TEACHING GUIDE 5

The SCIENCE Factor

FOR PRIMARY CLASSES

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INTRODUCTION

About this series

This science series has been painstakingly written, edited, and published with one aim in mind: to provide primary school students in Pakistan with a comprehensive, engaging, informative, and entertaining experience while learning about science.

The contents follow the guidelines provided by the Cambridge International Primary Programme and the UK National Curriculum for General Science.

Some students can find the idea of studying science an ordeal. They may have been exposed to learning materials that are too dry and dense: providing basic information without considering the learning needs of today's students. We have spent as much effort in making sure our series engages the student as we have on ensuring the accuracy and relevance of the content, making this an outstanding work in all respects.

Salient features of the series

- **consistent with the nature of learning**

  This series stimulates students' curiosity and develops their interest in learning. It also provides them with activities that facilitate their capacity for problem solving and enable them to learn more about themselves and the world around them.

- **coherent**

  The ideas within this series have a logical and natural connection with each other. There is a progressive articulation of concepts, skills, and content that prepares students to understand and use more complex concepts as they advance through the learning process.

- **developmentally appropriate**

  In accordance with providing for all areas of a child's development (i.e. physical, social, emotional, linguistic, aesthetic, and cognitive), this series provides for:

  - active exploration of the environment
  - self-directed and hands-on learning activities
  - balance between individual and group activities
  - regular and supportive interaction with teachers and peers
  - balance between active movement and quiet activities.

- **comprehensive**

  A great deal of work has gone into ensuring that students who work their way through this series end up with a sound knowledge of basic scientific principles that will put them in good stead for later learning, and indeed for when they have completed their formal education.

- **feasible**

  The combination of a student text, workbook, interactive digital resources, and teacher's guide make learning and teaching feasible and accessible, without the need to purchase other materials.

- **useful and relevant**

  The content in this series relates directly to students' needs and interests. It enables them to understand more about themselves and the world they live in.

General suggestions and advice on teaching science

Students should be encouraged to share what they know, so invite discussion and foster an environment where they feel comfortable. Starting from what a child knows helps them to feel confident learning new things.

The main focus of science at this level is to encourage the students to participate and investigate and this is done through asking and answering questions. Actively encourage students to participate in the different experiments and share their experiences.

We have created a character, Super Scientist.

Super Scientist has been used as a tool to make the book appealing to students. After all, we all know how much students enjoy animated characters. Teachers should use Super Scientist to generate interest, engagement, and humor. Super Scientist is here to make science fun.

A good way to approach the learning and teaching of science in every lesson is outlined below—all you have to remember is S.C.I.E.N.C.E.

S — Start by saying what the students are going to learn about

C — Constantly encourage student participation and involvement

I — Investigate the topic and follow students' interests

E — Encourage all students to explore and contribute by rewarding participation and praising their involvement

N — Notice the interests and questions of the students and explore them further

C — Consolidate what has been learnt in the lesson and link it to other topics that have been taught and the world around them

E — End on a positive note and explain what has been learnt and what is coming next

About this teacher's guide

This teacher's guide contains lesson plans, worksheets, and information that will enable teachers to actively support their students' development and provide opportunities for the students to acquire important knowledge and skills. Worksheets at the end of this guide and the workbook along with extension activities will help to reinforce and boost learning.

Teachers are encouraged to actively involve students in reinforcing concepts by interacting with the digital resources. If the required facilities are not available assign tasks from the digital resources for practice at home.

The cartoon character, Super Scientist, is the narrator and has been used for generating interest in the text. He is smart since he is a scientist, but he is prone to acting silly at times. He should be referred to and made use of for eliciting laughter wherever possible.

The Science Factor series has been enriched following the introduction of Single National Curriculum introduced by the Government of Pakistan in 2020. Consequently, The Science Factor contents follow the guidelines provided by the Cambridge International Primary Programme, the UK National Curriculum for General Science, as well as the SNC 2020 by Government of Pakistan.

The teaching guides of the series have been updated to reflect the newer content in the books and workbooks. Teachers will find lesson planning easy with our updated guides and worksheets available for the newer SLOs.

More importantly, the TGs ensure that teachers can lay the essential foundations of science concepts, to ensure that students:

- Attain the prescribed benchmarks by the end of grade 5.
- Are well prepared for the coursework required from grade 6 onwards.

To aid this endeavour, a detailed map of the new SNC provided SLOs and where they are present in the Science Factor series is provided. This invaluable planning aid will that teachers will continue to find teaching of science an enjoyable and thought-provoking process.

SNC type	grade	strand	SNC topic/chapter	SNC sub-topic	
GS	5	life science	CLASSIFICATION OF LIVING THINGS	Five Kingdom systems (Monera, Protista, Fungi, Plants, Animals)	
				Classification and Characteristics of Plants	
				Classification and characteristics of Flowering Plants (monocot and dicot)	
				Classification and Characteristics of Animals (vertebrates and invertebrates)	
			MICROORGANISMS	Viruses, Bacteria and Fungi	
				Role of microorganisms as decomposers	
				Advantages and disadvantages of microorganisms	
			FLOWERS AND SEEDS	Structure of a flower	
				Pollination and its types	
				Types of reproduction in plants	
				Structure and germination of seed (monocot/dicot)	
				Conditions necessary for seed germination	

	SNC SLOs	Location in TSF books
	• Describe classification of living organisms and its importance.	Book 5 p6
	• Classify the plants into two major groups (dicots and monocots) and give examples of each group.	Book 5 p 8-9
	• Compare and contrast the structure of a dicot and a monocot plant (with respect to their seeds, leaves and flowers).	Book 5 p 9
	• Differentiate between vertebrates and invertebrates based on their characteristics.	Book 5 p 11
	• Classify vertebrates into, fish, amphibians, reptiles, birds and mammals on the basis of their characteristics.	Book 5 pp 11-17
	• Classify invertebrates into five groups (sponges, worms, insects, snails, and starfish) on the basis of their characteristics.	Book 5 pp 11, 17-22
	• Understand the concept of extinction and endangered species and the role of human actions in the loss of biodiversity. Write some measures for conservation of endangered species.	Book 5 p 22-24
	• Define and describe microorganisms.	Book 5 pp 25
	• Identify the main groups of microorganisms and give examples for each.	Book 5 pp 26-28
	• Highlight the role of microorganisms in decomposition and discuss its harmful and beneficial effects.	Book 5 p 28-30
	• Recognize some common diseases of each group caused by microorganisms.	book 5 p 31
	• Recognize that microorganisms get transmitted into humans and spread infectious diseases.	Book 5 pp 31
	• Discuss and deduce advantages and disadvantages (any 3) of microorganisms by using some daily life examples.	Book 5 pp 28-30
	• Suggest preventive measure to protect him/herself from these infections.	Book 5 pp 32
	• Examine and Describe structure of a flower	Book 5 p 33
	• Define pollination and describe its types with examples.	Book 5 p 34
	• Define reproduction and differentiate between sexual and asexual reproduction in plants.	Book 5 p 34-41
	• Describe the structure of a seed and demonstrate its germination.	Book 5 pp 35
	• Compare and contrast the structure and function of chick pea and Maize seed.	Book 5 pp 36
	• Illustrate the conditions necessary for seed germination.	Book 5 pp 37

SNC type	grade	strand	SNC topic/chapter	SNC sub-topic	
GS	5	physical science	ENVIRONMENTAL POLLUTION	Pollution and its types	
				Causes of pollution	
				Effects of Pollution on life (Smoke, smog, Sewage Water, Solid Wastes, Industrial Wastes)	
				Preventive measures to reduce Pollution	
				Biodegradable and nonbiodegradable materials	
			PHYSICAL AND CHEMICAL CHANGES OF MATTER	Physical changes observed in everyday life	
				Chemical changes observed in everyday life	
			LIGHT AND SOUND	Sources of light	
				Luminous and non-Luminous objects	
				Transparent, opaque and translucent objects	
				Light travels in straight lines	
				Formation of shadows	
				Reflection of light	
				Production of sound	
				Propagation of sound	
				Intensity of sound (high, low)	

	SNC SLOs	Location in TSF books
	• Define pollution and its types.	Book 5 pp 42-46
	• Explain the main causes of water, air and land pollution.	Book 5 pp 43-46
	• Explain the effects of water, air and land pollution (unclean/toxic water, smoke, smog, excess CO2/other gases, open garbage dumps, industrial waste etc.) on the environment and life.	Book 5 pp 42-46
	• Discuss and explain the effects of burning fossil fuels and releasing greenhouse gases in air.	Book 5 p 44
	• Differentiate between biodegradable and non-biodegradable materials.	Book 5 pp 49-51
	• Explain the impact of non-biodegradable materials on the environment.	Book 5 pp 50-51
	• Investigate possibilities and suggest ways to reduce non-biodegradable materials.	Book 5 p 50-51
	• Identify observable changes in materials that do not result in new materials with different properties (e.g., dissolving, crushing aluminium can).	Book 5 p 54
	• Recognize that matter can be changed from one state to another by heating or cooling (candle wax).	Book 5 pp 54-57
	• Describe and demonstrate the states of water (i.e., melting, freezing, boiling, evaporation, and condensation).	Book 5 pp 54-57
	• Identify ways of accelerating the process of dissolving materials in given amount of water and provide reasoning (i.e., increasing the temperature, stirring, and breaking the solid into smaller pieces increases the process of dissolving).	Book 5 p 57-58
	• Distinguish between strong and weak concentrations of simple solutions.	Book 5 p 58
	• Identify observable changes in materials that make new materials with different properties (e.g., decaying, burning, rusting).	Book 5 p 59
	• Differentiate between physical and chemical changes with examples.	Book 5 pp 60
	• Identify natural and artificial sources of light.	Book 5 p 61
	• Justify that light emerges from a source and travels in a straight line.	Book 5 p 62
	• Investigate luminous and non-luminous objects in daily life.	Book 5 p 62
	• Identify and differentiate between transparent, opaque and translucent objects in their surroundings.	Book 5 p 64
	• Investigate that light travels in a straight line.	Book 5 p 62
	• Explain the formation of shadows.	Book 5 p 63
	• Predict the location, size and shape of a shadow from a light source relative to the position of objects.	Book 5 p 63
	• Demonstrate that shiny surfaces reflect light better than dull surfaces.	Book 5 p 65
	• Describe and demonstrate how sound is produced by a vibrating body.	Book 5 p 66
	• Identify variety of materials through which sound can travel.	Book 5 p 66-67
	• Identify that speed of sound differs in solids, liquids and gaseous medium.	Book 5 p 67
	• Define and describe the intensity of sound with examples.	Book 5 p 69

SNC type	grade	strand	SNC topic/chapter	SNC sub-topic	
GS	5	physical science	LIGHT AND SOUND	Noise and its effects on human health.	
				Controlling noise pollution	
			ELECTRICITY AND MAGNETISM	Static electricity	
				Charges and their properties	
				Conductors and insulators	
				Electric current	
				Electrical circuits and its components + Fuse and its uses	
				Magnet and magnetism	
				Properties of magnets	
				Types of magnets	
		earth and space science	STRUCTURE OF EARTH	Structure of Earth	
				Types of soil	
				Composition and characteristics of Soil	
			SPACE AND SATELLITES	Space	
				Satellites	
				Natural and artificial satellites	
				Types of artificial satellites and their uses	

