

New Edition

Gohar

SCIENCE

Key book

7

Project Directors: Abu Zar Ghaffari Gohar
Altaf Hussain Gohar

Project Manager: Tariq Mehmood Syan

Author: Dr. Akram Malik

Editor: Junaid Ahmad Syed

Designing Manager : M. Zia Ullah

Designed by: Ijaz Ahmad

Processed by: RazHam Prepress Services

Printing Manager: Zaheer Ahmad

Manager Display Centre: M. Waseem

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Head Office

**Gohar Curriculum Research
and Development Centre**

Gohar Centre, 7/C, Marther Street,
Lower Mall, Lahore, +92-42-37358207



Gohar Publishers

11-Urdu Bazar, Lahore.

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Sales Office: + 92-42-37352492

Fax: +92-42-37112948

Email: goharpublisher@gmail.com

www.goharpublishers.com

Islamabad

+92-51-54519171

5193595

5199306

Karachi

+92-21-35896530

Manchester

+90-51-54519171

7361600944

Dubai

+971-4-2248321

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**Unit
1****What is Science?****Exercise**

Complete each of the following sentences by writing the correct term.

- i. Science is the system of acquiring knowledge through observation and experimentation.
- ii. A mathematician uses the method of calculation to solve problems.
- iii. Astronomers discover new stars and other heavenly bodies.
- iv. The study of force and energy is called physics.
- v. The eraser was invented by Joseph Priestley.
- vi. Zakariya Al-Razi introduced urinalysis and stool tests.



Fill in the circle of the best option.

- i. **A person who studies and applies scientific method in daily life.**
☐ scientist ✓ ☐ writer
☐ photographer ☐ philosopher
- ii. **Scientists which discover new stars and other heavenly bodies are called:**
☐ doctors ☐ chemists
☐ chemistry ☐ mathematics ✓
- iii. **The study of life is called:**
☐ physics ☐ biology ✓
☐ chemistry ☐ mathematics
- iv. **The branch of science which deals with the study of**

force, energy and motion of objects is called:

- ☒ physics ✓
- ☐ chemistry
- ☐ biology
- ☐ mathematics

v. Who studies plants, animals, microorganisms and their behaviour?

- ☐ a chemist
- ☐ a biologist ✓
- ☐ a geologist
- ☐ a physicist

vi. Who developed sine, cosine and tangent tables.

- ☐ Al-Razi
- ☐ Al-Dinawari
- ☐ Musa Al-Khawarizmi ✓
- ☐ Joseph Priestley

vii. Kitab Al-Mansuri and A-Hawi are written by:

- ☐ Al-Dinawari
- ☐ Al-Razi ✓
- ☐ Al-Khwarizmi
- ☐ Al-Haitham

viii. Who is the founder of modern algebra?

- ☐ Newton
- ☐ Al-Dinawari
- ☐ Al-Khwarizmi ✓
- ☐ Al-RAzi

ix. Oxygen gas was discovered by:

- ☐ Charles Darwin
- ☐ Joseph Proust
- ☐ Marie Curie
- ☐ Joseph Priestley ✓

x. Who discovered radioactivity?

- ☐ Marie Curie ✓
- ☐ Michael Faraday
- ☐ Joseph Priestley
- ☐ Charles Darwin



Brain teasers.

i. What is science? Describe its main branches.

Ans: Science

Science is the system of acquiring knowledge through observation and experimentation.

Main Branches of Science

There are four main branches of science **chemistry**,

physics, biology and mathematics. Each at some point will use some of the ideas of the other.

Chemistry

Chemistry is the study of matter, the substance everything is made of. A **chemist** studies how different substances interact with each other and what their structure is.



Physics

Physics is the study of force, energy and motion of objects. A **physicist** not only discovers the principles of universe but also invents scientific instruments or devices.

Biology

Biology is the study of life. Plants, animals and microorganisms all have signs of life. **Biologists** study plants, animals, microorganisms and their behaviour. They are also interested in the chemical processes taking place in living things.

Mathematics

Mathematics is the science of numbers. Anything with numbers interests **mathematicians**. They use the method of calculation to solve problems. The same method is also used by a chemist, physicist or a biologist to solve a problem. Buildings, bridges, aeroplanes and rockets are designed by the use of mathematical calculations.

- ii. **What do you know about the contributions of Joseph Priestly?**

Ans: Joseph Priestley (1733-1804)

Joseph Priestly made many discoveries. Some are these:

1. He discovered that graphite (carbon) can conduct electricity.
2. He described the properties of carbon dioxide. His experiments on carbon dioxide led to the invention of soda pop
3. He was the first person to observe respiration and photosynthesis in plants.
4. He discovered 'nitrous oxide' of laughing gas.
5. He discovered oxygen gas. He also called it as good air.
6. He invented the **eraser** we use to erase lead pencil marks.



Joseph Priestley

iii. Write contributions of the following scientists.

(a) Musa Al-Kwarzimi (b) Madame Curie

Ans: Muhammad Bin Musa Al-Khwarizmi (780-850)

Al-Khwarizmi was one of the most outstanding mathematicians known to history. Here is a brief list of his achievements:

1. He is the founder of modern algebra.
2. He wrote many books on this subject including Kitab al-Jabr, It was the first book on elementary algebra.
3. He introduced Arabic numerals.
4. He developed sine, cosine and tangent tables. These tables were later translated by the West.
5. He also described the basic types of equations such as: $nx = m$
6. He introduced the decimal position system, and the concept of zero.

Muhammad Bin Musa
Al-Khwarizmi

7. He and some other mathematicians of his time were the first to map the globe.

Madame Curie (1867-1934)

"Nothing in life is to be feared, it is only to be understood." (Madame Curie)

Madame Marie Curie was the first woman who received two Nobel prizes, one in physics and another in chemistry. Her few contributions in science are as follows:

1. Marie Curie and her husband Pierre Curie discovered radioactivity (natural emission of radiation) in radium.
2. During her work, Marie also discovered that radiation could kill human cells. This discovery led her to isolate radium for use in killing tumors.
3. Marie became the first woman who was the director of the physics Research Laboratory at Sorbonne (France).
4. She designed the first mobile X-ray machine for injured soldiers at battlefield.
5. Through her work on radioactivity, she can also be thought of as the mother of the atomic bomb.



Marie Curie

iv. How is Al-Razi an eminent Muslim scientist?

Ans: Muhammad Bin Zakariya Al-Razi (865-925)

Al-Razi was one of the most prolific Muslim doctors. Some of his contributions are:

1. He wrote over 200 books including Kitab Al-Mansuri and Al-Hawi. These two books were related



Muhammad Bin
Zakariya Al-Razi

to medicines.

2. He classified substances as plants, animals and minerals.
3. He found a treatment for kidney and bladder stones.
4. He explained the nature of various infectious diseases like smallpox and measles.
5. He introduced the use of alcohol for medical purposes.
6. He also introduced urinalysis and stool tests.

v. Describe the scientific contributions of Al-Dinawari.

Ans: Abu Hanifah Ibn Dawood Al-Dinawari (826-896)

Al-Dinawari was a great botanist (expert of plants) of his time. He made many contributions in the field of science. Some are as follows:

1. He wrote a book on plants Kitab al-Nabat, in which he described at least 637 plants.
2. He also discussed plant evolution from birth to death.
3. He described the phases of plant growth and the production of flowers and fruits.

Science Fun



**Unit
2****Human Organ Systems****Exercise**

Complete each of the following sentences by writing the correct term.

- i. The process of breaking down of food digestion
- ii. Muscular contractions that move food peristalsis
- iii. The grape-like clusters of tiny thin-walled balloons in lungs alveoli
- iv. The dome-shaped muscle at the bottom of our chest diaphragm
- v. The process of getting air into and out of the lungs breathing



Fill in the circle of the best option.

- i. **The place where digested food is absorbed:**
☒ small intestine ☐ large intestine
☐ stomach ☐ mouth
- ii. **What part of our body contracts and moves down when we inhale?**
☐ bronchioles ☐ alveoli
☒ diaphragm ☐ kidneys
- iii. **Air is moistened, filtered, and warmed in the:**
☐ oesophagus ☒ nose
☐ mouth ☐ stomach
- iv. **A large muscle that separates the chest cavity from the abdominal cavity and helps in breathing:**
☐ larynx ☐ trachea
☒ diaphragm ☐ alveolus

- v. **Which produces juice for the final digestion of proteins, fats and carbohydrates?**
☐ mouth ☐ large intestine
☒ pancreas ☐ gallbladder
- vi. **The reverse process of peristalsis:**
☐ breathing ☐ burning
☒ vomiting ☐ blood circulation



Brain teasers.

- i. **How does carbon dioxide produce in our body?**

Ans: During respiration, carbon dioxide is produced in our body.

- ii. **How is small intestine important in our digestive system?**

Ans: Our small intestine produce juices for final digestion of food. Digested food is also absorbed in the small intestine.

- iii. **Why are we provided with teeth?**

Ans: Our teeth help to chew the food and grind it. In this way, teeth help in the digestion of food.

- iv. **What are alveoli?**

Ans: Alveoli are grapes like structures present in our lungs. Exchange of gases between the red blood cells and surrounding air takes place in alveoli.

- v. **Briefly describe the mechanism of breathing.**

Ans: The process of breathing is completed in two steps:

Inhaling: When the intercostal muscles pull our ribs outward and the diaphragm contracts, the air enters the lungs. It is called inhaling.

Exhaling: When the intercostal muscles and diaphragm muscles relax, the air moves out of the lungs. It is called exhaling.

vi. What measures can one take to prevent diarrhoea?

Ans: We can prevent diarrhoea by following the tips given below:

- Always wash your hands with soap after using the toilet.
- Wash all fruits and vegetables before cooking or eating.
- Don't eat uncooked meat and eggs.

1. Explain the process of digestion of food in the mouth and the stomach.

Ans: Human Digestive System

Breaking down food into simpler substances that our body can use is called digestion. The parts of body that take part in the process of digestion form the digestive system. The process of digestion occurs in a long tube called alimentary canal. It starts from the mouth and ends at the anus.

Mouth

The process of digestion begins from our mouth. Our teeth break the food into small pieces by cutting and grinding. The tongue mixes food with saliva which is secreted by salivary glands. Saliva starts the digestion of carbohydrates (starch and sugar). After some time, the food in the mouth becomes soft and moist. The tongue pushes this food to the back of our mouth.

Our teeth are the main tools we use to break down food in the mouth.

Stomach

Our stomach is a digestive organ with muscular walls. It mixes the food with digestive juice. The digestive juice begins the digestion of proteins (meat, egg, milk, pulses, etc.). The food spends about four hours in the stomach.

The digestive juice in the stomach also contains an

acid. The acid kills the germs present in our food. It also helps in the digestion of proteins.

2. Describe the human respiratory system.

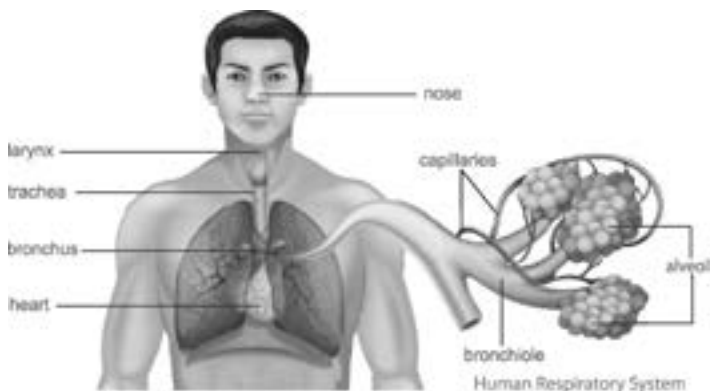
Ans: Human Respiratory System

All living things get energy by breaking down food substances. We also need oxygen to break down the food in every cell of our body. Our lungs take oxygen from the air during respiration (breathing).

