - Save light, even if you are going out of the room for some time. You should not forget to switch off light.

Trees are the most important for the Earth.

We have variety of plants which make our environment green. Plants give us food, fruits, furniture and clean air to save our life.

Few Ways to Go Green and Save Green

Always go green and save green at home or at work. If we take action to stop the climate changes, we can make our lives better.

Few Steps to Save the Earth :

- Save energy
- Save water
- Save gas
- Recycle your electronics

Plants as an Air Purifier

Air purifier is the most important tool, an equipment that helps to clean air and the Earth. In the environment, the toxic and dirty air is present that is not healthy for human consumption. In this regard, air purifier is the best remedy for such a nasty air. It can reduce most of the air pollution from the vicinity - as pollens, dust and microbes are present in the form of bacteria and dirty gases.

Always use nontoxic products at your homes. Open your windows to allow fresh air to come in. Use indoor plants, they can absorb dirty smell and gases from the air inside.