	SNC SLOs	Location in TSF books
	• Define noise and its harmful effects on human health.	Book 5 p 70
	• Appreciate the role of human beings in reducing noise pollution.	Book 5 p 70
	• Explain the phenomenon of static electricity in everyday life.	Book 5 p 72-73
	• Describe charges and their properties.	Book 5 p 71-73
	• Differentiate between conductors and insulators in daily life.	Book 5 pp 74
	• Describe flow of electric current in an electric circuit.	Book 5 pp 74-75
	• Describe and design an electric circuit and explain its components.	Book 5 pp 74-75
	• Recognize that magnets can be used to attract some metallic objects	Book 5 p 76
	• Describe and demonstrate that magnets have two poles and like poles repel and opposite poles attract.	Book 5 p 76-77
	• Identify earth as huge magnet and demonstrate it with experiment.	Book 5 p 76,78
	• Describe the working of a magnetic compass.	Book 5 p 79
	• Explain different types of magnets (permanent, temporary magnet and electro-magnet).	Book 5 pp 80-82
	• Describe the structure of the Earth (i.e., crust, mantle, and core) and the physical characteristics of these distinct parts.	Book 5 p 83
	• Describe the sources of water on Earth.	Book 5 p 84
	• Identify similarities and differences among the different types of soil.	Book 5 pp 85-86
	• Investigate the composition and characteristics of different soils.	Book 5 pp 85-87
	• Define the term 'space' and emphasize the need to explore it	Book 5 p 88
	• Recognize the role of NASA (National Aeronautics and Space Administration) in space exploration.	Book 5 p 88
	• Define the term 'satellite' and describe its importance.	Book 5 p 89
	• Describe the natural satellites of the planets of the solar system.	Book 5 p 89-91
	• Define artificial satellites and explain their importance in exploring the Earth and space.	Book 5 p 92-93
	• Recognize the key milestones in space technology.	Book 5 pp 89
	• Describe the uses of various satellites in space i.e. geostationary, weather, communication and Global Positioning System (GPS).	Book 5 p 93

SNC type	grade	strand	SNC topic/chapter	SNC sub-topic	
GS	5	STEM	TECHNOLOGY IN EVERYDAY LIFE	Technical model making skills out of clay, paper, reed board, reeds, packing material	
				Making Technical Devices	
				First aid and disaster management	

	SNC SLOs	Location in TSF books
	• enlist and practice safety procedures while carrying out the activities	Book 5 p 94
	• Make a model of footbridge and bookshelf	Book 5 p 100-101
	• Use spirit level/water level to level different objects (table, picture, frame etc.)	Book 5 p 101
	• Use a plumb line to install a flag pole vertically and make a sun clock.	Book 5 p 102
	• Use a wire cutter and stripper to make electrical wire joints.	Book 5 p 103
	• Prepare LED light strings working with 12 volt battery	Book 5 p 103
	• Make a musical instrument from easily available resources	Book 5 p 103-104
	• Make moveable van, bus, etc.	Book 5 p 104
	• Use first aid box to dress a wound.	Book 5 p 95
	• Practice shifting a person to hospital	Book 5 pp 95-96
	• Practice earth quake, fire and flood drill	Book 5 pp 97-99

UNIT 1 CHARACTERISTICS AND LIFE PROCESSES OF ORGANISMS

Background

This unit builds on the classification of animal and plant kingdoms. It also tells you what plant and animal cells are and explains the concept of biodiversity. Moreover, it gives you some examples of endangered species and extinct animals. Use the activities in this guide as well as the Student's Book and Workbook to make your lesson enjoyable. They will also help to strengthen and reinforce these concepts.

Learning outcomes

Students should be able to:

- describe classification of living organisms and its importance.
- classify plants into two major groups (dicots and monocots) and give examples of each group.
- compare and contrast the structure of a dicot and a monocot plant (with respect to their seeds, leaves, and flowers).
- differentiate between vertebrates and invertebrates based on their characteristics.
- classify vertebrates into fish, amphibians, reptiles, birds and mammals on the basis of their characteristics.
- classify invertebrates into five groups (sponges, worms, insects, snails, starfish) on the basis of their characteristics.
- analyse some of the factors caused by humans which are affecting biodiversity.
- Suggest and write some measures for conservation of endangered species.

Resources

- Student's Book pages 6-24
- Workbook pages 2-9
- Honey bee video
- Pictures of mollusks, sponges, worms, echinoderms, and cnidarians
- 2-3 minute clip of different ecosystems and the biodiversity in each
- Pictures of endangered species in Pakistan e.g. snow leopard, Indus dolphin etc.

Student's Book and lesson ideas

1.

- Welcome the students into the class and ask them to sit at their tables.

- Explain that they are going to be learning about the differences between living things and non-living things. Explain using examples from the classroom e.g. students (humans), plants as living and white board, tables and chairs as non-living.
- Show the students a picture of a bat and ask them the following questions:
  - Does it need air to breathe?
  - Does it grow?
  - Does it need food and water to survive?
  - Does it walk or move by itself?
- Write down the characteristics of the five kingdoms of living things. Tell them to write three examples for each kingdom.
- Compare and contrast the structure of a dicot and a monocot plant (concerning their seeds, leaves, and flowers).
- Ask the students to tell some of the mammals' examples and draw one of their favourite mammals.
- Draw a plant cell and animal cell and label them in the class. Also, ask the students to write down the functions of the parts of the plant cell and animal cells.

2.

- Welcome the students into the class and ask them to sit at their tables.
- Review what they had discussed in the previous class and encourage students to ask questions.
- Explain the terms 'cold-blooded' and 'warm-blooded'; ask the students to provide examples of them
- Tell the main characteristics of each class of vertebrates, show pictures of them, and ask the students which one fits in which category?
- Write the names of the animals on the board (e.g., humans, cats, bird, lizard, dolphin) and ask the students how they move? Flying, walking, swimming, etc.
- Demonstrate how honey is produced by showing a 2-3 minute video.
- Differentiate between the characteristics of reptiles and Amphibians. Give three examples.
- Explain what are Arthropods. Ask students to write down the five groups of them from the book.

3.

- Welcome the students into the class and ask them to sit at their tables.
- Talk about mollusks, sponges, worms, echinoderms, and cnidarians using pictures and examples.
- Explain biodiversity and its importance. Show a 2-3 minute clip of different ecosystems and biodiversity in each.
- Describe what does extinct mean? Ask the students to give an example of an extinct animal.
- Write down the list of endangered species in Pakistan and give pictures of each (cut outs). Ask

students to match the picture to the name.

- Ask students the following questions and discuss:
  - Why is the octopus not a fish?
  - Why is the spider not an insect?

Activities

- Arrange the students in groups or individually and read aloud the activities. Follow the instructions given in the Student's Book and Workbook.
- Help the students answer the questions from "In your notebook" and "Learning is fun" etc. Remind them that all the answers are in the Student's Book.

Workbook steps

Help the students solve answers and activities in the Workbook. They may do these individually in class or as homework or they may work in groups of 2-3. After completing each task from the workbook, students may compare their answers and check their answers with each other.

ANSWERS

Book Answers

In your Notebook (pg 14)

The 3 main differences are that mammals are warm-blooded, females are able to feed their young with milk from their mammary glands and they have hair or fur, while reptiles are cold-blooded, they lay eggs with leathery, waterproof shells and they have scales instead of hair or fur.

Jumbled Names (pg 16)

Cassowary

Ostrich

Stingray

In your Notebook (pg 16)

1. The 3 main differences are that mammals are warm-blooded, females are able to feed their young with milk from their mammary glands and they have hair or fur, while reptiles are cold-blooded, they lay eggs with leathery, waterproof shells and they have scales instead of hair or fur.
2. Birds have several common characteristics:
   - They are warm-blooded.
   - They lay eggs with hard shells.
   - They have feathers and wings.
   - They have scales but only on their legs and feet.

- They breathe through lungs.
- They have a beak but no teeth.
- They have a furcula, which is also known as a wishbone

3. Fish breathe through gills. Although fish live in water, they need oxygen just like animals on land. Fish get their oxygen from the water. They take in water through their mouth and pass the water over the gills where the oxygen is extracted.

In your Notebook (pg 18)

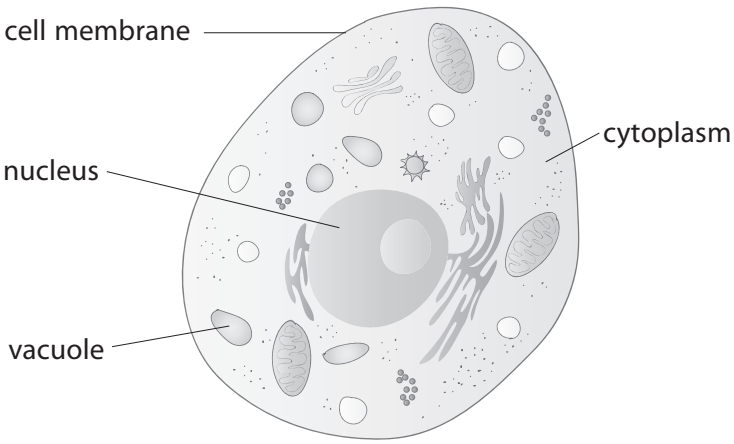
1. The 3 main physical characteristics of an insects are:
   - A body divided into three sections (head, thorax, abdomen)
   - One pair of antennae
   - Three pairs of legs on their thorax
2. The 3 main physical characteristics of amphibians are:
   - They have thin skins.
   - They do not have scales
   - They do not have claws

Unit 1 Review (pg 24)

1. To make the study of living things easier.
2. a. vertebrates

   b. invertebrates
3. All living things are made up of cells. Cells hold all of the equipment and information necessary to keep an organism alive. Each type of cell performs a different function. There are nerve cells in your brain that receive messages, and others that send messages. There are blood cells that carry oxygen around the body, and others that protect the body against disease.

   An animal cell looks like this:



The main parts of the cell are the nucleus, cytoplasm, cell membrane, and vacuole.

The nucleus is the control centre of the cell. The nucleus also controls the cell's growth and reproduction.

The cytoplasm helps to move materials around the cell and also dissolves waste.

The vacuole is a space in the cytoplasm that can contain either air, liquid, or food.

The cell membrane acts as a barrier to the world outside the cell. It lets the things in and out of the cell and stops dangerous things from getting in.

The smaller parts within a cell are called organelles.

4. a. Birds have several common characteristics:
    - They are warm-blooded.
    - They lay eggs with hard shells.
    - They have feathers and wings.
    - They have scales but only on their legs and feet.
    - They breathe through lungs.
    - They have a beak but no teeth.
    - They have a furcula, which is also known as a wishbone.

   b. Fish have several common characteristics:
    - They live in water.
    - They breathe through gills.
    - Most have scales.
    - Most lay eggs.
    - Most have fins to help them move through the water.
    - They are cold-blooded.

   c. Amphibians have several common characteristics:
    - They have thin skins.
    - They begin life in the water and then live on land.
    - Adult females return to the water to lay their eggs.
    - They do not have scales or claws.
    - They are cold-blooded.

   d. Arthropods are divided into five main groups; insects (beetles, ants), arachnids (spider, scorpion), crustaceans (crabs, lobsters), centipedes, and millipedes. All insects share 3 main charactersitics.

   - a body divided into three sections (head, thorax, abdomen)
   - one pair of antennae

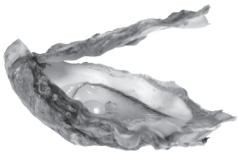
- three pairs of legs on their thorax.

4e . Reptiles have several common characteristics:

- They are cold-blooded.
- They lay eggs with leathery, waterproof shells.
- They have four legs (except for snakes).
- They have scales instead of hair or fur.
- They breathe through lungs.
- They have external ear openings (except for snakes).