Breathing is the process that moves air in and out of the lungs. **Respiration** is the process by which living organisms use oxygen of air and food to produce energy. The parts of body used in the process of breathing form the **respiratory system**.

Parts of Our Respiratory System

Our respiratory system consists of the nose and throat, the wind pipe (trachea), the breathing muscles and the lungs.



Nose and Throat

The air enters our body through our nose or mouth. Our nose has hair and mucous to clean, moisten and warm the air.

The air enters the throat and passes through the larynx. Our vocal cords are present in the larynx to produce sound.

Trachea (Windpipe)

Air passes from the larynx into the trachea or windpipe. Our windpipe is made of C-shaped rings of cartilage. These rings keep our windpipe open. Mucous and tiny hair in the trachea also filter the air.

Bronchi and Lungs

The trachea divides into two branches called bronchi (singular bronchus). Bronchi carry air into the lungs.

Our lungs are the most important organs of the respiratory system. In each lung the bronchus divides into smaller tubes called bronchioles. At the end of each bronchiole, tiny air sacs called alveoli are present. Alveoli are surrounded by blood capillaries. Oxygen of the air passes through the walls of alveoli into the capillaries. The red blood cells carry this oxygen to every cell of our body. Cells in our body use oxygen and food to produce energy and carbon dioxide. The blood brings carbon dioxide back to the lungs. Carbon dioxide leaves our body when we breathe out.

3. Write notes on the following:**i. Constipation****ii. Pneumonia****Ans: Constipation**

Constipation is the painful or difficult passing of faeces. During the period of constipation some persons may pass faeces three or less than three times a week. It is a common digestive disorder in Pakistan.

Causes of Constipation

Constipation is caused by taking food low in fibre, lack of physical activity, not drinking enough water, delay in going to the washroom, etc. We can avoid constipation by:

- adopting a proper lifestyle.

- taking regular exercise.
- eating lots of fibre food (fruit, vegetables and cereals).
- drinking plenty of water (at least 8 glasses everyday).
- going to the washroom when we have the urge.

Pneumonia

Pneumonia is an infection that affects the lungs. The lungs are made of small sacs called alveoli, which are filled with air. When a person has pneumonia, the alveoli are filled with pus, which makes breathing painful.

Pneumonia is the main cause of death in children worldwide.

Symptoms

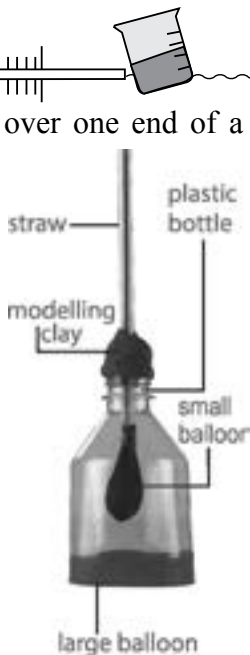
Common symptoms of pneumonia are cough, fever, nasal congestion, rapid breathing with wheezing sound, chest pain, loss of appetite, etc.

Treatment

Visit your doctor as soon as possible to treat pneumonia. Your doctor may prescribe an antibiotic medicine. Vaccines can also be used to prevent pneumonia. Wash your hands frequently to avoid germs. Use a tissue or handkerchief when you cough or sneeze.

Science Fun

1. Pull the opening of a small balloon over one end of a drinking straw. Use tape to attach the balloon to the straw.
2. Cut the neck of a large balloon. Ask your friend to hold a plastic bottle whose bottom has been cut off. Stretch the balloon over the cut end of the bottle (use tape).
3. Push the end of the straw with the small balloon into the mouth of the bottle. Then use modeling clay to seal the mouth of the bottle and to hold the straw in place.
4. Pull down the large balloon and observe what happens to the small balloon.
5. Now push the large balloon and observe its effect on the small balloon.



Can you explain the movement of your lungs with the help of this activity?

Ans: Our lungs have no muscles. Two types of muscles work during the breathing process ; the intercostal muscles of ribs, and the dome-shaped diaphragm. The process of breathing is completed in two steps:

Inhaling: When the intercostal muscles pull our ribs outward and the diaphragm contracts, the air enters the lungs. It is called inhaling.

Exhaling: When the intercostal muscles and diaphragm muscles relax, the air moves out of the lungs. It is called exhaling.

**Unit
3****Transport in Humans and
Plants****Exercise**

Complete each of the following sentences by writing the correct term.

- I. Blood vessels which carry blood towards heart veins
- ii. Blood vessels which supply blood only to the heart coronary vessels
- iii. Transports food in a plant body phloem
- iv. Pores to exchange gases in plants stomata
- v. Transports water and minerals from roots to leaves xylem



Fill in the circle of the best option.

- I. **Blood is carried away from the heart in:**
 - ☐ arteries ✓
 - ☐ veins
 - ☐ nerves
 - ☐ ureters
- ii. **Where does the exchange of food, oxygen and wastes occur in the human body?**
 - ☐ in arteries
 - ☐ in veins
 - ☐ in capillaries ✓
 - ☐ in lymph vessels
- iii. **Why does the blood turn dark red as it circulates through the body?**
 - ☐ It starts to clot.
 - ☐ It gets old and dirty while flowing through the body.
 - ☒ The oxygen in it is replaced with carbon dioxide.

- ☐ The farther blood is from the heart, the more dark red it is.
- iv. **The movement of prepared food from leaves to those parts of plant body where it is needed is called:**
 - ☐ transpiration ☐ translocation ✓
 - ☐ osmosis ☐ active transport
- v. **Which chamber of the heart receives the oxygenated blood from the lungs?**
 - ☐ right atrium ☐ left atrium ✓
 - ☐ right ventricle ☐ left ventricle
- vi. **The loss of water by evaporation from plants is called:**
 - ☐ translocation ☐ transpiration ✓
 - ☐ pressure flow ☐ diffusion

Brain teasers.

- i. **What do you mean by oxygenated blood?**

Ans: The blood which dissolves oxygen from the lungs is called the oxygenated blood.

- ii. **What is the estimated size of our heart?**

Ans: Our heart is about the size of our clenched fist.

- iii. **Which arteries carry deoxygenated blood from heart to the lungs?**

Ans: Pulmonary arteries carry deoxygenated blood from heart to lungs.

- iv. **Name at least two diseases that can damage our kidneys.**

Ans: High blood pressure and diabetes can damage our kidneys.

- v. **Which tissue does transport water in plants?**

Ans: Xylem tissues transport water from roots to leaves in plants.

vi. Name three parts of the circulatory system.

Ans: Heart, blood and blood vessels are the three main parts of the circulatory system.

vii. Explain why it is important to circulate blood through the body.

Ans: When the blood circulates throughout the body, it delivers oxygen and collects waste materials.

viii. How many chambers does the human heart have? Give names.

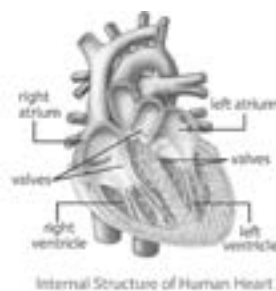
Ans: Our heart has four chambers:

- i. two atria ---- right atrium and left atrium.
- ii. two ventricles ---- right ventricle, left ventricle.

1. Describe the structure of human heart.

Ans: Human Heart

Our heart is a muscular organ about the size of our fist. The heart is found in our chest. It pumps oxygen-poor blood (deoxygenated blood) to the lungs and oxygen-rich blood (oxygenated blood) to the body. There are four chambers in our heart; two upper chambers called **atria** (singular atrium) and two lower chambers called **ventricles**.



The ventricles of our heart are larger than the atria. Both atria contract at the same time, and so the ventricles.

2. Compare the structures and functions of blood vessels.

Ans: Blood Vessels

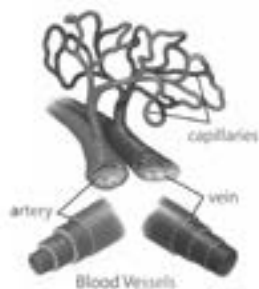
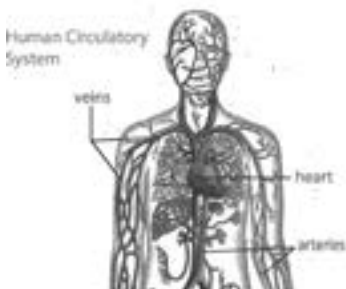
The blood travels throughout the body through blood vessels. The three types of blood vessels are arteries,

capillaries and veins.

Arteries are the blood vessels that carry blood away from the heart. Arteries have thick and flexible walls. Most of the arteries carry oxygenated blood, but pulmonary arteries carry deoxygenated blood to the lungs. Arteries divide many times to smaller tubes, called capillaries.

Capillaries are the smallest blood vessels in the body. They are so small that red blood cells flow through them one cell at a time. Food and oxygen from the blood of capillaries diffuse into the cells. Waste materials and carbon dioxide from the cells diffuse into the blood of capillaries. Capillaries again join to form the larger blood vessels called veins.

Veins are the blood vessels that bring blood back to the heart. Most of the veins bring deoxygenated blood back to the heart, but pulmonary veins bring oxygenated blood from the lungs to the heart.

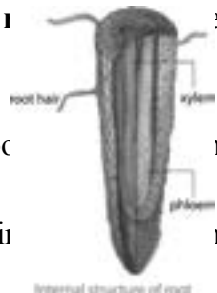


3. Describe that structure of a plant's movement of materials.

Ans: Structure of Roots

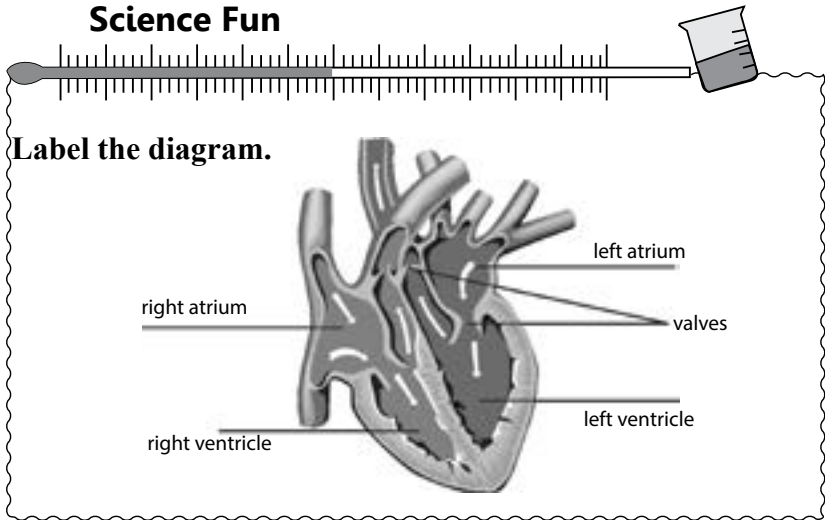
From the moment a seed grows, its root absorbs water and minerals in the soil.

- Roots have branches that play an important role in the absorption of water.



- The root hair on the roots absorb water and minerals from the soil.
- Roots have xylem tissues to move water and minerals from the soil up through the stems, to the leaves.
- Phloem tissues in roots help to transport food.

Science Fun



**Unit
4****Reproduction in Plants****Exercise**

Complete each of the following sentences by writing the correct term.

- i. It protects a seed flower
- ii. Male and female sex cells gametes
- iii. The exchange of pollen grains between two plants of similar type cross-pollination
- iv. Most grasses are pollinated by wind
- v. It is present in the ovary of the flower and develops into seed ovule



Fill in the circle of the best option.