5. Reptiles
6. Examples:

Mollusc:

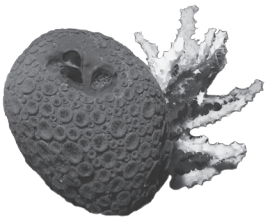


clam

octopus

snail

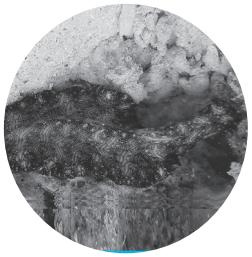
Sponge:



sponge

Worm:

segmented worm



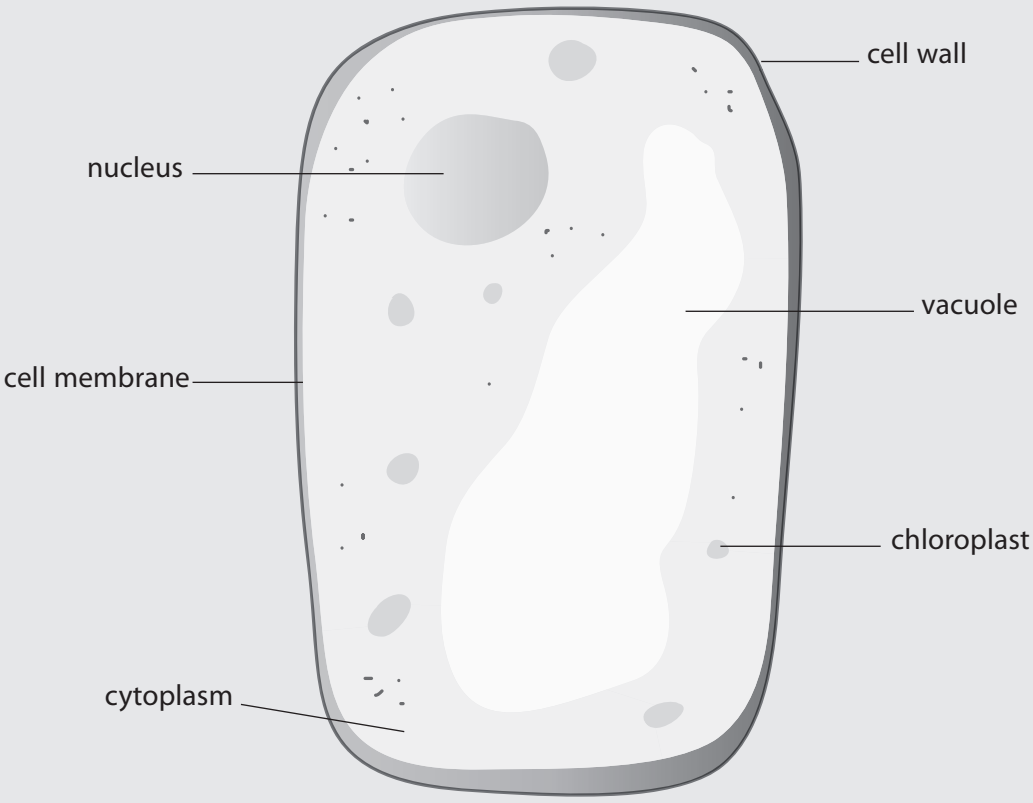
flatworm

roundworm

7. Endangered species are those whose numbers are declining. There are several endangered species in Pakistan. They include the Indus River dolphin, Markhor, blackbuck, snow leopard and Goitered gazelle.
8. Sometimes human activity causes them to become endangered or extinct. Overlogging, deforestation, overuse of resources, and pollution are leading causes of habitat destruction leading to extinction.
9. Endangered means their numbers are declining. Extinct means they have disappeared altogether.

Workbook Answers

Plant cell



Plant Crossword

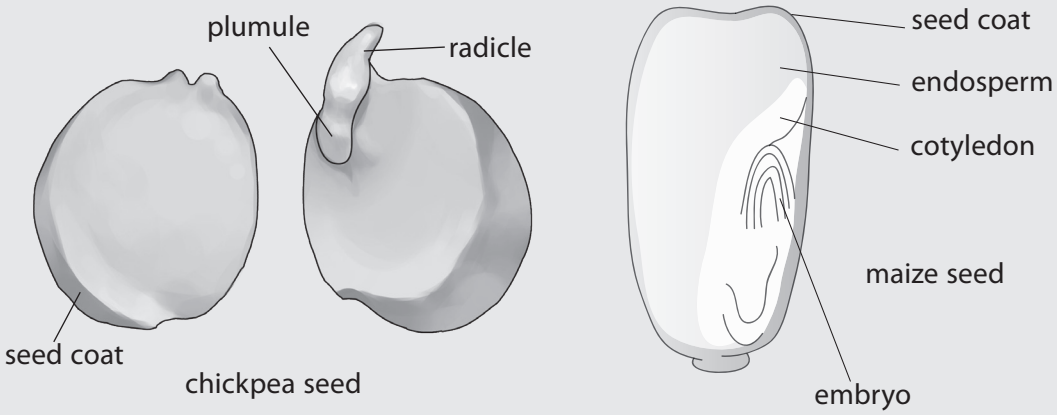
Across

3. nucleus
4. seed coat
6. Angiosperms
8. Spore

Down

1. Chloroplast
2. Evergreen
5. Cotyledon
7. Monocot

Monocots and dicots

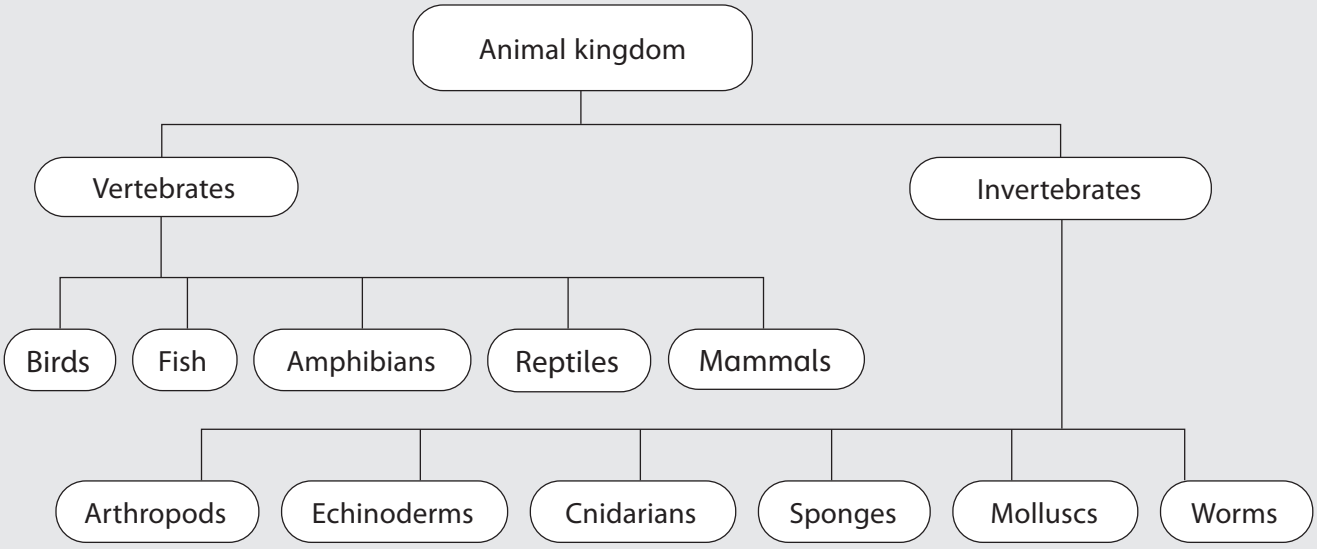


When they germinate, the difference between monocots and dicots can be seen in their leaves.

A monocot plant such as Maize, onion, rice, sugarcane, lilly, and wheat has narrow leaves with parallel veins on them. Their flowers have petals which are either 3 or multiples of 3 (i.e. 3, 6, 9, etc).

A dicot plant such as Chickpea, tomato, cabbage, apple and peach tree, has broader leaves with net like veins on them. Their flowers have petals which are either 4 (or 5) in number or multiples of 4 or 5.

The animal kingdom



I.

II. 1. Nucleus

2. Nerve

3. Elephant

4. Kangaroo

5. warm

6. reptiles

7. French

8. invertebrates

9. Arthropods

10. Beetles/ants/spiders/crabs/lobsters etc.

Which animal has which features?

- Mammals:
  - They are warm-blooded.
  - The females are able to feed their young with milk from their mammary glands.
  - They have hair or fur.
- Reptiles:
  - They are cold-blooded.
  - They lay eggs with leathery, waterproof shells.
  - They have four legs (except for snakes).
  - They have scales instead of hair or fur.
  - They breathe through lungs.
  - They have external ear openings (except for snakes).
- Birds:
  - Birds have several common characteristics:
  - They are warm-blooded.
  - They lay eggs with hard shells.
  - They have feathers and wings.
  - They have scales but only on their legs and feet.
  - They breathe through lungs.
  - They have a beak but no teeth.
  - They have a furcula, which is also known as a wishbone.
- Fish:
  - They live in water.
  - They breathe through gills.
  - Most have scales.
  - Most lay eggs.

- Most have fins to help them move through the water.
- They are cold-blooded.

- Amphibians:
  - They have thin skins.
  - They begin life in the water and then live on land.
  - Adult females return to the water to lay their eggs.
  - They do not have scales or claws.
  - They are cold-blooded.
- Insects:
  - a body divided into three sections (head, thorax, abdomen)
  - one pair of antennae
  - three pairs of legs on their thorax.

Types of animals

I. 1.Amphibians

2. reptiles

3. warm-blooded

4. Amphibians, cold-blooded, vertebrates

5. reptiles, cold-blooded, vertebrates

II. **vertebrates**	**same in both**	**invertebrates**
• have a backbone • less than 5% of all animals on Earth • do not have an external skeleton • do not have compound eyes • comparatively larger in size than invertebrates	• live on planet earth • composed of animal cells • have a lifecycle from birth to death	• do not have a backbone • more than 95% of all animals on Earth • have an external skeleton • have compound eyes • comparatively smaller in size than vertebrates

Where's the skeleton

Human: inside

Fish: inside

Fly: outside

Worm: outside

Grasshopper: outside

Crab: outside

Lizard: inside

Bird: inside

Extinct or living?

✗ : dodo, pterodactyl, tasmanian tiger, quagga, sea lion

✓ : auk, sea cow, ostrich, antelope, elephant, tiger, kangaroo

UNIT 2 MICROORGANISMS

Background

This unit builds on ways to preserve food to keep it free of germs. It also reviews healthy habits and learns that some diseases are caused by harmful microorganisms. Moreover, this unit also discovers the preventive measures to protect from these infections. Use the activities in this guide as well as the Student's Book and Workbook to make your lesson enjoyable. They will also help to strengthen and reinforce these concepts.

Expected learning outcomes

Students should be able to:

- identify main groups of microorganisms and give examples of each.
- highlight the role of microorganisms in decomposition and discuss its harmful and beneficial effects.
- recognize some common diseases of each group cause by microorganisms.
- recognize that microorganisms get transmitted into humans and spread infectious diseases.
- Discuss and deduce advantages and disadvantages (any 3) of microorganisms by using some daily life examples.
- suggest preventative measures to protect themselves from these infections.

Resources

- Student's Book pages 25-32
- Workbook pages 10-11

Student's Book and lesson ideas

1.

- Welcome the students into the class and ask them to sit at their tables.
- Ask the students what they know about microorganisms.
- Tell them to state the advantages and disadvantages of microorganisms using day-to-day examples.
- Discuss the roles of microorganisms as decomposers? Help the students identify some common diseases of each group caused by microorganisms.
- Ask the students to analyse the various ways in which illnesses are transmitted. Some infections/viruses, for example, can be spread by contaminated food and water.
- Tell the students the precautions to protect them from these infections/viruses e.g. washing their

hands, wearing a mask etc.