- i. **The part of a plant that forms seeds is the:**
 - ☐ stem
 - ☐ root
 - ☐ leaf
 - ☒ flower
- ii. **When a bee visits a flower:**
 - ☐ Seeds stick to its body.
 - ☐ Cones stick to its body.
 - ☒ Pollen grains stick to its body.
 - ☐ Fruit sticks to its body.
- iii. **Which structure is helpful to the pollen grains to carry sperms to the ovary?**
 - ☐ cotyledon
 - ☐ carpel
 - ☒ pollen tube
 - ☐ seed
- iv. **The sticky part of a flower is called:**
 - ☐ sepal
 - ☐ stamen
 - ☐ ovary
 - ☒ stigma

v. Asexual reproduction involves:

- ☐ two gametes
- ☒ a single parent plant
- ☐ only male sex cell
- ☐ fertilization

Brain teasers.**i. Differentiate between asexual and sexual reproduction.**

Ans: The type of reproduction in which a cell from only one parent develops into offspring is called asexual reproduction.

The type of reproduction in which two gametes (one from each parent) combine to form a zygote is called sexual reproduction.

ii. What are the male and female parts of a flower?

Ans: Stamen is the male part of a flower. Carpel is the female part of a flower.

iii. Define pollination.

Ans: The process by which pollen grains transfer from the stamen to the stigma of a carpel in the flower is called pollination.

iv. Name a few pollinators.

Ans: Insect, animals, air and water, etc. are a few pollinators.

v. Define a sperm and an egg.

Ans: A sperm is male sex cell.

An egg is the female sex cell.

vi. Which part of a seed develops into the first root?

Ans: The radical of a seed develops into the first root.

1. Write a detailed note on pollination in plants.

Ans: Pollination

A flower's colourful petals attract insects that pollinate the flower. The transfer of pollen grains from the anther of a flower to the stigma of the carpel is called **pollination**.

Kinds of Pollination

There are two kinds of pollination, i.e. self-pollination and cross-pollination.

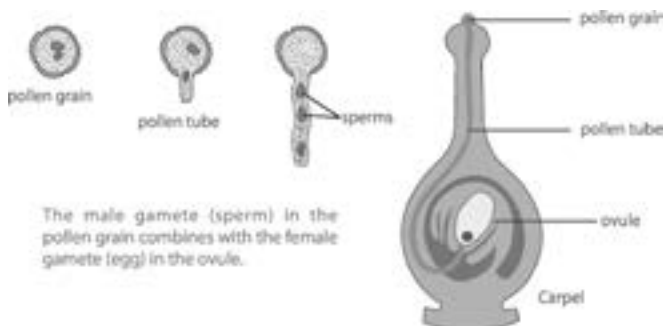
- The transfer of pollen grains from the anther to the stigma of the same flower or another flower on the same plant is called **self-pollination**. Pea, tomato, rice plants, etc. are self-pollinated.
- The transfer of pollen grains from the anther of a flower to the stigma of a flower on another plant of the same kind is called **cross-pollination**. Poplar, willow, apple, papaya trees, etc. are cross-pollinated plants. For cross-pollination, the plants must grow flowers at the same time. Cross-pollination usually happens in plants near each other. Cross-pollination produces stronger plants as compared to the self-pollination.

2. Explain fertilization in plants.

Ans: Fertilization in Plants

The surface of the stigma in a flower is sticky and pollen grains stick to it. Here, a pollen tube grows out from each pollen grain. Two sperms are present in this pollen tube. The tube grows downward through the style and enters the ovary. Pollen tube finally enters an ovule and releases its sperms in it. One of the sperms combines with the egg to form zygote.

The process of fusion of sperm with the egg is called **fertilization**.



Changes after Fertilization

After fertilization, several changes take place in the flower. The sepals, petals and stamens dry up and fall off. The fertilized egg inside the ovary develops into embryo. Ovules become seeds. The ovary grows large and develops into a fruit. The fruit protects the seed or seeds.

3. Describe the structure of a seed.

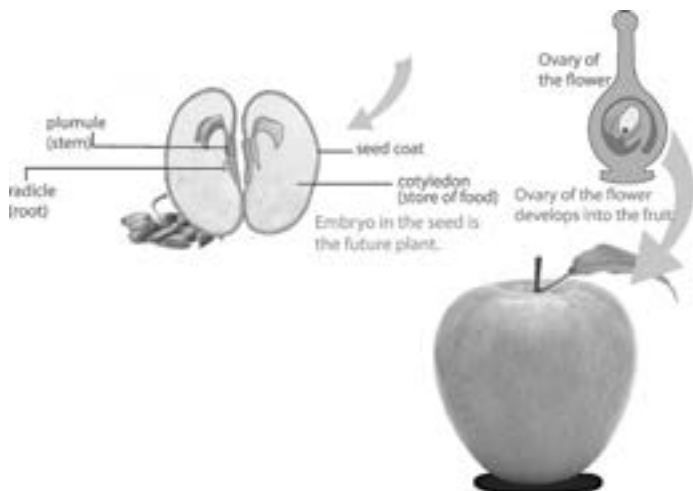
Ans: Seed: After fertilization an ovule becomes a seed. The embryo and its store of food are covered by a tough seed coat.

The most important part of a seed is its embryo. Embryo grows into a new plant. The embryo consists of the following parts.

Radicle: This part of the embryo develops into the first root of the new plant.

Plumule: This part of the embryo develops into the first shoot (stem) of the new plant.

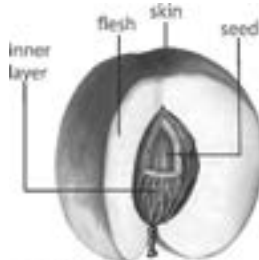
Cotyledons: This part of the embryo supplies food to the growing young plant.



4. Write a note on fruit.

Ans: Fruit: The ripened ovary is called a fruit. The ovary wall forms the fruit wall, called the **pericarp**. Inside the ovary, ovules develop into seeds. The matured fruit may contain single or many seeds.

The pericarp has three layers in most fruits like peaches and mangoes.

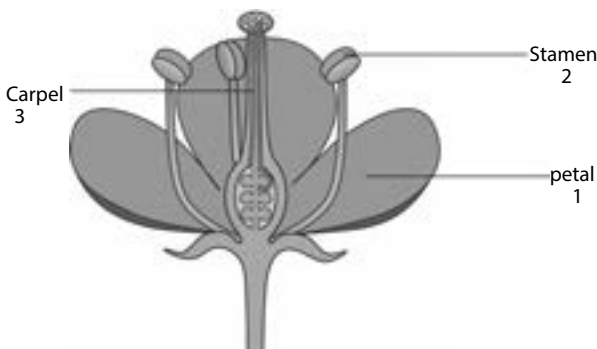


Plants produce fruit to disperse their seeds.

- The outer layer is skin
- the middle layer is fleshy
- The inner layer is tough or hard. Some fruits have hard and dry pericarp, e.g. nuts.

Science Fun

Label the parts of the flower and write the purpose of each part.



1. Colourful petals attract insects to help in polination.
2. Stamens produce pollen grains which contain male sex cells or sperms.
3. The Carpel contains ovules which have female sex cells or eggs. Later, Ovules change into seeds.

**Unit
5****Reproduction in Plants****Exercise**

Complete each of the following sentences by writing the correct term.

- i. The basic source of energy for every ecosystem **The sun**
- ii. Any living thing in the environment **biotic factor**
- iii. All the populations living in an area make a **community**
- iv. Several food chains overlap in a **food web**
- v. Breakdown the bodies of dead animals and plants **decomposers**



Fill in the circle of the best option.

- i. **The sunlight energy enters in an ecosystem through:**
☒ plants ☐ decomposers
☐ manimals ☐ water
- ii. **Organisms that make their own food are called:**
☒ producers ☐ heterotrophs
☐ consumers ☐ decomposers
- iii. **Bacteria and fungi are:**
☒ decomposers ☐ producers
☐ grazers ☐ predators
- iv. **Which one is a producer in an ecosystem?**
☐ lion ☐ hawk
☒ plant ☐ rat
- v. **Which organisms have maximum amount of energy in a food chain?**

- ☐ primary consumers
- ☐ secondary consumers
- ☐ tertiary consumers ☒ producers

vi. A group of tigers living and reproducing in a forest is an example of:

- ☐ a community ☒ a population
- ☐ an ecosystem ☐ a habitat



Brain teasers.

i. What kinds of organisms are at the start of most food chains?

Ans: Producers (green plants, algae, etc) are at the start of most food chains.

ii. Name biotic factors of an ecosystem.

Ans: Plants, animals and decomposers (bacteria, fungi and other microorganisms) are the biotic factors of an ecosystem.

iii. How are producers, consumers and decomposers related to each other?

Ans: Producers (plants, algae) produce their own food.

- This food is also used by consumers (animals, fungi).
- When producers and consumers die, decomposers (bacteria and fungi) breakdown their bodies.

iv. Define an ecosystem.

Ans: An ecosystem is a system formed by the interaction of living organisms and non-living things in an environment.

v. What do you mean by community in an ecosystem?

Ans: All the populations of organisms living in a particular habitat make a community.

vi. Name the ways by which we can save our natural resources.

Ans: How to Protect Habitats

Everyone can help protect habitats by saving the resources. Reducing, reusing, and recycling are three ways to save resources and protect ecosystem.

- **Reduce** means to cut down on the use of resources.
- **Reuse** means not to throw away things that can be used again.
- **Recycle** means to make new things from the used material.

1. What is a habitat? Describe its few kinds.

Ans: Habitat

The place where an animal or plant lives and reproduces is called its habitat. A habitat provides the things an organism needs, i.e. food, water, shelter, etc. Many populations of organisms live in each habitat.

Kinds of Habitats

Organisms live in different habitats. An organism has special features to live in its habitat.

1. The Pond Habitat

A pond is an aquatic habitat which is rich in life. Plants like algae, duckweed, water lily, etc. are found in water. The animals like fishes, pond skaters, wolf spiders, snails, frogs and microscopic organisms are also found in the pond habitat.

2. The Desert Habitat

Deserts are the driest land areas. They receive very little rainfall. Rainwater quickly drains away due to the sandy soil. Some plants and animals have adapted to the limited supply of water. Cacti, euphorbia, lizards, snakes, kangaroo rats, camels, etc. are found in a desert habitat.

3. The Grassland Habitat

Grassland is a grassy, windy, partly-dry area. These areas receive a medium amount of rain. The soil found here is very fertile. Grasses are the producers in a grassland habitat. Mostly grazing animals like the sheep, goats, cows, antelopes, buffaloes, and deer are a few examples that are found in a grassland. A few flesh-eaters like cheetahs, foxes, wolves and a few birds like owls, eagles, hawks, etc. are also found in this habitat. Many kinds of insects are also found in grasslands.

2. Describe factors that can bring daily and yearly changes in the habitat.

Ans: The Factors Causing Changes in a Habitat

Light, temperature, air, soil and water are abiotic factors of the environment. Changes in these factors bring changes in the populations of a habitat.

Sunlight is the basic source of energy on the Earth. Plants use light energy to make their own food. All forms of life on the Earth depend directly or indirectly on green plants for food. Light intensity affects the number of plants in a habitat.

Temperature can also bring change in the population of a habitat. Any extraordinary rise or fall in temperature may disturb the habitat.

Water is essential for life. Where there is more water, more organisms are found there. Availability of water in a habitat can greatly influence its organisms.

Natural disasters such as droughts, floods, earthquakes, etc. can bring changes in habitats.

A **drought** is a period when there is no rain for a long time in an area. Most pond plants and animals die or move to other ponds in case of a drought.

Sometimes **lightning** strikes a tree in a forest, causing forest fires. Plants and trees are burned and destroyed.

Some animals die, others may move to safer places.

Earthquakes are sudden shocks of the Earth's surface. Earthquakes can change a habitat very quickly.

3. Describe adaptations of some aquatic animals to live in their habitat.

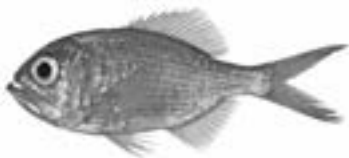
Ans: Adaptations

An **adaptation** is a change in the organism's body or behaviour that helps it to survive in its habitat. Organisms that are not well adapted to their habitats may not survive.

Aquatic Habitats

Animals and plants living in aquatic habitats have such body parts that help them to live in water.

1. Streamlined body shape is an important adaptation for animals to move easily through water.
2. Webbed feet of ducks, seagulls and frogs work like ores to help move in water.
3. Floating plants like water hyacinth, duckweed and water lily have floating leaves and submerged roots. Their bodies contain air spaces. Their leaves have waxy covering to prevent water from collecting on them.
4. **Explain a food chain and a food web with examples.**



The streamlined shape of a fish helps it to move in water.

Ans: Food Chains and Food Webs

Organisms eat organisms and are in turn being eaten by others. This feeding relationship among organisms is called a food chain. Most food chains start with producers like:

grass → zebra → lion

leaves → caterpillar → bird → hawk

Green plants are producers so, they are the first in most food chains. Animals that feed on plants are the second

in a food chain.

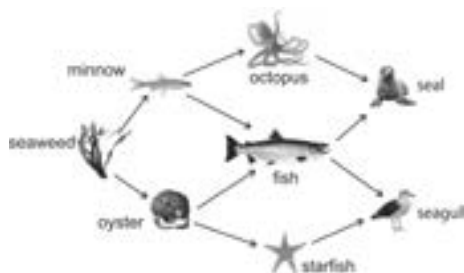
Food Web

An organism can be a part of many food chains. Several food chains in an ecosystem overlap to form a network called **food web**.

Example 1: A lion does not feed entirely on deer but it also hunts cows and goats. Similarly owl and hawk may also take different organisms as their food. So, most animals feed on one or more than one kind of animals. Therefore many food chains form a kind of network or a food web.

Science Fun

Look at the following food web and answer the questions given below.



- i. Name the producer in the food web.

Ans: seaweed

- ii. From where the producer gets energy?

Ans: The Sun

- iii. Name three consumers in the food web.

Ans: minnow, fish, oyster

- iv. Write down two food chains in this food web.

Ans: 1. Seaweed → minnow → fish

2. Seaweed → oyster → fish → seagull

**Unit
6****Reproduction in Plants****Exercise**

Complete each of the following sentences by writing the correct term.

- i. Large sheets of ice are called **glaciers**
- ii. The process of removal of impurities of water **purification of water**
- iii. Rivers, lakes and ponds are the sources of **fresh water**
- iv. Harmful and unwanted substances in water **water pollution**
- v. Toxic gases in the air react with rain water to make **acid rain**



Fill in the circle of the best option.

- i. **Drinking water sources can be contaminated by:**
☐ natural materials
☒ run-off from fields and roads
☐ forests ☐ mountains
- ii. **What percentage of the Earth's water supply is fresh water?**
☒ 3% ☐ 5%
☐ 10% ☐ 15%
- iii. **We can get the purest form of water:**
☐ by boiling water
☒ by distillation process
☐ from tube-wells ☐ from rivers

iv. Heavy mechanical complexes use a large amount of water for:

- | | |
|--|--------------------------------|
| <input checked="" type="radio"/> cooling | <input type="radio"/> freezing |
| <input type="radio"/> washing | <input type="radio"/> wasting |

v. Which one is not the source of water pollution?

- | | |
|------------------------------------|---|
| <input type="radio"/> human wastes | <input type="radio"/> industrial wastes |
| <input type="radio"/> fertilizers | <input checked="" type="radio"/> rain water |



Brain teasers.

i. Why is fresh water important?

Ans: • We drink fresh water.

- Plants need fresh water.
- Many animals and plants can only live in fresh water.

ii. Where is most of the fresh water found?

Ans: Most of the fresh water is found in glaciers. Glaciers are the large sheets of ice.

iii. Why is the most of the Earth's water salty?

Ans: About 97% of Earth's water is found in oceans. Water in the oceans has dissolved salts. That is why, most of the Earth's water is salty.

iv. If water runs downhill to the seas, what are some ways that fresh water becomes polluted?

Ans: During its downhill movement several harmful substances can mix with the fresh water. These harmful substances make the fresh water polluted.

1. Explain how water is the most essential part of life.

Ans: Water for Life

All living things need water to survive.

- Plants, fish, insects, birds and other animals all need water to grow.
- Green plants must have water to make food during

photosynthesis. Some plants and animals live only in water.

- Aquatic animals use oxygen dissolved in water. Aquatic plants use carbon dioxide dissolved in water.
- Our body also needs water. Water makes up about two-thirds of our body. Water helps us in several ways.
- Water helps to digest our food. It helps to remove waste products from our body.
- Water keeps our body cool in hot weather by sweating which is mainly water.
- We might be able to live for a month without food. But we cannot survive without water for more than a week

2. What makes our water impure?

Ans: Sources of Water Pollution

Here are some major sources of water pollution.

Human Wastes: People release sewage into drains which carry it to rivers. Sewage from houses contains fat, toilet wastes, food particles, detergents, harmful bacteria, etc. These human wastes not only cause diseases in human beings and also destroy aquatic life.

Industrial Wastes: Industries release a large number of toxic chemicals into rivers and canals. Smoke and toxic gases released from industries also cause the rain water to become **acid rain**. These chemicals can kill fish and other aquatic animals and plants.

Fertilizers: Farmers use fertilizers and pesticides in their crops. The rainwater carries these chemicals to water resources and cause water pollution. This polluted water is not fit for aquatic plants and animals.

3. How can we preserve water?

Ans: Conservation of Water

There is only a limited amount of fresh water on Earth, so we must save it.

- Turn off the tap when you brush your teeth or take water in a tumbler.
- Wash fruits and vegetables in a bowl. Don't wash dishes under running water.
- Only use washing machine with a full load.
- If you have a lawn, water it early in the morning or late in the afternoon.
- Check regularly the leaks in water pipes and get them repaired immediately.
- Paper mills, oil refineries, chemical industries heavy mechanical complexes and nuclear power plants should conserve water by:
 1. reducing water use.
 2. recycling of water.
 3. reusing water.

4. Describe a few methods to clean water.

Ans: How To Clean Water

The process of removing impurities from water is called **purification of water**. We can use following methods to purify water.

1.By Filtration

In laboratory, we can purify water by this method on small scale. Impure water is passed through a filter paper. Suspended particles and insoluble salts are left on the filter paper whereas clear water is obtained in the beaker.

2. By Boiling

Boiling is the safest way to purify water. In villages, people can easily use this method to purify their drinking water. Bacteria, germs and other microorganisms

present in water are killed by boiling water for 15 to 30 minutes. The water is cooled before drinking.

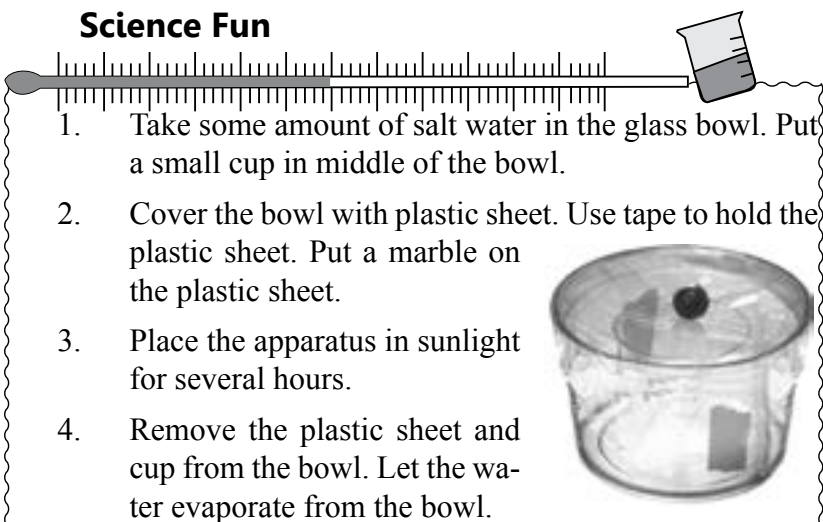
3. By Chlorination

If boiling is not possible we can add liquid house hold bleach to the water. Bleach contains chlorine. For this purpose, place the water in a clean container. Add proper amount of bleach or chlorine to make it pure.

4. Use of Potash Alum

We can add potash alum to the water to purify it. Sand, clay and other suspended impurities of water will settle down. Water will be pure after decantation.

Science Fun

- 
1. Take some amount of salt water in the glass bowl. Put a small cup in middle of the bowl.
 2. Cover the bowl with plastic sheet. Use tape to hold the plastic sheet. Put a marble on the plastic sheet.
 3. Place the apparatus in sunlight for several hours.
 4. Remove the plastic sheet and cup from the bowl. Let the water evaporate from the bowl.

Observe the bottom of the small cup and the bowl.

- i. What did you find in the bottom of the cup and the bowl?
- ii. From where did the water come in the cup?

Ans: i. We observed the salt in the bottom of the bowl.

ii. We observed clear water in the cup.

**Unit
7****Structure of an Atom****Exercise**

Complete each of the following sentences by writing the correct term.

- i. Two or more atoms of the same element with a different number of neutrons
isotopes
- ii. The atomic particle with no charge
neutron
- iii. It is the number of protons in an atom
atomic number
- iv. An atom with positive or negative charge
ion
- v. A molecule having one atom in it
mono atomic molecule



Fill in the circle of the best option.

- i. **An atom has no overall charge if it contains equal number of:**
 - ☐ electrons and neutrons
 - ☒ electrons and protons
 - ☐ protons and neutrons
 - ☐ positrons and neutrons
- ii. **Isotopes are found because atoms of the same element can have different number of:**
 - ☐ protons
 - ☒ neutrons
 - ☐ electrons
 - ☐ none of the above
- iii. **In the chemical formula CO₂, the subscript 2 shows which of the following?**

- ☐ There are two oxygen ions.
 - ☒ There are two oxygen atoms.
 - ☐ There are two carbon atoms.
 - ☐ There are two CO₂ molecules.
- iv. **The atomic number of flourine (F) is 9. Its mass number is 19. How many neutrons are present in its atom?**
- ☐ 7 ☐ 8
 - ☐ 9 ☒ 10
- v. **The number of electrons in N-shell can be:**
- ☐ 2 ☐ 8
 - ☐ 18 ☒ 32



Brain teasers.

- i. **What does give the positive charge to the nucleus of an atom?**

Ans: The presence of positively charged protons in the nucleus of an atom, gives it positive charge.

- ii. **Define a cation and an anion.**

Ans: • When an atom releases its one or more electrons from the outermost shell, the number of protons increases. The atom becomes a positive ion or cation.

- When an atom absorbs one or more electrons in its outermost shell, the number of protons decreases. The atom becomes a negative ion or anion.

- iii. **What is chemical formula?**

Ans: Describing a molecule in the form of symbols and valencies is called the chemical formula.

- iv. **List the names, charges and locations of three kinds of particles that make up an atom.**

Ans:

Name of particle	Charge	Location
proton	positive (+ve)	Nucleus
Neutron	nutral (No)	Nucleus
Electrons	negative	around the nucleus

v. **How are the isotopes of an element alike and how are they different?**

Ans: • Isotopes of an element are same, because they have equal number of protons, and electrons (atomic number).

- Isotopes of an element are different because they have different number of neutrons (mass number)

vi. **A chlorine atom has 17 protons and 18 neutrons. What is its mass number? What is its atomic number?**

Ans: Atomic number = 17

$$\text{Mass number} = 17p + 18n = 35$$

vii. **Why the electrical charge on an atom is zero, or neutral?**

Ans: The number of positively charged protons is equal to the number of negatively charged electrons. Neutrons have no charge. That is why, an atom is a neutral particle.

1. **Describe the structure of an atom.**

Ans: Structure of an Atom

Atoms are made of even smaller particles called electrons, protons and neutrons. The central part of the atom is called the **nucleus**. Protons and neutrons are present in the nucleus.

Electrons revolve around the nucleus. An electron has negative charge. Its mass is extremely small.