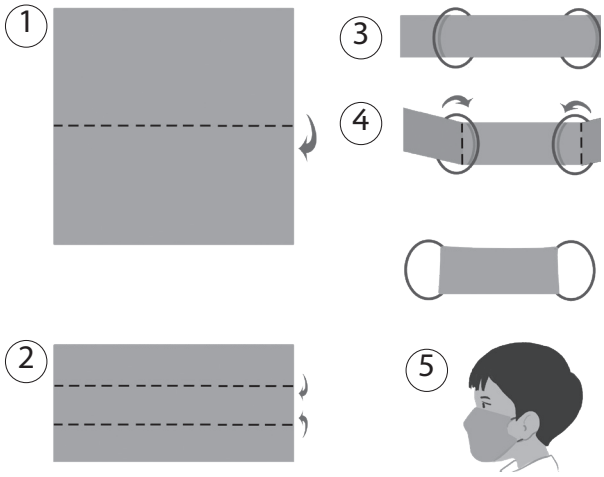
- Make a mask in class.

How to make a face mask

You need:

- a bandana, scarf or cloth (roughly 50 by 50 cm)
- two rubber bands or elastics

1. Fold the cloth in half (top to bottom).
2. Fold it twice again.
3. Place a large rubber band at each end (about 15 cm from the ends).
4. Fold the ends of the cloth into the middle.
5. To wear the mask, place it over your mouth and nose and loop the bands over your ears.



- Discuss the difference between fungi and plants.

2.

- Welcome the students into the class and ask them to sit at their tables.
- Review what they had discussed in the previous class and encourage students to ask questions.
- Use graphs to demonstrate the spread of various diseases. For example, you may create illustrations and write labels for mosquito eggs, larvae growing in filthy water, adults flying away, female mosquito biting a person, and the person having a malarial fever to demonstrate how malaria is spread.
- Discuss the prevention measure for the dengue virus.
- Teach the students not to consume food or drink left out in the open for an extended period since bacteria and fungi can grow on it and rapidly multiply in the food.
- Question the students if they have ever missed class due to illness and listen to their theories about the origins and symptoms of their diseases.
- Ask them about the Coronavirus and what they do to protect themselves from it.
- Explain the types of Protists to the students. Tell them to state examples.
- Demonstrate the tips to the students (given in the book) that can help prevent food poisoning.

Activities

- Arrange the students in groups or individually and read aloud the activities. Follow the instructions given in the Student's Book and Workbook.
- Help the students answer the questions from "In your notebook" and "Learning is fun" etc. Remind

them that all the answers are in the Student's Book.

Workbook steps

Help the students solve answers and activities in the Workbook. They may do these individually in class or as homework or they may work in groups of 2-3. After completing each task from the workbook, students may compare their answers and check their answers with each other.

ANSWERS

Book Answers

In your Notebook (pg 28)

Plants	Fungi
Have stems, leaves, and roots	Do not have stems, leaves, and roots
Some plants have flowers	Do not have flowers
Are able to produce their own food	Are not able to produce their own food

2. There are two main types of protists: protozoa and algae.
3. Bacteria only have one cell.
4. The role of bacteria is to act as decomposers. They breakdown the chemical elements inside other organisms. Some germs are bacteria as well.
5. Fungi attach themselves to animals (e.g., humans) and plants.

In your Notebook (pg 31)

1. Bacteria can cause food to go bad as the bacteria and fungi that land on the food from air then produce chemicals in the food which make us ill causing food poisoning. Tuberculosis, diphtheria, typhoid fever, cholera, dysentery, and pneumonia are all also caused by bacteria.
2. These are the tips to make food safe:
   - Cook food until it is really hot. If it's too hot, people can wait until it is the right temperature to eat.
   - Wash your hands before handling food, as well as during the handling process.
   - Do not chop food on a chopping board that has been used but not washed.
   - Do not let heated food sit for too long before being eaten. This will give bacteria a chance to contaminate the food again.
   - Check that food is hot all the way through by poking a skewer through it or cutting a piece with a knife. Sometimes when you heat a thick piece of food, the middle does not cook through enough.

- Stir food when heating so that the heat is evenly distributed.
- Do not reheat food more than once.
- Make sure that frozen foods are properly thawed before heating them.

Unit 2 review (pg 32)

1. a. vaccine

   b. microorganisms

   c. antibiotics

   d. fungi

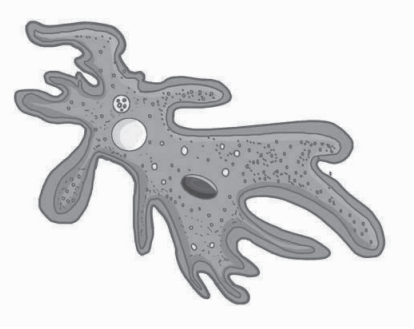
2. Some microorganisms help nature via decomposition and also help humans in food preparation, digestion and preventing diseases (via antibiotics and vaccines). The student may write a note on any two ways.

3. Mushrooms are fungi. Some fungi attach themselves to plants. Mushrooms are examples of fungi that do this. If you see mushrooms on a tree or around the base of a tree, you will know that the mushrooms are getting their nourishment from the cells of that tree.

4. Antibiotics are medicines that help fight diseases. Antibiotics work by destroying, slowing down, or preventing the growth of bacteria to cure bacterial infections. However, antibiotics are useless against infections caused by viruses, such as cold, flu, etc.

5. There are two main types of protists: protozoa and algae. Like bacteria, protozoa are microscopic single-cell organisms. However, they do not live on other organisms, they are free living. That means they can easily move from one organism to another. Some protozoa are eaten by fish. Others cause diseases in animals. Protozoa have an animal-like cells. On the other hand, algae have a plant-like cell. While most algae have just one cell, some have multiple cells. Algae live in water and are able to make their own food from sunlight. Some algae are microscopic but some are much larger.

6. One type of protozoa is the amoeba. Amoebae live in water, among rotting food, and in humans. They are advanced enough to have arm-like structures that help them grasp food particles and move.



amoeba

7. Some microorganisms are helpful to human life, e.g. they help in food preparation, digestion and preventing diseases (via antibiotics and vaccines), while some are harmful e.g. may cause illness and disease, food decay and so on. The students may write an answer supporting either side, based on personal preference, and support their argument with relevant evidence.

Workbook Answers

1. **Fungi vs plants**

Plants	Fungi
Have stems, leaves, and roots	Do not have stems, leaves, and roots
Some plants have flowers	Do not have flowers
Are able to produce their own food	Are not able to produce their own food

Microorganisms – good or bad?

Benefits: Some microorganisms help nature via decomposition and also help humans in food preparation, digestion and preventing diseases (via antibiotics and vaccines). The student may write a note on these in detail.

Harm: Some microorganisms may also cause harm e.g., may cause illness and disease, food decay and so on. The student may write a note on these in detail.

Bacteria and food

Bacterial infections	**Viral infections**
Tooth decay, food poisoning, typhoid, Tuberculosis, cholera	Hepatitis, Chikungunya, Covid, Dengue, Measles, Polio, influenza, infection bacterial

Tips to help prevent food poisoning

- Cook food until it is really hot. If it's too hot, people can wait until it is the right temperature to eat.
- Wash your hands before handling food, as well as during the handling process.
- Do not chop food on a chopping board that has been used but not washed.
- Do not let heated food sit for too long before being eaten. This will give bacteria a chance to contaminate the food again.
- Check that food is hot all the way through by poking a skewer through it or cutting a piece with a knife. Sometimes when you heat a thick piece of food, the middle does not cook through enough.
- Stir food when heating so that the heat is evenly distributed.
- Do not reheat food more than once.
- Make sure that frozen foods are properly thawed before heating them.

UNIT 3 FLOWERS AND SEEDS

Background

This unit builds on the terms flower and seed. It introduces the types of pollination, reproduction, and fertilization in plants. Moreover, it also tells you the conditions necessary for seed germination. Use the activities in this guide as well as the Student's Book and Workbook to make your lesson enjoyable. They will also help to strengthen and reinforce these concepts.

Expected Learning Outcomes

Students should be able to:

- examine and describe the structure of a flower.
- define pollination and describe its types with examples.
- define reproduction and differentiate between sexual and asexual reproduction in plants.
- describe the structure of a seed and demonstrate its germination.
- compare and contrast the structure and function of chickpea and Maize seed.
- illustrate the conditions necessary for seed germination.

Resources

Student's Book pages 33-41

Workbook pages 13-17

video of reproduction in plants

Student's Book and lesson ideas

1.

- Welcome the students into the class and ask them to sit at their tables.
- Ask the students what do they know about plants and seeds?
- Ask the students to draw the structure of the plant, and label it.
- Discussed the term pollination and its types?
- Show a 2-3 min video of reproduction in plants. Also, differentiate asexual reproduction and sexual reproduction in plants.

2.

- Welcome the students into the class and ask them to sit at their tables.

- Review what they had discussed in the previous class and encourage students to ask questions.
- Ask the students to draw and label the structure of a seed.
- Tell the students to compare the structure and function of chickpea and Maize seeds.
- Draw on the board the different stages of the germination of a seed and explain each step.
- Show the students how to create parameters for seed germination.
- Explain the functions of spores using pictures/diagrams

Activities

- Arrange the students in groups or individually and read aloud the activities. Follow the instructions given in the Student's Book and Workbook.
- Help the students answer the questions from "In your notebook" and "Learning is fun" etc. Remind them that all the answers are in the Student's Book.

Workbook steps

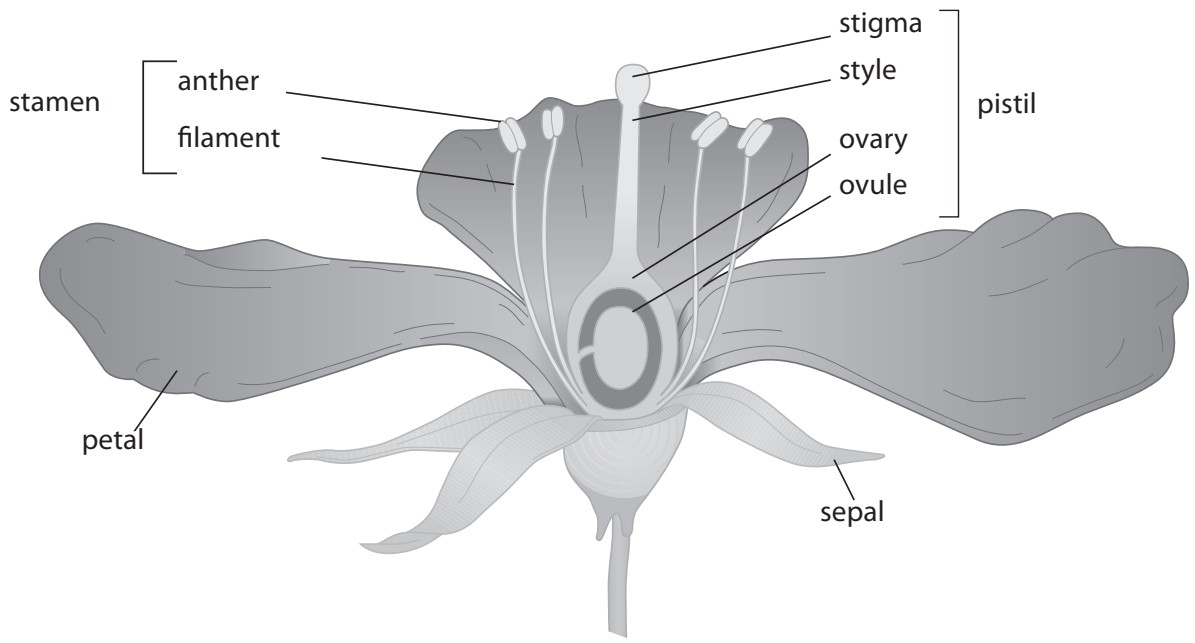
Help the students solve answers and activities in the Workbook. They may do these individually in class or as homework or they may work in groups of 2-3. After completing each task from the workbook, students may compare their answers and check their answers with each other.