A **proton** has positive charge. The number of protons in an atom is equal to the number of electrons revolving around the nucleus. It has a mass 1837 times great-

er than that of electron.

A **neutron** has no charge. This neutral particle is also found in the nucleus of an atom. The mass of a neutron is almost equal to the mass of a proton.

2. What is an ion? How ions are formed?

Ans: Ion

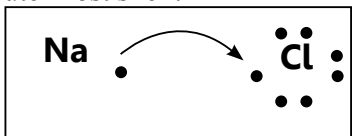
An atom with positive or negative charge is called an **ion**. For example, sodium ion (Na^+), chloride ion (Cl^-), oxide ion (O^{2-}), copper ion (Cu^{2+}), etc.

How are ions formed?

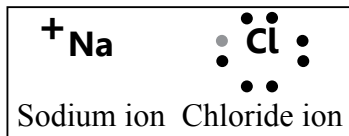
When an atom releases its one or more electrons from the outermost shell, the number of protons increases. It becomes a positive ion or **cation**. When an atom absorbs one or more electrons in its outermost shell, the number of electrons increases. It becomes a negative ion or **anion**. Positive ions and negative ions attract each other to form compounds. See the table. **Example**

How is sodium chloride (NaCl) formed?

1 One electron transfers from sodium atom to chlorine atom. Sodium atom has 1 electron in its outermost shell. Chlorine atom has 7 electrons in its outermost shell.



2 After losing one electron, sodium atom becomes sodium ion (Na^+). The chlorine atom gains one electron to become chloride ion (Cl^-).



3 Negative and positive ions attract each other to form sodium chloride (NaCl).



3. Define the term isotope. Write about the applications of isotopes in the fields of medicine and agriculture.

Ans: Isotopes and their Uses

The atoms of the same element having same atomic number but different mass numbers are called **isotopes**.

Isotopes are of great importance in the fields of medicine and agriculture.

1. **Carbon-14** is used to calculate the age of plants.
 2. **Nitrogen-15** is used to study the effects of nitrogenous fertilizers in plants.
 3. **Sodium-24** is used to study circulation of blood.
 4. **Phosphorus-32** is used in treatment of blood cancer and bone diseases.
 5. **Chromium-51** is used to study red blood cells in patients with blood deficiency.
 6. **Iron-59** is used to study absorption of iron in human body.
 7. **Cobalt-60** is used in cancer treatment.
 8. **Iodine-131** is used to treat a disease called goiter.
- 4. State The Law of Constant Composition and give examples.**

Ans: Law of Constant Composition

In the late 1700, a French scientist **Joseph Proust** studied the chemical compounds and presented The Law of Constant Composition. The law states that **the composition of a compound is always the same regardless of how the compound was made or obtained.**

Water can be obtained from many sources (river, well, sea, etc.), but its composition is always the same. There are 2 atoms of hydrogen and 1 atom of oxygen present in a molecule of water (H_2O).

Carbon dioxide (CO_2)

Science Fun

Make formulae of the following:

Silver chloride AgCl

Sodium oxide Na₂O

Aluminium chloride AlCl₃

Hydrogen sulphide H₂S

Magnesium fluoride MgF₂

Sodium phosphide Na₃P

**Unit
8****Physical and Chemical Changes
and Processes****Exercise**

Complete each of the following sentences by writing the correct term.

- i. A change in size, shape or state of matter
physical change
- ii. Results in new substances with different properties
Chemical change
- iii. Farmers use to increase crop production
fertilizers
- iv. A compound containing only carbon and hydrogen atoms
hydrocarbon
- v. A polymer that can be easily moulded
plastic



Fill in the circle of the best option.

- i. **Burning a match stick is an example of a:**
☐ physical change ☒ chemical change
☐ change in pressure ☐ change of colour
- ii. **Which one is a physical change?**
☐ frying an egg
☒ breaking a wooden stick
☐ burning of candle ☐ toasting bread
- iii. **An example of a chemical change is:**
☐ boiling of water ☐ evaporation of water
☒ burning of paper ☐ melting of ice
- iv. **The red colour of a rose turns brown. It is a:**

- ☐ physical change ☒ chemical change
- ☐ reversible change ☐ sudden change
- v. **The vegetable oil is changed into banaspati ghee (solid fat) by the addition of:**
 - ☐ nitrogen ☐ carbon
 - ☐ oxygen ☒ hydrogen
- vi. **A chemical change results in a:**
 - ☐ loss of matter ☐ solution
 - ☐ phase change
 - ☒ different kind of matter



Brain teasers.

- i. **What is meant by a physical change?**

Ans: A change in the state, size, shape or colour of a substance, is called a physical change.

- ii. **Define a chemical change.**

Ans: A change in which new substances are formed is called a chemical change.

- iii. **Give an example to show that people change the environment.**

Ans: To construct new roads and housing societies, people clear the land and cut forests. In this way, they change the environment.

- iv. **What is hydrogenation?**

Ans: The addition of hydrogen ion to oils in the presence of nickel, is called hydrogenation. the oil changes into solid fat.

- v. **What is a plastic?**

Ans: A plastic is any material that can be moulded into any form. It is a very large molecule or polymer.

1. **Explain with examples that a chemical change**

brings change in the properties of a substance.

Ans: Chemical Changes

A **chemical change** is one in which a new substance is formed.

- Chemical changes are permanent and are not easy to reverse.
- Burning of paper, rusting of iron, turning of milk into yogurt, cooking of food, etc. are some examples of chemical changes.
- Coal is carbon. When we burn coal, it changes into smoke, energy and ash. So, burning of coal is a chemical change because new substances are formed during this process.

2. Write brief notes on:

i. Plastics ii. Change of vegetable oil into fat

Ans: Plastics

Plastics are also the result of chemical changes. A **plastic** is any material that can be moulded into any form.

- Plastics are very large molecules made from many smaller molecules called monomers. That is why plastics are also called polymers (long molecules made from smaller molecules). Monomers are obtained from crude oil. Polyethylene, polyvinyl chloride (PVC), etc. are some examples of plastics.
- By heating, plastics can be moulded into a number of shapes, we can find it in toys, cups, bottles, utensils, etc. Plastics do not decay and therefore are a cause of pollution. Recycling is the best way to deal with pollution caused by plastics.

Change of Vegetable Oil into Fat

A chemical process called hydrogenation changes veg-

etable oil into solid fat (Banaspati ghee).

- When hydrogen is passed through vegetable oil in the presence of nickel, it converts into solid fat. This process is called hydrogenation.
- Vegetable oil is liquid while fat (ghee) is solid at room temperature. A large amount of heat is used to bring about this chemical change.

Vegetable oil + Hydrogen \longrightarrow Banaspati ghee (fat)

3. How are fertilizers useful and harmful for us?

Ans: Fertilizers

Farmers use certain substances to increase the fertility of the soil. A substance which adds minerals to the soil is called a fertilizer. It may be a natural fertilizer or a chemical fertilizer. Chemical fertilizers are prepared in factories. Many chemical changes take place during their preparation. Most fertilizers supply nitrogen (N), phosphorous (P) and potassium (K) elements to the soil (known as NPK).

Harmful Effects of Improper Use of Fertilizers

In case of excess spreading, some fertilizers are not absorbed by the plants. These fertilizers may reach into canals and rivers causing water pollution and encourage the growth of algae. During the manufacture of chemical fertilizers a lot of fossil fuel such as coal and natural gas is used, due to which our fossil fuel reserves are reducing quickly.

4. Explain reversible and irreversible changes with examples.

Ans: Reversible and Irreversible Changes

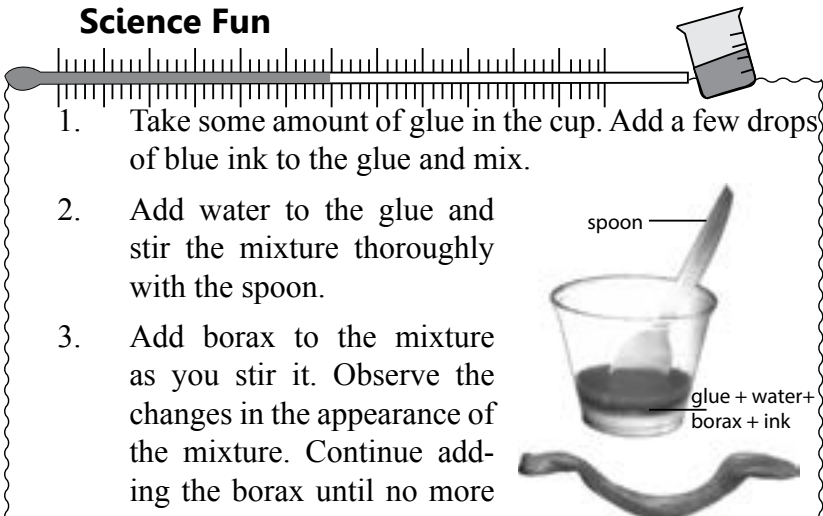
A change that can go forwards or backwards is called a reversible change. It is a temporary change. We can get the same thing again.

Examples: Melting of ice into liquid water, switching on a tube light, increase of heartbeat during running, mixing of salt in water, wetting a dry cloth, etc. are reversible changes.

- A change that cannot go back is called an **irreversible change**. It is a permanent change. We cannot again get the thing in its original form.

Examples: Turning of milk into yogurt, mixing of Plaster of Paris with water, burning of paper and wood, rotting egg or fruit, etc. are examples of irreversible changes.

Science Fun

- 
1. Take some amount of glue in the cup. Add a few drops of blue ink to the glue and mix.
 2. Add water to the glue and stir the mixture thoroughly with the spoon.
 3. Add borax to the mixture as you stir it. Observe the changes in the appearance of the mixture. Continue adding the borax until no more liquid is visible.
 4. Pick up the material and give it different shapes.
- Can you compare the new compound with plastic?.

Ans: Yes, the new compound can be compared with the plastic.

Unit 9

Transmission of Heat

Exercise



Complete each of the following sentences by writing the correct term.

- i. The transfer of heat by movement of molecules from place to place
convection
- ii. It can maintain the temperature of drinks
vacuum flask
- iii. The transfer of heat by direct contact of molecules
conduction
- iv. The surface which absorbs and radiates heat better
black



Fill in the circle of the best option.

- i. **When we sit in the sun we are heated by:**

<input type="radio"/> convection	<input type="radio"/> conduction
<input checked="" type="radio"/> radiation	<input type="radio"/> convection current
- ii. **Warm air rises because of:**

<input type="radio"/> light	<input checked="" type="radio"/> convection
<input type="radio"/> conduction	<input type="radio"/> radiation
- iii. **A metal spoon is placed in a cup of hot water. The spoon gets warm by:**

<input checked="" type="radio"/> conduction	<input type="radio"/> convection current
<input type="radio"/> radiation	<input type="radio"/> convection
- iv. **In a vacuum flask, the vacuum prevents the transfer of heat by:**

<input checked="" type="radio"/> conduction	<input type="radio"/> convection
<input type="radio"/> radiation	<input type="radio"/> air
- v. **When warm water rises in a lake and cold water sinks, what is happening?**

- ☐ conduction ☒ convection
- ☐ radiation ☐ mixing
- vi. **Heat energy can be transferred well by conduction from one material to another only if both are:**
 - ☒ solids ☐ liquids
 - ☐ gases ☐ all the three
- vii. **Which colour is a good reflector of heat?**
 - ☐ red ☐ black
 - ☐ blue ☒ white



Brain teasers.

- i. **Why do we use cooking pots made of metals?**

Ans: Metals are good conductors of heat, so we use metal cooking pots to cook food.

- ii. **What is a convection current?**

Ans: The upward and downward movement of molecules of water or particles of air due to heat is called a convection current.

- iii. **Which surfaces do absorb maximum heat?**

Ans: Dark-coloured surfaces absorb maximum amount of heat from their surroundings.

- iv. **Why do we use woollen clothes and blankets during winter days?**

Ans: Woollen clothes and blankets slow down the transfer of heat because they trap air inside them. The air is a bad conductor of heat. We feel warm in woollen clothes and blankets during cold winter days.

- v. **What is the advantage of gliding flight for a bird?**

Ans: A lot of energy of birds is saved during gliding. They do not move their wings up and down during such flight. They rest on convection currents of air.

1. **What is convection? How does it occur?**

Ans: Convection

The transfer of heat in which molecules of a medium actually move to the source of heat energy to absorb heat and then move away from it, is called **convection**.

How convection occurs

Convection occurs in liquids and gases only because their molecules can move freely. The molecules of a solid are held closely together. They cannot move freely, therefore, convection is not possible in solids.

The upward and downward movement of molecules of water or air is called a **convection current**.

Winds

Winds and ocean currents are examples of effects of convection.

The heat of the Sun heats up the surface of the Earth and the air near it also gets hot. The air expands and gets lighter, therefore, it rises. Ocean currents are also set up due to convection of heat. Water of the hot regions of an ocean gets hot, it expands and gets lighter, but water in the colder regions remains cold and heavy. Hot water moves along the surface of the ocean towards the colder regions. The cold water flows below the surface of the ocean towards the hot regions. In this way, ocean currents are set up.

2. Write a few everyday applications of conduction of heat.

Ans: Everyday Applications of Conduction of Heat

Conduction plays an important role in our lives.

1. Cooking utensils, electric kettle, iron, soldering iron, etc. are made of metals to conduct heat quickly. Their handles are made of plastic or wood which are bad conductors.
2. Woolen clothes and blankets slow down the transfer of heat. It happens so because the wool traps air in it. The air is a bad conductor of heat.
3. Double-pan windows are used in buildings to slow the transfer of heat. Air between the two layers of

glass acts as an insulator.

4. Thermos bottles use air or a vacuum to slow the transfer of heat by conduction.

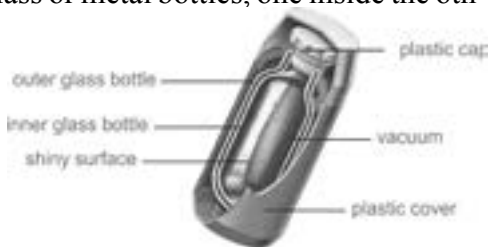
3. Write a note on a vacuum flask.

Ans: The Vacuum Flask

The vacuum flask is a container which can keep hot things hot and cold things cold. The vacuum flask reduces the rate of transfer of heat by all the three ways, i.e. conduction, convection and radiation.

Explanation: The vacuum flask (thermos flask) is actually two thin glass or metal bottles, one inside the other. Air between the glass walls is removed to create vacuum. The vacuum prevents the transfer of heat by **conduction**

and **convection**. The walls of both bottles are coated with aluminium on the vacuum side. These silvered (like a mirror) and smooth glass walls prevent transfer of heat by **radiation**. The mouth of the flask is made from a bad conductor such as cork or plastic. A little amount of heat may be lost by conduction through the mouth. The thin walled glass bottle is protected by keeping it in a metal or plastic container.



4. Write brief notes on:

- i. Ocean currents and winds
- ii. Gliding flight of birds

Ans: Ocean currents and winds

Winds and ocean currents are examples of effects of convection.

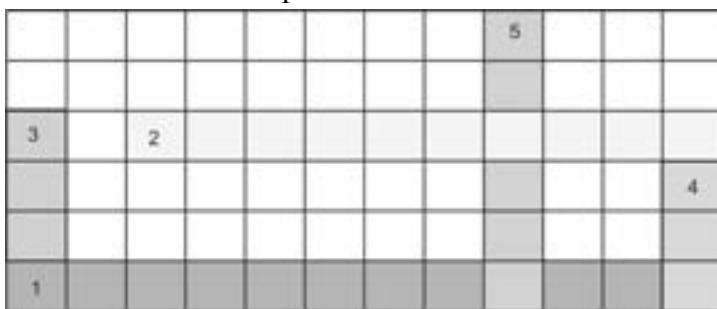
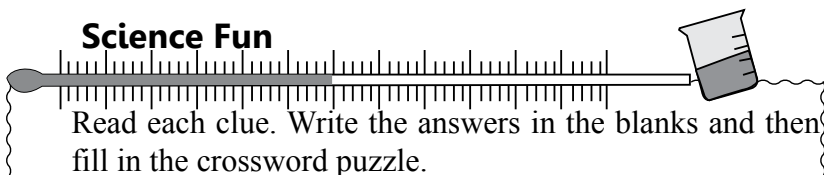
The heat of the Sun heats up the surface of the Earth and the air near it also gets hot. The air expands and gets lighter. Ocean currents are also set up due to convection of heat.

Water of the hot regions of an ocean gets hot, it expands and gets lighter, but water in the colder regions remains cold and heavy. Hot water moves along the surface of the ocean towards the colder regions. The cold water flows below the surface of the ocean towards the hot regions. In this way, ocean currents are set up.

The Gliding Flight of Birds

Convection currents also take place in atmosphere. The heat from the Sun warms the air near the ground. The warm air expands and becomes lighter in weight. As warm air rises, colder air rushes in to fill its place near the ground. This process continues. Birds like eagles, hawks, vultures and gulls take advantage of this phenomenon. They enjoy gliding. During gliding flight a bird does not move its wings, but glides on air currents. A lot of energy of birds is saved during gliding.

Science Fun



Across

1. The flow of energy through a liquid or a gas convection
2. The flow of energy by direct contact conduction
5. Good conductors of heat Metals

Down

3. Transfer of thermal energy Heat
4. Major source of heat Sun

**Unit
10****Dispersion of Light****Exercise**

Complete each of the following sentences by writing the correct term.

- i. The bending of light, when it enters from one medium to another
refraction of light
- ii. The angle of incidence at which maximum refraction occurs
critical angle
- iii. The ratio of the speed of light in vacuum to its speed in another medium
refractive index
- iv. The splitting of white light into its component colours
dispersion of light



Fill in the circle of the best option.

- i. **When a light ray passes from one medium to another at an angle:**
☐ reflection occurs ☒ refraction occurs
☐ refraction does not occur
☐ reflection does not occur
- ii. **Which of the following objects does not refract light?**
☐ a microscope ☐ a magnifier
☐ a camera ☒ a mirror
- iii. **The splitting of white light into its component colours is called:**
☒ dispersion of light ☐ reflection of light

- ☐ total internal reflection ☐ mirage

iv. A ray of light strikes at an angle on one side of a rectangular glass block.



Which diagram shows the right path of the light ray?



v. We see a mirage due to the:

- ☐ reflection of light
☒ total internal reflection
☐ dispersion of light
☐ refraction of light

vi. A coin in the bowl becomes visible when water is added. It is because of:

- ☐ reflection of light ☒ refraction of light
☐ total internal reflection ☐ dispersion of light

Brain teasers.

i. What happens, when light travels from glass into air at an angle?

Ans: When light travels from glass into air at an angle it moves away from the normal. the angle of refraction is greater than the angle of incidence.

ii. What is refractive index?

Ans: Refractive index is the ratio of the speed of light in vacuum to its speed in the medium.

iii. How can you calculate the refractive index of water?

Ans: We can calculate the refractive index of water by using the following equation.

$$\text{Refractive index (water)} = \frac{\text{Speed of light in water}}{\text{Speed of light in vacuum}}$$

iv. What happens when the primary colours of light are mixed in equal proportions?

Ans: When primary colours of light are mixed in equal proportion, white light is obtained.

v. Why do we see colours of different objects?

Ans: Every object reflects the particular colour of light into our eyes. For example, green grass reflects green colour of light and it looks green.

vi. Define critical angle.

Ans: The angle of incidence whose relevant angle of refraction is 90° , is called the critical angle.

vii. State the laws of refraction.

Ans: Laws of Refraction

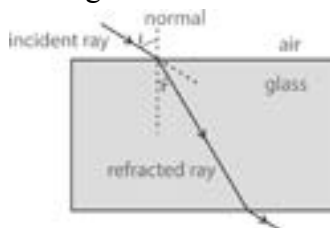
There are two laws of refraction:

1. The incident ray, the refracted ray and the normal at the point of incidence, all lie in the same plane.
 2. The ratio of the speed of light in vacuum to its speed in another medium is always constant.
- 1. Define refraction of light. Discuss the effects of refraction with examples.**

Ans: Refraction

Light travels at different speeds in different mediums. Light travels the fastest through the vacuum.

When light passes from one transparent medium to another, it changes its speed and direction (or bends). This bending of light is called **refraction**. But, when light falls perpendicular to the surface of the medium, it does not change its direction.



Examples of Refraction

You may have seen some of these scenes around you:

- the shallow bottom of a water tub which is actually deep
- a puddle of water on the road on a hot, sunny day
- a beautiful rainbow in the sky after rain

All these scenes are the result of refraction of light.



2. Define total internal reflection. Explain the phenomenon of mirage.

Ans: Total Internal Reflection

When light passes from glass or water to air (denser to rarer medium), it bends away from the normal. But when angle of incidence (i) is greater than the critical angle ' C ', the light rays reflect in the same denser medium. This phenomenon is called total internal reflection.

Total internal reflection takes place only when:

1. Light passes from a denser medium (water or glass) to a rarer medium (air).
2. The angle of incidence of all rays must be greater than the critical angle of that denser medium.

Mirages

A **Mirage** is an image of some distant object which appears to us due to the refraction and total internal reflection of light.

The air higher up is cooler than the air near the road. Light travels faster when it reaches the warmer air. The light rays bend as they travel downward due to refraction. Near the ground where air is even more warm, the

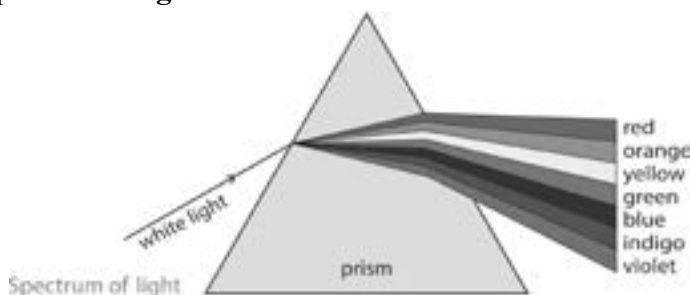
light rays travel almost parallel to the ground but continue to bend in other direction (total internal reflection). When we see these bending light rays, our brain assumes that the rays have travelled in a straight line. These rays seem to us as reflecting from water. As a result, we see a mirage. Desert travelers often observe mirages.

3. What is dispersion of light? Why does white light get dispersed?

Ans: Dispersion of Light

Sunlight is often called white light, although it is a combination of different colours. We can see these colours in a rainbow. These colours are red, orange, yellow, green, blue, indigo and violet.

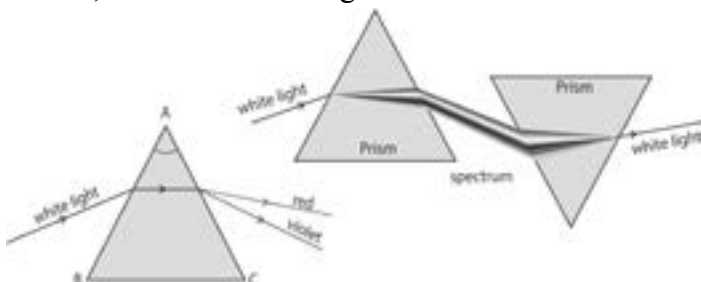
We can also split white light into its colours by passing it through the prism. The band of seven colours obtained is called **spectrum** of white light. The splitting of white light into its component colours is called **dispersion of light**.



Why does White Light get Dispersed?

When a beam of light enters a prism, all the colours of white light refract at different angles— it causes the white light to split into its component colours. Red light bends the least. Violet light bends the most and refracts by the largest angle. In this way, white light disperses into its component colours. When this spec-

trum is again passed through another prism as shown below , a beam of white light is obtained.