ANSWERS

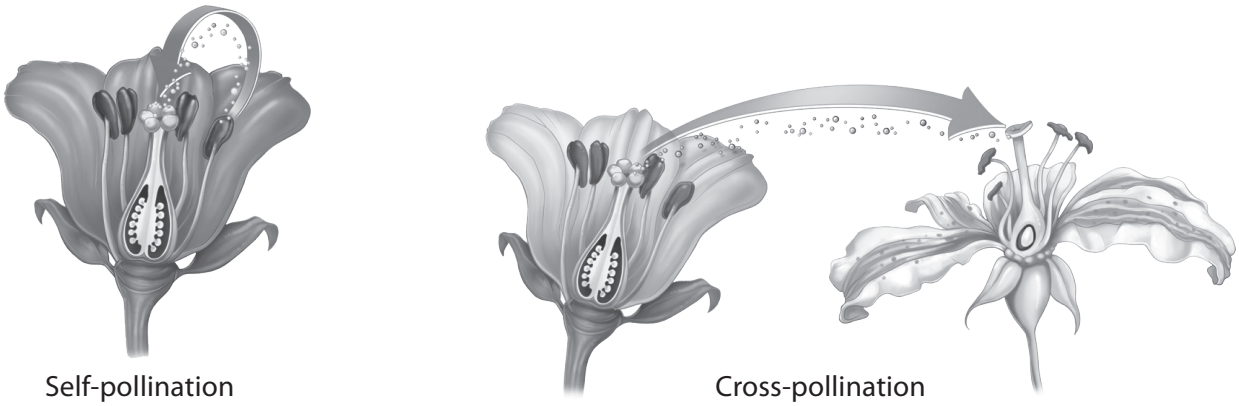
Book Answers

In your Notebook (pg 35)

1.



2.



Self-pollination

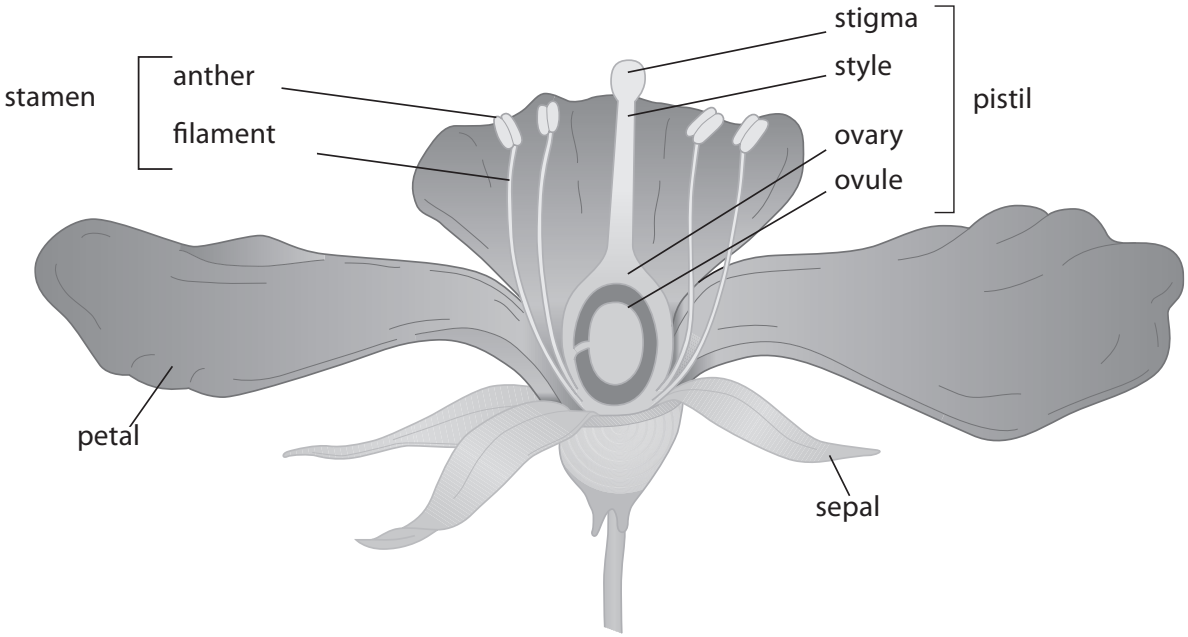
Cross-pollination

3. There are two types of plant reproduction: Sexual and Asexual. Sexual reproduction involves the use of male and female reproductive cells and pollination. In flowering plants, reproduction takes place in the flowers. Asexual reproduction involves just one plant and no reproductive cells. An example of asexual reproduction is cutting a piece of the stem or root of a plant and planting it in the ground. With asexual reproduction, the new plant is identical to the parent plant.

In your Notebook (pg 38)

1. c
2. b
3. a

Unit 3 Review (pg 41)

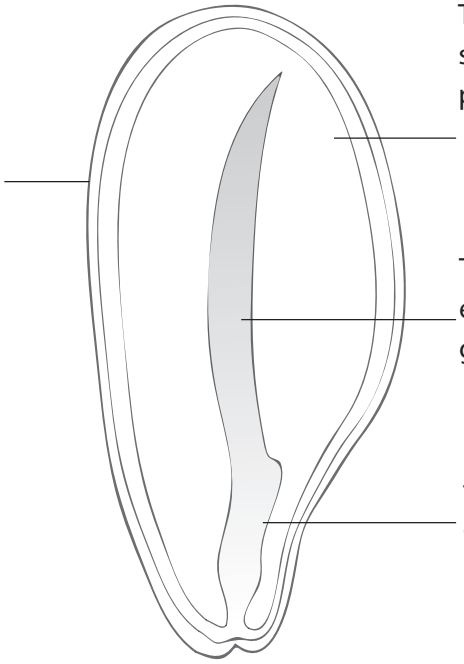


2. These are the conditions that a seed needs for germination to occur:
   - water

- oxygen
- heat

3.

The **seed coat** protects everything inside the seed so that it has a good chance of germinating. The seed coat is also called a testa. Some seeds have thin seed coats, while others have hard ones. Fruit plants often have very hard seed coats.



The **endosperm** is the tissue that surrounds the embryo and provides it with nutrition.

The **cotyledon** is a seed leaf that emerges from the seed when it germinates.

The **embryo** is where life starts within the seed.

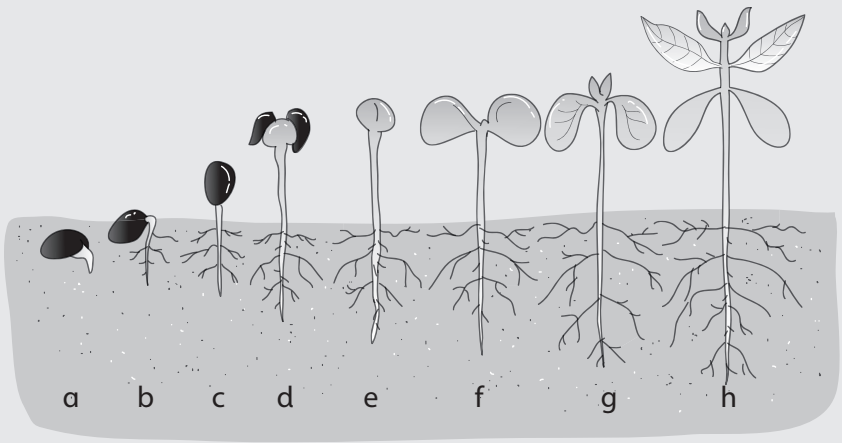
4. Seeds are scattered far and wide in several ways. Sometimes the make-up of the seeds determines how they are scattered. Some seeds are sticky or have hooks or spikes. This means that when animals (including humans) brush against them, they stick to the animal until they drop to the ground in a different place. Some seeds grow in fruit. The fruit is eaten by animals and the seeds are carried somewhere else inside the animal's body. They come out of the body in the animal's waste and start growing in the ground. Some seeds are very light which means they are blown through the air even in the softest of breezes. Some seeds are not only light but also shaped like wings which help them travel farther through the air. Some plants produce heavy seeds that fall to the ground because of gravity. These plants do not produce many seeds, so they avoid the problem of too many seeds competing for a limited amount of space. Some seeds live in seedpods. These pods burst suddenly and throw the seeds out over a large area. And some seeds float on water and are then washed ashore where they start growing.
5. The ground needs to be damp and contain the right nutrients, and the area needs to have the right amount of light.

Workbook Answers

Seed definitions

cotyledon	A seed leaf that emerges from the seed when it germinates
embryo	Where life starts within the seed
endosperm	A tissue that surrounds the embryo and provides it with nutrition
seedcoat	Protects everything inside the seed so that it has a good chance of germinating

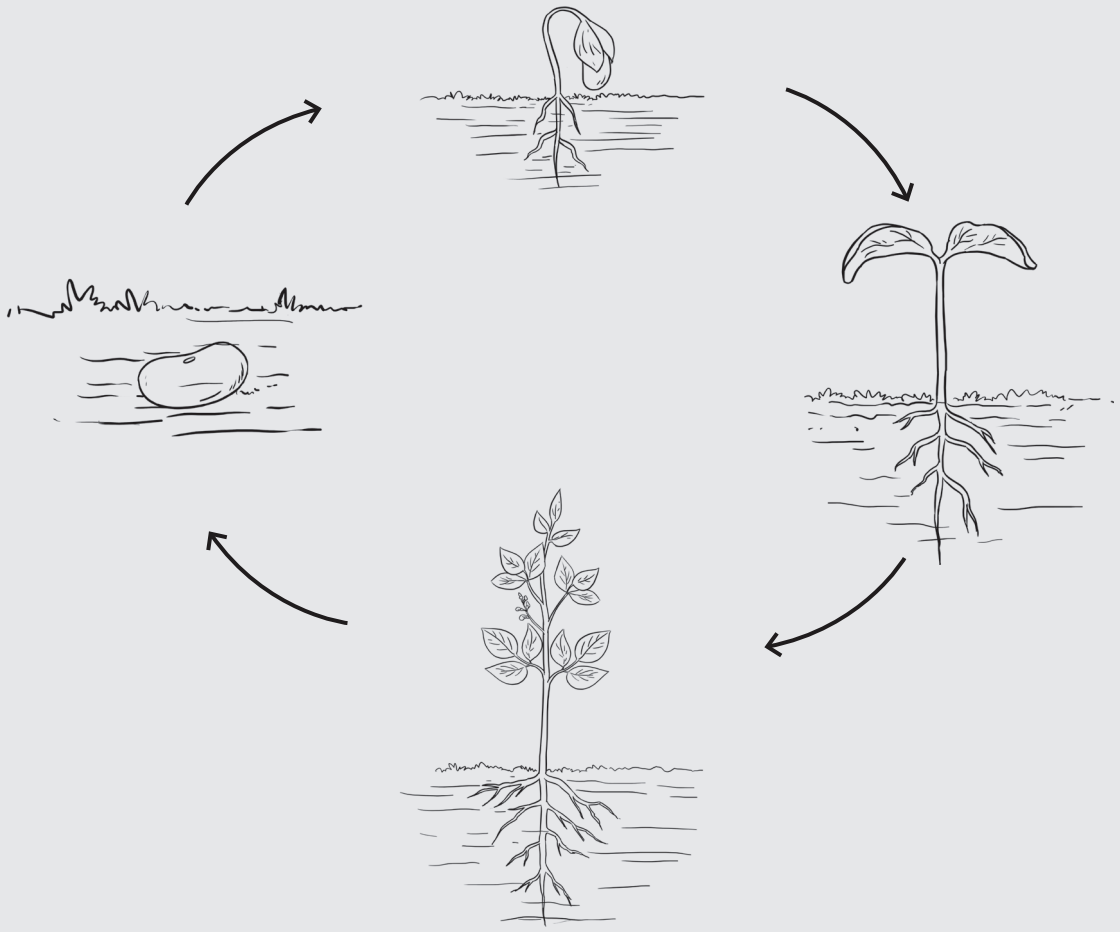
Germination



- The seed soaks up water from the ground. When the water enters the seed it breaks down the food that is stored inside the seed.
- When the food inside the seed breaks down, it releases energy. This energy causes the embryo plant to grow inside the seed.
- The embryo plant gets too big for its seed and breaks through the case. The case has been softened by the water.
- The first parts of the plant to break through the seed are the roots.
  The roots grow downward and anchor the plant to stop it from being blown or washed away. (a, b above)
- The next part to emerge is the cotyledon (or cotyledons if it is a dicot plant). The cotyledon has a shoot attached to it and the shoot grows upwards towards the surface of the ground. (c above)
- Once the shoot breaks through the surface, light and heat from the Sun enable the plant to start producing its own food. The cotyledon leaves turn green.
- Now the plant is no longer relying on the food in its seed. As it produces more of its own food, it grows more leaves. It also grows bigger and eventually produces seeds that eventually form new plants. (d onwards)

Germination

Life cycle of a plant



UNIT 4 ENVIRONMENTAL POLLUTION

Background

This unit builds on what pollution is and its various types. This unit also tells you ways to reduce waste and pollution. Moreover, it also discusses the concept of biodegradable and non-biodegradable. Use the activities in this guide as well as the Student's Book and Workbook to make your lesson enjoyable. They will also help to strengthen and reinforce these concepts.

Expected Learning Outcomes

Students should be able to:

- define pollution and its types.
- explain the main causes of water, air, and land pollution.
- explain the effects of water, air, and land pollution (unclean/toxic water, smoke, smog, excess CO2/ other gases, open garbage dumps, industrial waste, etc.) on the environment and life.
- explain the effects of burning fossil fuels and releasing greenhouse gases in air.
- differentiate between biodegradable and non-biodegradable materials.
- explain the impact of non-biodegradable materials on the environment.
- investigate possibilities and suggest ways to reduce non-biodegradable materials

Resources

Student's Book pages 42-51

Workbook pages 18-21

Videos about the earth and pollution

Student's Book and lesson ideas

1.

- Welcome the students into the class and ask them to sit at their tables.
- Explain that they are going to be learning about the environment and its health today.
- Ask them if they think the earth is healthy and the reasons for both yes and/or no.
- Explain what pollution is and ask if they know any types of pollution?
- Tell the students different methods to protect themselves and the environment from pollution and also its importance.

- Ask the students if they have seen any kind of air pollution and noise pollution in our country.
- Tell the students to draw and explain the pollution around them.
- List three causes of land pollution and water pollution.
- Highlight the need for clean air, water, and land for the environment's survival. Also, stress how the community is responsible for maintaining a pollution-free environment.

2.

- Welcome the students into the class and ask them to sit at their tables.
- Review what they had discussed in the previous class and encourage students to ask questions.
- Ask the students to give examples of illnesses if you consume dirty water.
- Draw three examples of biodegradable and non-biodegradable materials.
- Ask the students ways to reduce non-biodegradable waste.
- Show them a short film about the earth and pollution (e.g. an animated movie on Youtube such as this one: https://www.youtube.com/watch?v=b6_G-PRlDwk)
- Conduct a clean up drive on the beach or at a park.

Activities

- Arrange the students in groups or individually and read aloud the activities. Follow the instructions given in the Student's Book and Workbook.
- Help the students answer the questions from "In your notebook" and "Learning is fun" etc. Remind them that all the answers are in the Student's Book.

Workbook steps

Help the students solve answers and activities in the Workbook. They may do these individually in class or as homework or they may work in groups of 2-3. After completing each task from the workbook, students may compare their answers and check their answers with each other.

ANSWERS

Book Answers

In your Notebook (pg 46)

1. Pollution occurs when a part of the environment becomes unhealthy for the organisms that live in it. Pollution must be avoided to save the earth and prevent destruction of the planet, preserve resources and stay safe from various diseases.
2. There are five types of pollution: land pollution, noise pollution, air pollution, water pollution, and visual pollution. The students may write an answer based on which type of pollution they mostly experience and what they think causes it.

In your Notebook (pg 48)

Noise:

One reason for noise pollution in some areas is the use of loud machinery for household tasks such as mowing lawns. The use of quieter machines would reduce noise pollution.

Buses and trucks should not use pressure horns as they are very loud. Drivers should realize that they are contributing to noise pollution by honking the horns of their vehicles unnecessarily. Badly-maintained car engines also add to noise pollution.

People could also be more considerate of others and turn down the music and radios in their cars and homes. Musical functions should not be held in open spaces in residential areas as they disturb local residents.

Planting trees around places where noise is made can help muffle the sound.

Visual:

Reducing visual pollution means ensuring that things like billboards, power lines, and buildings are designed to fit into the environment.

Air:

The biggest action that can be taken to prevent air pollution is for governments, businesses, and communities to stop relying on fossil fuels like coal for their energy, and start using renewable sources. Renewable sources include solar power and wind power.

Another way to reduce air pollution is to use public transport or walk or ride bicycles rather than drive cars. Cars should be well maintained so that exhaust fumes are reduced to the minimum. The black fumes contain carbon monoxide which is a deadly gas.

Water:

One way to reduce water pollution is for businesses to find better ways to dispose of waste than dumping it in waterways. We should also make sure not to dump garbage or harsh chemicals into local water bodies.

If people relied less on oil as a source of energy, there would be less need for so many oil tankers to sail around the world. That would reduce the risk of oil spills.

Unit 4 Review

1. This is an opinion-based answer. Students may identify the major contributors to pollution and what advice to give them.
2. Students should identify the 5 main types of pollution (i.e., land, noise, air, water and visual pollution) and how they all negatively affect the environment and also how to reduce each.
3. Biodegradable waste decomposes naturally while non-biodegradable waste doesn't decompose naturally.

4. Land pollution is the deterioration of the earth's land surfaces. There are several causes of land pollution including:

- Excessive use of chemical pesticides by farmers kills microorganisms such as bacteria and fungi that are essential for healthy soil.
- Dumping of rubbish. Apart from being visually unattractive, dumping waste can contaminate the land and cause the deaths of animals that may eat poisonous waste.
- The improper disposal of chemicals and other dangerous and poisonous substances by factories. When left untreated these chemicals seep into the soil and then the land is almost impossible to use for any other purpose.

A great deal of land pollution on Earth could be reduced if people follow the three 'Rs': Reduce, Reuse, Recycle. That means, we must reduce the amount of waste we create, reuse materials whenever we can, and recycle all materials that can be turned into something else

5. Water pollution is when bodies of water that we depend on become polluted. When this occurs, it is not only humans who are affected but all organisms because all life requires a clean water source.

Among the main causes of water pollution are:

- Sewage and waste dumped in streams, rivers and oceans. This sewage and waste can contain chemicals, detergents, and human waste that are harmful to the water and to life that depends on it.
- Chemical waste from factories released into water bodies as a way of disposing it. These chemicals a harmful to living things.
- Oil pollution from shipping accidents and dumping. This can cause serious harm to sea life and other animals that depend on sea creatures as part of the food chain.

  One way to reduce water pollution is for businesses to find better ways to dispose of waste than dumping it in waterways. We should also make sure not to dump garbage or harsh chemicals into local water bodies.

If people relied less on oil as a source of energy, there would be less need for so many oil tankers to sail around the world. That would reduce the risk of oil spills.

Workbook Answers

Examples of pollution

Land: e.g. rubbish/trash, chemicals etc. May be reduced if people follow the three 'Rs': Reduce, Reuse, Recycle.

Noise: e.g. horns, machinery/factory noise, traffic etc. The use of quieter machines, using lesser horns while driving and not listening to loud music/radio would reduce noise pollution. Planting trees around places where noise is made can help muffle the sound.

Air: e.g. smog, dust, poisonous gasses etc. May be reduced if we stop relying on fossil fuels like coal for their energy, and start using renewable sources. Another way to reduce air pollution is to use public transport or walk or ride bicycles rather than drive cars.

Water: e.g. sewage, oil and harmful chemicals etc. May be reduced if we find better ways to dispose of waste than dumping it in waterways.

Visual: e.g. power lines, advertising billboards, construction sites etc. May be reduced by ensuring that things like billboards, power lines, and buildings are designed to fit into the environment.

Types of pollution

I. 1. environment/ enjoyment of the environment

2. contribute to land pollution

3. can cause hearing loss, stress, lack of sleep and high blood pressure (for humans), interfere with the navigation systems of animals that depend on sound to travel, such as bats. In extreme cases it can cause animal deaths.

4. factories, coal-fired electricity plants, and other industry-related processes.

5. if people follow the three 'Rs': Reduce, Reuse, Recycle.

6. decomposed naturally.

7. it can take hundreds of years, or even longer, to breakdown.

8. sewage and waste dumped in streams, rivers and oceans, chemical waste from factories released into water bodies as a way of disposing it, and oil pollution from shipping accidents and dumping.

9. one of the greatest environmentalists.

10. air is polluted by harmful and poisonous gases, dust, smoke, and other substances harmful to living organisms or to their environment.

Environment wordsearch

W	A	T	E	R	W	A	Y	S	A	M	G	O	N	A
R	Z	V	S	E	C	P	N	U	Q	S	N	L	J	O
C	D	Y	E	C	X	U	V	M	J	A	O	H	P	E
O	T	P	U	Y	Z	A	N	I	X	F	P	L	L	U
N	C	L	W	C	O	G	E	O	P	A	G	Y	A	O
T	Y	U	A	L	T	I	H	D	I	M	F	M	S	R
A	Q	T	K	E	H	R	A	W	E	S	D	G	T	E
M	C	R	P	E	S	T	I	C	I	D	E	Q	I	O
I	N	E	E	C	M	O	X	S	A	Y	J	O	C	G
N	Q	X	R	F	O	E	F	W	D	R	L	B	I	K
A	I	Y	U	I	K	G	S	I	M	K	Z	W	V	X
T	I	S	I	R	E	N	E	W	A	B	L	E	W	D
E	O	U	X	T	V	U	F	P	S	Y	P	Q	P	S
B	P	R	O	E	W	J	D	S	E	W	A	G	E	A
P	L	Z	Y	J	Z	B	W	D	N	V	M	A	U	C

UNIT 5 PHYSICAL AND CHEMICAL CHANGES OF MATTER

Background

This unit builds on what matter is and explains its type. This unit will also demonstrate that heating and cooling can cause matter to melt, freeze, condense, and evaporate. Moreover, it will show how matter can change from one state to another. Use the activities in this guide as well as the Student's Book and Workbook to make your lesson enjoyable. They will also help to strengthen and reinforce these concepts.

Expected Learning Outcomes

Students should be able to:

- identify observable changes in materials that do not result in new materials with different properties (e.g., desolving, crushing aluminium can).
- recognize that matter can be changed from one state to another by heating or cooling (candle wax).
- describe and demonstrate the states of water (melting, freezing, condensation, evaporation).
- identify ways of accelerating the process of dissolving materials in given amount of water and provide reasoning (i.e., increasing the temperature, stirring, and breaking the solid into smaller pieces increases the process of dissolving).
- distinguish between strong and weak concentrations of simple solutions.
- identify observable changes and materials that make new materials with different properties (e.g., decaying, burning, rusting.
- differentiate between physical and chemical changes with examples.

Resources

Student's Book pages 52-60

Workbook pages 22-29

Videos for melting, boiling, freezing, condensation, evaporation

boiled egg and raw egg

Student's Book and lesson ideas

- Welcome the students into the class and ask them to sit at their tables.
- Explain that they are going to be learning about what makes everything around them.