Science Fun

1. Take a short, opaque plate and place a coin at its bottom.
2. Position yourself in such a way that the coin is just not visible to you.
3. Ask your partner to pour water into the plate until you can see the coin clearly.

What happens?

When the coin is not visible to you, the rays of light travelling from the coin in a straight line are not able to enter your eyes.

These rays are blocked by the edge of the



plate. As soon as water is poured in the plate, the change of medium occurs. Now light has to travel from water into air. Due to refraction of light it bends to enter your eyes. The coin is now visible to you due to refraction.

**Unit
11****Sound Waves****Exercise**

Complete each of the following sentences by writing the correct term.

- i. The lower portion of a transverse wave **trough**
- ii. The highness or lowness of a sound **pitch**
- iii. The distance a wave covers in one second **speed**
- iv. A compression and a rarefaction combine to form **longitudinal wave**
- v. A material thing through which a wave travels **medium**



Fill in the circle of the best option.

- i. **When a wave travels through a medium:**
 - ☐ particles are transferred from one place to the other
 - ☒ energy is transferred from one place to the other
 - ☐ particles and energy both are transferred from one place to the other
 - ☐ nothing happens
- ii. **The speed of sound in air is:**
 - ☐ greater than that of light
 - ☐ 100 kilometres per hour
 - ☐ 100 metres per hour
 - ☒ 330 metres per second

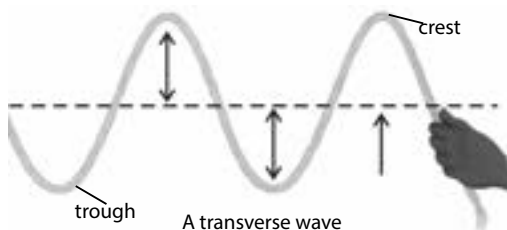
- iii. A sound wave is a:
- ☐ transverse wave ☒ longitudinal wave
 - ☐ standing wave
 - ☐ sometimes transverse and sometimes longitudinal
- iv. **Objects that vibrate slowly have a pitch that is:**
- ☐ high ☐ loud
 - ☐ soft ☒ low
- v. **Sound waves travel more quickly through:**
- ☒ solids ☐ gases
 - ☐ space ☐ liquids



Brain teasers.

- i. **Sketch a transverse wave and label a crest, a trough, a wavelength, and amplitude.**

Ans:



- ii. **Define the wavelength of a longitudinal wave.**

Ans: The distance between two adjacent compressions or rarefactions, is called the wavelength of a longitudinal wave.

- iii. **Name a few devices that use different sounds in our everyday life.**

Ans: We use many devices which produce different sounds. For example, the sound of a doorbell tells us that someone is at the door. Sirens, telephones, radios, security system alarms, smoke detectors and stereo players, etc. produce different sounds.

iv. What makes some sounds louder than others?

Ans: Amplitude makes some sounds louder than other.

v. What is the relationship between frequency and pitch?

Ans: Pitch and frequency of a sound are directly proportional to each other. The higher the frequency, the higher the pitch is.

vi. How does sound travel?

Ans: Sound travels through some medium. The medium can be a solid (metal wire), liquid (water) or gas (air).

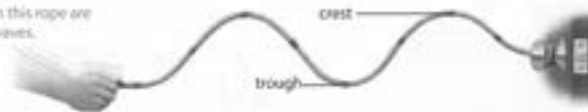
1. Compare transverse waves and longitudinal waves.

Ans: Transverse Waves

A wave in which particles of the medium move perpendicularly to the direction of the wave is called a **transverse wave**. Waves that are produced in water are transverse waves.

- The part of the transverse wave where the particles of the medium are above the normal position is called **crest**, while the part of the wave below the normal position is called **trough**.

The waves in this rope are transverse waves.



Longitudinal Waves

A wave in which particles of a medium move back and forth, parallel to the direction of the wave is called a **longitudinal wave**.

The parts of a longitudinal wave, where particles of the medium are compressed together, are called **compressions**. The parts of a longitudinal wave, where particles of the medium are spread out, are called **rarefactions**.

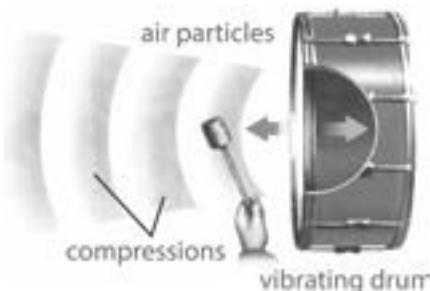
2. What type of waves are sound waves, and how do they transfer sound energy?

Ans: Sound Waves

A sound wave traveling through air is an example of a longitudinal wave.

When a drummer beats a drum, the surface of the drum vibrates and creates a disturbance in the air beside it.

When the drumhead moves to the left, it compresses the particles of air and creates a compression. When the drumhead moves to the right, the particles of the air on the right move farther apart, creating a rarefaction. These compressions and rarefactions travel through the air as longitudinal waves. When the disturbance in the air reaches our ears, we hear the sound of the drum.



3. Describe loudness and pitch of the sound.

Ans: Pitch and Loudness

Pitch

The voice of a girl is more shrill than the voice of the boy. This difference is due to the pitch. A shrill sound is called a high pitch sound, whereas a less shrill sound is called a low pitch sound. Pitch is the highness or lowness of a sound. Pitch of the sound depends on the frequency of the sound wave. The higher the frequency, the higher the pitch is.

Loudness

Sometimes, we need to shout in a louder voice. We have to use an extra energy. Loudness is related to the

amplitude of a sound. The larger the amplitude, the louder the sound. Loudness helps us to distinguish a soft sound from a loud sound of the same frequency.

4. Write brief notes on:

(i) Audible frequency range (ii) Speed of sound

Ans: Audible Frequency Range

The word audible means 'able to be heard'. Our ears cannot hear sounds of all frequencies. The range of frequencies which a person can hear is known as **audible frequency range**.

A healthy human ear can hear sounds of frequencies from 20 Hz to 20,000 Hz. It is the audible frequency range for humans. Different animals have different audible frequency ranges.

Audible Frequency Ranges of Different Animals			
Animals	Frequency range (Hz)	Animals	Frequency Range (Hz)
dog	20--45,000	dolphin	150-- 150,000
cat	45 -- 64,000	bat	2,000 -- 110,000
cow	23 -- 35,000	elephant	1 -- 20,000


Speed of Sound

Light travels much faster than sound. Different waves travel at different speeds. The distance a wave covers in unit time is called its speed. Speed is measured in metre per second. Sound travels at different speeds in different mediums.


Audible Frequency Ranges of Different Animals		
Medium	State of matter	Speed (m/sec)
air	gas	330
water	liquid	1,500
brick	solid	3,600

wood	solid	3,800
steel	solid	6,000

Science Fun



- Rotate the wheel of your bicycle as shown in the figure.
- Touch a piece of cardboard to the spokes of the rotating wheel and listen to the sound produced.
- Now increase the speed of rotating wheel and again listen to the sound produced.



We observe that on increasing the speed of the wheel, the sound becomes more shrill due to increase in its frequency. In other words we can say that the **pitch** of the sound has increased.

**Unit
12****Sound Waves****Exercise**

Complete each of the following sentences by writing the correct term.

- i. The circuit provides only one path for the current
series circuit
- ii. One unit on our electricity meter
kilo watt hour (kwh)
- iii. The unit of potential difference
volt
- iv. The unit of electric current
ampere



Fill in the circle of the best option.

- i. **Electric current is the:**
☐ flow of atoms ☐ flow of protons
☒ flow of electrons ☐ flow of neutrons
- ii. **The potential difference in a circuit between two points is measured in:**
☒ volts ☐ amperes
☐ watts ☐ coulombs
- iii. **Which one is an insulator?**
☐ copper ☒ glass
☐ iron ☐ aluminium
- iv. **Resistance of a conductor depends on:**
☒ thickness of the wire ☐ length of the pipe
☐ voltage of the electrical source
☐ speed of the flow of charges
- v. **The device to measure potential difference in a circuit is called:**
☐ ammeter ☒ voltmeter
☐ barometer ☐ thermometer

vi. When there are more than one path for a current to flow, the circuit is called:

- | | |
|--------------------------------------|---|
| <input type="radio"/> series circuit | <input checked="" type="radio"/> parallel circuit |
| <input type="radio"/> open circuit | <input type="radio"/> closed circuit |



Brain teasers.

i. What is an electric current?

Ans: The flow of charges through a conductor is called an electric current.

ii. What causes the current to flow in an electrical circuit?

Ans: Potential difference causes the charges to flow in an electrical circuit.

iii. What are the functions of an ELCB?

Ans: An ELCB is an electromagnetic switch. It quickly turns off the power when the current flowing through the Earth wire exceeds the limit. If some one tries to use a faulty electric appliance, an ELCB breaks the circuit at once.

iv. Compare fuses and circuit breakers. Which one is easier to use?

Ans: Fuses and circuit breakers are used for the same purpose. But, replacing the blown out fuse again and again is not a pleasant experience. A circuit breaker works like a fuse, but it does not blow out. It just breaks the circuit by tripping.

v. What is the main difference between a series circuit and a parallel circuit?

Ans: In a series circuit, there is only one path for the current to flow. In a parallel circuit, there are more than one paths for the current to flow.

vi. How does increasing the potential difference affect the current?

Ans: By increasing the potential difference, we can experience the flow of charges for a longer time. Charge will flow as long as there is a potential difference between the two points.

1. Describe series and parallel circuits in detail.

Ans: Electric Circuits

An electric circuit is a complete path along which charges flow.

There are two main kinds of circuits, i.e. series circuits and parallel circuits.

Series Circuits

If all the components are connected one after another in a single loop, then it is a series circuit. In a series circuit, there is only one path for the current to flow. The amount of current which flows through each component (bulb) of the circuit is the same.



A series circuit provides only one path for the flow of current.

Disadvantage of the Series Circuits

There is a disadvantage of the series circuit:

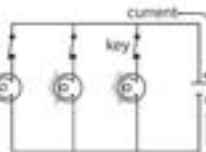
- There is only one path for the current to flow. A break at any part of the circuit stops the flow of current in the whole circuit.

Parallel Circuits

If the components are connected in two or more loops, then it is a parallel circuit. In a **parallel circuit**, there are more than one path for the current to flow. The current flowing through different branches of a parallel circuit may be the same or different. But the current in each branch is less than the total current flowing out

from the electrical source (battery).

In a parallel circuit, there are more than one path for the current to flow.



Advantage of a Parallel Circuit Over a Series Circuit

A parallel circuit has an advantage over a series circuit.

- There are more than one path for the current to flow. A break in any branch of the circuit stops the current flowing through that branch only.

2. Explain heating and chemical effects of the current.

Ans: Effects of an Electric Current

We can see several effects of electrical energy in our everyday life.

Heating Effect of Current

When electric current flows through a metal wire, it makes it hot. Light is also produced when a wire becomes very hot. We use many appliances in our homes that convert electric current to heat.

Chemical Effect of Current

An electric current can chemically affect the materials. When a current flows through a solution, it can break up the solution into its components. This process is called **electrolysis**. Electricity is also used to coat a metal object with a thin layer of another metal. This process is called **electroplating**.

3. Write notes on:

- Resistance
- Electrical Power
- MCBs (Miniature Circuit Breakers)

Ans: i. Resistance

Electric current flows through some things better than others do. The measurement of how well something conducts electricity is its resistance.

Resistance is the hindrance to the flow of current. During

its journey through an electric circuit, the charges collide countless times with atoms within the conductor (wire). It creates resistance. The unit of resistance is **ohm**.