- Ask the students what matter is and if they can name any matter they know?
- Discuss what is a molecule and ask the studenst to draw a water molecule
- Discuss the characteristics of solids, liquids, and gases.
- Explain the three states using role-play. E.g. have a group of students stand close together and give them a gentle nudge (solid) vs. have them stand farther apart (liquid and gas).
- Ask the students to state two examples of solid, liquid, and gases, and draw one solid, one liquid, and one gas.
- Ask the students the following questions:
    - Can you demonstrate how solid particles are packed together?
    - In liquids, how does a particle move?
    - Tell the students to close their eyes and open a perfume to show how gases spread?

2.

- Welcome the students into the class and ask them to sit at their tables.
- Review what they had discussed in the previous class and encourage students to ask questions.
- Demonstrate melting, boiling, freezing, condensation, evaporation to the students using videos.
- Ask the students what happens when they hold ice cream and don't lick it?
- Use a boiled egg and a raw egg to demonstrate a irreversible change to the students.
- Compare physical and chemical change using diagrams
- Ask the students how ice cubes are formed?
- Tell the students to make a mixture and solution at home and come back and explain what happened?

Activities

- Arrange the students in groups or individually and read aloud the activities. Follow the instructions given in the Student's Book and Workbook.
- Help the students answer the questions from "In your notebook" and "Learning is fun" etc. Remind them that all the answers are in the Student's Book.

Workbook steps

Help the students solve answers and activities in the Workbook. They may do these individually in class or as homework or they may work in groups of 2-3. After completing each task from the workbook, students may compare their answers and check their answers with each other.

ANSWERS

Book Answers

In your Notebook (pg 53)

1. Students may take help from the internet, an encyclopedia or a handout given by the class teacher pertaining information about Albert Einstein e.g., his date of birth, background, key discoveries etc.
2. The way its particles move and how tightly packed they are, determines the state of matter.

Unit 5 Review

1. a. melting

   b. condensation

   c. evaporation

   d. freezing

2. Comparison of physical and chemical changes

Physical changes	Chemical changes
No new substance is formed.	A new substance is formed.
Brings about a change in the physical properties.	Brings about a change both in the physical and chemical properties.
Examples: tearing of paper, cutting of wood, crushing of aluminium can, dissolving of sugar or salt, evaporation, melting, condensation, freezing, boiling.	Examples: preparation of yoghurt, cheese, or butter from milk, boiling of egg, cooking of food, baking of bread, rusting of nails, etc.

3. There are four ways heat can change matter from one state to another:
   - melting e.g. when an ice cube turns to water
   - freezing e.g. when water turns into an ice cube
   - condensation e.g. when steam turns into water
   - evaporation e.g. when water turns into steam

4. Most solids melt when they reach a certain temperature i.e. via heating/boiling. Heating solid matter gives the particles energy. Once the temperature reaches the melting point of that material the particles have enough energy to move far enough away from each other for the solid to change into a liquid.
5. Freezing a matter changes it from a liquid into a solid. It does this by taking away energy, so it is the opposite of melting. When liquid is frozen, the particles stop moving and become closer and closer until the liquid becomes a solid. For e.g. liquid water freezes at 0o centigrade or 32o Fahrenheit.
6. Condensation happens when a gas is cooled so much that it becomes a liquid. This happens because the particles in the gas lose energy and start moving closer together. Condensation occurs naturally in clouds, when water vapour meets the cold air, transforming the vapour into tiny droplets of water. If you leave a cold glass on a table in a warm room, you will find condensation droplets on the surface of the glass, where the warm room air came in contact with the cold glass.
7. Evaporation is different from boiling. Liquids start evaporating at temperatures well below their boiling points. Water is always evaporating from the Earth. This is part of the water cycle. The temperature on Earth never reaches the boiling point of water. However, the higher the temperature, the more quickly the water evaporates.

Workbook Answers

Matter code

1. External
2. Talc
3. Blood
4. Molecules
5. Container
6. Gases
7. Temperature
8. Heating
9. Dissolved
10. Freezing

Which process?

1. Melting
2. Evaporation
3. Freezing
4. Evaporation
5. Melting

6. Condensation
7. Freezing
8. Evaporation

Change of state

Ice lolly, soup(steam), rain, bottle of water (droplets on the bottle), butter

Changing matter

1. Chemical
2. Physical
3. Physical
4. Chemical
5. Physical
6. Physical

Matter quiz

1. C
2. B
3. B
4. D
5. B
6. D
7. B
8. B
9. A
10. B

UNIT 6 LIGHT AND SOUND

Background

This unit builds on what is light and sound and identifies light sources. This unit tells you how light and sound can travel and explain the properties of light and sound. Use the activities in this guide as well as the Student's Book and Workbook to make your lesson enjoyable. They will also help to strengthen and reinforce these concepts.

Expected Learning Outcomes

Students should be able to:

- identify natural and artificial sources of light.
- justify that light emerges from a source and travels in a straight line.
- investigate luminous and non-luminous objects in daily life.
- identify and differentiate between transparent, opaque and translucent objects in their surroundings.
- Investigate that light travels in a straight line.
- explain the formation of shadows.
- predict the location, size and shape of a shadow from a light source relative to the position of objects.
- demonstrate that shiny surfaces reflect light better than dull surfaces.
- describe and demonstrate how sound is produced by a vibrating body.
- identify variety of materials through which sound can travel.
- identify that speed of sound differs in solids, liquids and gaseous medium.
- define and describe the intensity of sound with examples.
- define noise and its harmful effects on human health.
- appreciate the role of human beings in reducing noise pollution.

Resources

Student's Book pages 61-70

Workbook pages 30-40

Torches

Glass of water

Rubber band

Ruler

Student's Book and lesson ideas

1.

- Welcome the students into the class and ask them to sit at their tables.
- Ask them what light is? And what are the sources of light?
- Explain what luminous and non-luminous objects are and write down a list of luminous, non-luminous, transparent, translucent, and opaque objects on the board with the help of students (use examples from class and demonstrate, e.g. window, table, bulb etc)
- Instruct students to light a torch and throw it on the white ball. It brightens up. Pose the following question to the students: Is the ball bright because of its own light?
- Take a glass of water and hold it up. Ask the students whether they can see through the glass or not. Explain to them about transparent objects.
- Explain what a shadow is and how it is formed. Demonstrate using the torch and a white background.
- Ask them why the moon seems brighter at night and why they cannot see stars in the day?

2.

- Welcome the students into the class by using hand gestures ONLY. Don't make any sound.
- Explain the importance of sound and hearing in our life.
- Tell the students to explain sounds without speaking, and then ask them how hard it was to understand what they were trying to say?
- Ask students to explore with their rubber bands and hear what they can come up with. Continue the activity by asking students to develop other ways to illustrate sound vibration, such as tapping a ruler against their desk.
- Tell them to drop a pencil when there is silence in the class. Ask them to explain what happened.
- Tell the students to sing their favourite songs while putting their fingers against their throat and ask them how they felt?
- Ask the students to clap slowly and loudly and tell them to differentiate the intensity of the sound.

- Identify that speed of sound differs in solids, liquids and gaseous medium.
- Ask them how music is produced.
- Tell them to name different musical instruments. Ask them to share is they can play any of these instruments
- Tell them to list down ways to reduce noise pollution.

Activities

- Arrange the students in groups or individually and read aloud the activities. Follow the instructions given in the Student's Book and Workbook.
- Help the students answer the questions from "In your notebook" and "Learning is fun" etc. Remind them that all the answers are in the Student's Book.

Workbook steps

Help the students solve answers and activities in the Workbook. They may do these individually in class or as homework or they may work in groups of 2-3. After completing each task from the workbook, students may compare their answers and check their answers with each other.

ANSWERS

Book Answers

In your Notebook (pg 63)

1. Light travels in straight lines called rays. A collection of rays is called a beam.
2. When something gets in the way, the light is blocked. This is how a shadow is formed.
3. Luminous objects are those that give out light of their own, e.g the Sun, a fire, and a candle are all luminous objects. Non-luminous objects don't give out light of their own, e.g. a book, the moon, a door, etc.

In your Notebook (pg 64)

1. a. Transparent objects allow all light to pass through i.e. they do not block light at all or are "see-through". Clear glass or water is transparent.

   b. Opaque objects are objects that do not allow any light to pass through. A solid wooden door is opaque.

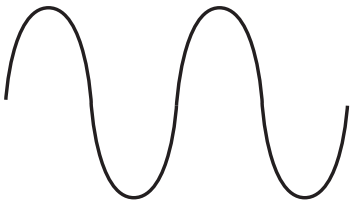
   c. Objects that allow some light to pass through are called translucent. Wax paper, frosted glass, and some plastics are all translucent.
2. It's made of transparent glass because you need to be able to see the road ahead clearly while driving, this would only be possible if light passes completely through the glass.

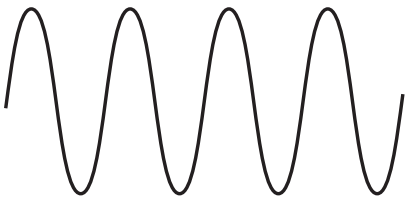
In your Notebook (pg 68)

1. Sounds are vibrations that can be heard when they reach an ear. These vibrations travel from our ears to the brain, through electrical impulses in nerve cells, which recognises them as sound, in less than a second.
2. Instruments make sounds by producing vibrations. If you beat the surface of a drum, you hear a sound. If you do not touch the surface of the drum, it will not vibrate, and no sound will be produced. Similarly, if you attach that string across the soundbox of a guitar, the vibrating string causes the soundbox to vibrate. As a result, air particles inside the soundbox start vibrating at the same frequency as the string. The wood of the guitar helps to amplify this sound. All instruments work in the same way.
3. Different musical notes can be created by changing the force and length of the vibrations produced by the same instrument. For example, with a guitar...
   - strings can be held down at different points to change the length of the string creating the vibration
   - strings can be tightened or loosened
   - strings can be placed in different positions in relation to the soundbox

Unit 6 Review

1. a. Artificial sources include electric lights, gas lights and candles. These sources help us see in the absence of natural sources e.g. at night or in the dark (when the Sun is not there).

   b. Non-luminous objects don't give out light of their own, e.g. a book, the moon, a door, etc. We can see non-luminous objects because light from luminous objects shines on them.
2. Some characteristics of shadows are:
   - Shadows are always formed on the opposite direction from the source of light.
   - The shape of the shadow is similar to the object that made it
   - The size of the shadow changes if the position or distance of the light source moves.
3. a.  low frequency notes

   b.  high frequency notes
4. Frequency is the number of waves produced in a second. The higher the frequency, the higher the sound. It is measured in units called hertz

Choose the correct words

1. Natural
2. Natural
3. Non-luminous
4. Luminous
5. Rays
6. Shadow
7. Day
8. Opposite
9. Shorter
10. Transparent

Transparent, translucent, and opaque

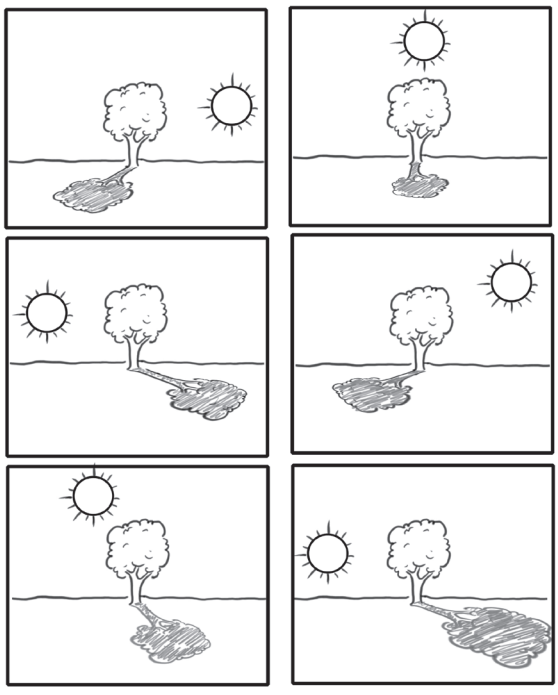
Opaque glass: reflective mirrors, colored/opaque glass jars or crockery

Transparent glass: lenses, windshield

Translucent glass: frosted glass, stained glass

Shadows

Light and shadows



Controlling the direction of sound

A. 1. vibrate

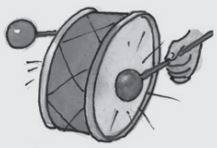
2. ears

3. brain

4. waves

5. smaller

B. Sounds help humans hear and communicate, they help animals who navigate using sound to live and find food etc.



Quietest to loudest

Jet engine, Helicopter, Rock concert, Car horn, Motor bike, Moderate rainfall, Vaccum cleaner, Alarm clock, Conversation, Ticking watch, Refrigerator, Whisper

Light and sound quiz

1. D
2. C
3. C
4. A
5. C
6. B
7. B
8. A
9. C
10. B

Sound crossword

Across

4. brain
5. water

6. low
7. waves

Down

1. vibrations
2. loud
3. ears

UNIT 7 ELECTRICITY AND MAGNETISM

Background

This unit demonstrates how important is electricity in our lives. It explains static electricity and how electric circuits are formed. Moreover, this unit also introduces electromagnetism and helps us identify the difference between conductors and insulators. Use the activities in this guide as well as the Student's Book and Workbook to make your lesson enjoyable. They will also help to strengthen and reinforce these concepts.