The resistance of a wire depends on **length of the wire** and **thickness of the wire**.

ii. Electrical power

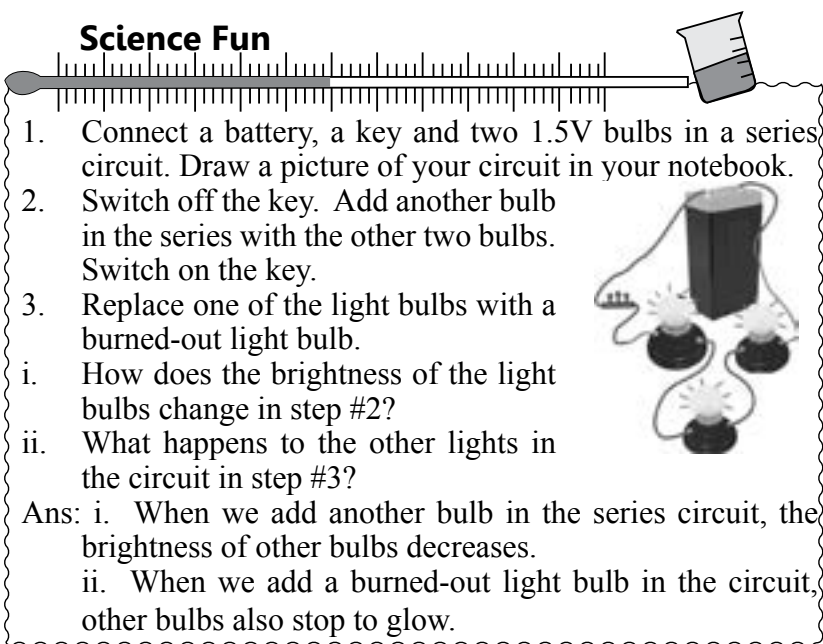
Electrical power is the rate at which a device converts electrical energy into another form of energy. Its unit is watt (W).

One **kilowatt-hour (kWh)** is the amount of energy used up when an electrical appliance of 1,000 watt works for 1 hour.

MCBs (Miniature Circuit Breakers)

Replacing the fuse again and again is not a pleasant experience. An MCB is a small electromagnet switch that works like a fuse but it does not blow out. It just breaks the circuit by tripping.

Science Fun

- 
1. Connect a battery, a key and two 1.5V bulbs in a series circuit. Draw a picture of your circuit in your notebook.
 2. Switch off the key. Add another bulb in the series with the other two bulbs. Switch on the key.
 3. Replace one of the light bulbs with a burned-out light bulb.
 - i. How does the brightness of the light bulbs change in step #2?
 - ii. What happens to the other lights in the circuit in step #3?

Ans: i. When we add another bulb in the series circuit, the brightness of other bulbs decreases.
ii. When we add a burned-out light bulb in the circuit, other bulbs also stop to glow.

**Unit
13****Sound Waves****Exercise**

Complete each of the following sentences by writing the correct term.

- i. An oval-shaped galaxy is called **elliptical galaxy**
- ii. A cluster of stars with a definite pattern **constellation**
- iii. A large group of stars, gas, and dust **galaxy**
- iv. The last stage of a low-mass star's life **black dwarf**
- v. A device that is able to make far away objects appear close **telescope**



Fill in the circle of the best option.

- i. **Star distances are usually measured in:**
☐ metres ☐ kilometres
☒ light-years ☐ yards
- ii. **Bright stars may appear dimmer than others because they are:**
☐ older ☒ farther away
☐ younger ☐ closer to the Earth
- iii. **The last stage in the life of a massive star is:**
☒ black hole ☐ black dwarf
☐ white dwarf ☐ red giant
- iv. **When great amount of energy is produced in a protostar, then a protostar is called:**

- ☐ a supergiant ☒ a star
- ☐ a neutron star ☐ a black hole
- v. **A cluster of stars present in a nebula include red stars, blue stars, yellow stars and white stars. Which stars are most like the Sun?**
 - ☐ red ☒ yellow
 - ☐ blue ☐ white
- vi. **Our neighbouring galaxy is named as:**
 - ☐ Cepheus ☒ Andromeda
 - ☐ Canis Major ☐ Taurus

**Brain teasers.**

- i. **Are blue stars young or old? How can you tell?**

Ans: Blue stars are the hottest stars in the universe. They emit greater amounts of heat and light as compared to red, yellow and white stars. We can say that blue stars are younger, because older stars have lost much of their energy.

- ii. **Name one observation that supports the Big Bang Theory.**

Ans: Edwin Hubble found that distant galaxies in every direction are going away from us with a very high speed. This observation is acceptable if the universe began in a huge explosion.

- iii. **List in order, the four stages in the life cycle of a low-mass star.**

Ans: i. Nebula ii. protostar iii. red giant
iv. white dwarf v. black dwarf

- iv. **How do constellations differ from galaxies?**

Ans: A constellation is a pattern in which we see a few stars.

A galaxy is a group of billions of stars, nebulae, planets and dust, etc.

v. How do scientists think the universe began?

Ans: Scientists think that the universe began with a tremendous explosion called the Big Bang. This explosion started the expansion of the universe.

vi. What type of star ends its life cycle as a black hole?

Ans: A massive star ends its life cycle as a black hole.

vii. For how many years will the Sun be a red giant?

Ans: Brightness of Stars

The brightness of a star depends on two factors:

1. distance of the star from the Earth
2. amount of energy the star emits

viii. On which factors does the brightness of a star depend?

Ans: A light year is a measure of distance that light covers in one year with a speed of about 300,000 kilometres per second.

ix. What is a light-year?

Ans: A light-year is a measure of distance that light covers in one year with a speed of 300,000 kilometres per second.

x. What galaxy our Sun belongs to?

Ans: Our Sun belongs to the Milky Way galaxy.

1. Explain the Big Bang Theory of the origin of the universe.

Ans: The Big Bang Theory

According to Islam and other Ibrahimic religions, universe was created by Allah (Almighty). According to the Holy Quran, Allah (Almighty) said **كُنْ** and the universe was created (**فَيَكُونُ**). Scientists have been presenting different theories of creation of the universe from time to time. One of these theories is “**The Big Bang Theory**”. According to this theory:

- About 10 to 20 billion years ago, the universe was packed into one giant fireball. Then a tremendous ex-

plosion started the expansion of the universe. This extraordinary explosion is known as the Big Bang. This explosion hurled matter and energy in all directions.

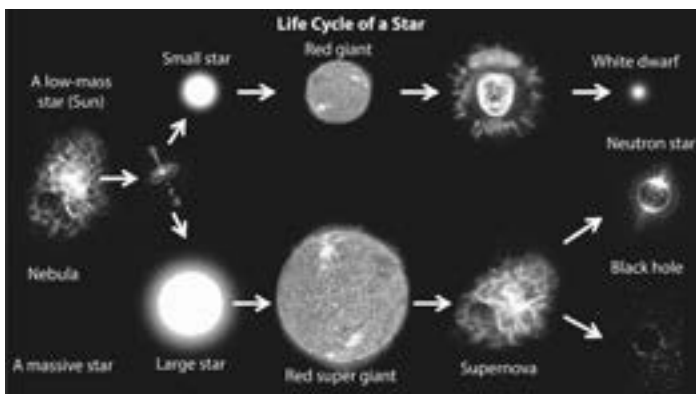
- After the Big Bang, the universe assumed the form of huge clouds of extremely hot, expanding and contracting gases. With the passage of time, stars and galaxies are formed.

The Big Bang theory was first proposed in 1927 by a priest, George Lamaitre of Belgium. This theory was supported by the discoveries of Edwin Hubble and Nobel Prize-winning scientists Arno Penzias and Robert Wilson.

2. Describe the life cycle of a low-mass star.

Ans: The Life of Stars

Science has told us that the universe is finite, with a beginning, a middle and a future. Stars have life cycles too. A star is also born, changes, and then dies. The lifespan of a star is measured in billions of years.



Birth of a Star

We have studied that great clouds of gasses and dust are present in galaxies. Each of these clouds is called a **nebula**. Stars are born in nebulae (singular nebula). A nebula collects more dust and gas during its travel through space. The gas and dust particles are packed

into a hot spinning ball of matter. Such a ball of hot matter is called a protostar. With the passage of time, a protostar becomes hot enough to produce great amount of energy. At this stage a protostar is called a **star**. A star like the Sun emits light and heat all the time.

Death of a Star

The matter of a star is converting into energy. This radiant energy is released into space. Our star (the Sun) is dying. Let us see, how:

Red Giant Stage

Our star (the Sun) has passed five billion years while emitting energy. After the next five billion years, the hydrogen in the core of the Sun may be used up. The Sun will start to collapse. Its core will become denser and hotter and the Sun will swell in size. It will become a **red giant**. The Sun will be a red giant for only about 500 million years.

Dwarf Stage

By and by the Sun in the form of red giant will cool and gravity will make it collapse inward. Our star will become a **white dwarf** at this stage. Eventually, the Sun will become a burn-out black chunk of very dense matter. It will not emit light any more. This last stage of a star's life is called a **black dwarf**.

3. Describe the three main types of galaxies.

Ans: Galaxies

A galaxy is a very large group of stars, nebulae, gases, dust and planets. A galaxy may contain billions of stars. Our solar system is the part of the Milky Way galaxy.

There are many types of galaxies in the universe. Scientists classify galaxies in three main types on the basis of shape.

Spiral Galaxies

A galaxy that has a flat disklike shape with a bulge in the centre is called a spiral galaxy. Spiral galaxies may have a few or many spiral or curved arms. A large amount of dust and gases is present in these galaxies. The Milky Way and Andromeda are spiral galaxies.

Elliptical Galaxies

These are oval shaped galaxies. These galaxies do not rotate as spiral galaxies around their axis. An elliptical galaxy contains less amounts of dust and gases as compared to a spiral galaxy. Trillions of stars may be present in an elliptical galaxy. New stars cannot form in most elliptical galaxies. Most of them contain only old stars.

Irregular Galaxies

These galaxies have no definite shape. The stars in an irregular galaxy do not appear to be grouped in any set shape. These galaxies have many shapes and sizes. The Clouds of Magellan, is an irregular galaxy. It is a very small galaxy near the Milky Way. These galaxies are not very common.

- 4. Write notes on:** **i. Star Distances**
 ii. Safety methods to use when observing the Sun

Ans: Star Distances

The stars are very far away from us. They are also at great distances from each other. Distances between stars are so great that they cannot be measured in kilometres. Instead, we use light-years to express the distance in the universe.

A **light-year** is a measure of distance that light covers in one year with a speed of 300,000 kilometres per second. It seems that a light-year is a very long distance. The Sun is our closest star in our galaxy. The next closest star Proxima Centauri is 4.2 light-years away from us. We can also say that light of this star will take 4.2 years to reach the Earth.

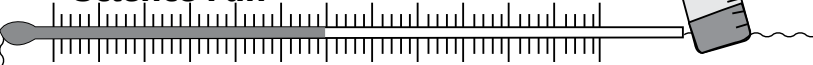
Safety Tips for Observing the Sun

The Sun emits dangerous radiation. Viewing directly into the Sun can damage our eye sight. Make sure the safety of your eye before viewing the Sun.

1. A pinhole or small opening is used to view the image of the Sun on a screen placed a half metre or more beyond the opening.
2. Use two or three sheets of X-Rays film for viewing the Sun.

Remember! No filter is safe for use with any optical device, i.e. telescope, binoculars, etc.

Science Fun

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1. Join the thin lens on one end of the small tube with the help of scotch tape.
 2. Now join the thick lens on one end of the large tube with the help of scotch tape.
 3. Slide the open end of the small tube into the large tube to make a telescope (see the picture).
 4. Hold your telescope, and look at an object through one lens. Then turn the telescope around, and look through the other lens. Slide the small tube in and out of the large tube to focus the object.
 - i. What did you observe as you looked through thin lens and thick lens?
 - ii. Using your observations, tell which lens you should look through to observe the stars.



Ans: i. The thick lens makes the objects to look more close than through a thin lens.

A thick lens has greater focal length as compared to a thin lens.

ii. We can use both the lenses in combination observe the stars.