Expected Learning Outcomes

Students should be able to:

- explain the phenomenon of static electricity and explain how it is caused, giving examples from everyday life.
- describe charges and their properties.
- differentiate between conductors and insulators from daily life.
- describe the flow of electric current in an electric circuit.
- describe and design an electric circuit and explain its components.
- recognize that magnets can be used to attract some metallic objects.
- describe and demonstrate that magnets have two poles and like poles repel and opposite poles attract.
- identify earth as huge magnet and demonstrate it with experiment.
- describe the working of a magnetic compass.
- explain different types of magnets (permanent, temporary magnet and electro-magnet).

Resources

Student's Book pages 71-82

Workbook pages 41-46

Fuse

Magnet (horseshoe and bar)

Iron fillings

Paper

Student's Book and lesson ideas

1.

- Welcome the students into the class and ask them to sit at their tables.
- Explain electricity and the procedure of static electricity in everyday life.
- Ask them if they know how the electricity comes to our school and home?
- Ask them to describe charges and their properties.
- Write down five examples of conductors and insulators on the board with the help of class participation.
- Explain how current flows in an electric circuit.
- How does the fuse work, and explain its types.
- Show students what a fuse looks like and allow them to take a closer look
- Ask the students to list down the potential dangers of electricity at home and make a checklist of the precautions and whether they follow them

2.

- Welcome the students into the class and ask them to sit at their tables.
- Review what they had discussed in the previous class and encourage students to ask questions.
- Explain to the students what is magnetism and how does it work
- Explain to the students how the magnet compass works
- Teach them the types of magnets and pass around the magnets in class
- Ask the students to try which sides of the magnet attracts and repels one another and ask why
- Ask them to list down the objects attracted by a magnet; they can do this by trying out different objects in class
- Take a paper, place iron fillings on top of the paper and a magnet below the paper. After a while, you will see the iron fillings align with the magnetic field on the paper – carry out this experiment in class and ask the students why this happens
- Ask the students how can they make an electromagnet. Demonstrate this by showing the students a 2-3 minute video on how electromagnets are made.

Activities

- Arrange the students in groups or individually and read aloud the activities. Follow the instructions given in the Student's Book and Workbook.
- Help the students answer the questions from "In your notebook" and "Learning is fun" etc. Remind them that all the answers are in the Student's Book.

Workbook steps

Help the students solve answers and activities in the Workbook. They may do these individually in class or as homework or they may work in groups of 2-3. After completing each task from the workbook, students may compare their answers and check their answers with each other.

ANSWERS

Book Answers

In your Notebook (pg 73)

The type of electricity, caused by two objects rubbing together, is called static electricity. Friction changes the balance of positive and negative charges between objects. This results in an electric charge. The friction between two objects gives them an electric charge, by causing the electrons to jump from one object to the other. This means that static electricity can leap from one object to another.

In your Notebook (pg 76)

Sometimes the electric current supplied to households can get a sudden increase or decrease in its level. This can cause damage to devices such as bulbs, televisions, fridges, irons, etc. To prevent this damage, circuit breakers or fuses are used in electrical circuits. There are many types of fuses, including: cartridge fuse (the most common fuse is this one. The fuse part is enclosed in a glass envelope with metal caps on both ends. The fuse is inserted into the proper holder), automotive fuse (they are colour coded according to graded current and come in the form of a 'blade'. Other high-power circuits use these), and switch fuse (a handle that is manually operated can connect or disconnect high current fuses. It is commonly found in household circuit breaker board).

In your Notebook (pg 81)

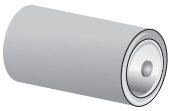
1. An electromagnet is a magnet that can be switched on and off with electricity. When the current flows it works like a magnet, when the current stops, it goes back to being an ordinary metal.
2. They can work as alarm systems, electronic appliances and so on. The students may use the internet to answer this question.

Unit 7 Review

1. What you'll need:

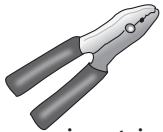
- large iron nail

- thinly-insulated copper wire (30 cm)

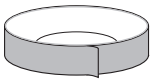


- D-cell battery

- paperclips and pins

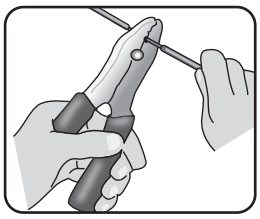


- wire strippers

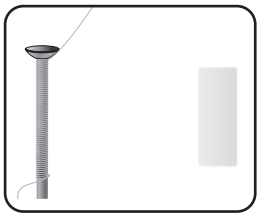


- masking tape

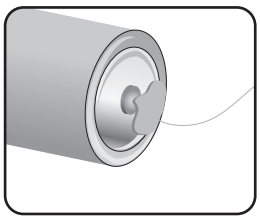
What you'll do:



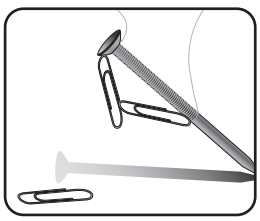
1. Using the wire strippers, remove a few centimetres of insulation from each end of the lengths of copper wire.



2. Wrap about one-third of the wire tightly around the nail. You need to leave about 10 centimetres of wire at each end. If you do, the nail will be wrapped with the middle section of the wire. The wire should be wrapped so closely that the coils touch all the way down without overlapping.



3. Wrap one end of the wire around the positive terminal of the battery. Wrap the other end around the negative terminal of the battery. Use a piece of tape to hold the wire in place.



4. Place the nail near the paper clips and nails. Because the nail is now an electromagnet, it should pick them up. You could find some larger objects and see how much weight your magnet can pick up.

2. The students should follow the instructions given in the question and write what happens. The paper will stick to the comb because of static electricity. Running a comb through your hair creates friction. This moves electrons from your hair to the comb, charging the comb with static electricity. The comb now has a negative charge. When you hold the comb near paper, its negative charge pushes away some of the negative charge to the paper, leaving the paper with a positive charge. Positive and negative charges attract, so the paper sticks to the comb.
3. Conductors are materials that allow an electric current to flow through them easily. Insulators are materials that do not allow an electrical current to flow through them easily.

Designing an electric circuit

This activity uses an electrical circuit to demonstrate how electricity flows through conductors and insulators. First prepare and test the circuit, without using the test materials you have collected. This will help you check that all connections are made correctly in the circuit.

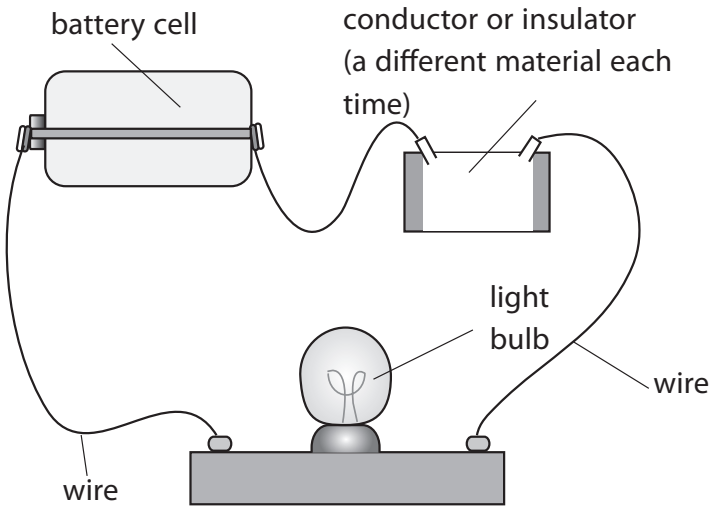
What you'll need:

- Three connecting wires with clips on the end
- 1.5 volt battery cell

- 2.5 volt light bulb
- Lots of different materials (e.g. plastic, wood, cloth, glass, rubber, different metals)

What you'll do:

1. Attach one end of a wire to the negative end of the battery cell and the other end to the base of the light bulb.
2. Attach one end of another wire to the light bulb and leave the other end unattached.
3. Attach one end of the last wire to the positive end of the battery and leave the other end unattached.
4. One by one join your materials to the spare clips to complete your circuit.



What you'll see:

The light will glow if the material is a good conductor of electricity. It will not glow if the material is an insulator.

4. The type of electricity, caused by two objects rubbing together, is called static electricity.

5. a. When the current flows an electromagnet works like a magnet, when the current stops, it goes back to being an ordinary metal. This helps in the working of many electrical appliances e.g. alarms and kettles.

   b. Insulators are materials that do not allow an electrical current to flow through them easily. Insulators may be used for protection purposes e.g. as the handle of an appliance using electricity.

   c. Many appliances in our homes use conductors as it allows electricity to pass through them, for example, an electric iron, an immersion heater, a toaster, an electric kettle etc.

   d. The transformer is a voltage control device that is used widely in the distribution and transmission of alternating current power. The function of the transformer is to transform alternating current energy from one voltage to another voltage.

   e. Sometimes the electric current supplied to households can get a sudden increase or decrease in its level. This can cause damage to devices such as bulbs, televisions, fridges, irons, etc. To prevent this damage fuses are used in electrical circuits.

   f. The purpose of a substation is to 'step down' high voltage electricity from the transmission system to lower voltage electricity so it can be easily supplied to homes and businesses in the area through lower voltage distribution lines.

Workbook Answers

Fill in the blanks

1. hurt
2. water
3. pins, tools, toys, pens
4. wet

Circle the correct answers

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

Wordsearch

S	I	A	P	L	H	C	E	P	P	C
T	A	B	F	O	G	U	Y	O	O	U
A	T	L	D	H	N	P	O	W	A	R
T	O	E	B	F	S	T	A	E	L	R
I	N	S	U	L	A	T	O	R	S	E
C	O	N	D	U	C	T	O	R	S	N

1. static
2. conductors
3. insulators
4. power

Conductors and insulators

I. Conductors are materials that allow an electric current to flow through them easily. Insulators are materials that do not allow an electrical current to flow through them easily.

II. Sometimes the electric current supplied to households can get a sudden increase or decrease in its level. This can cause damage to devices such as bulbs, televisions, fridges, irons, etc. To prevent this damage fuses are used in electrical circuits.

III.

Switch fuse	The fuse is protected by a glass envelope with metal caps at both ends.
Cartridge fuse	They come in the shape of a 'blade' (a clear plastic envelope with flat contacts) and are colour coded according to graded current.
Automotive fuse	High current fuses can be connected or disconnected manually using a handle.

Attract and repel

I. Repel, Attract, Repel, Attract

II. Rubber

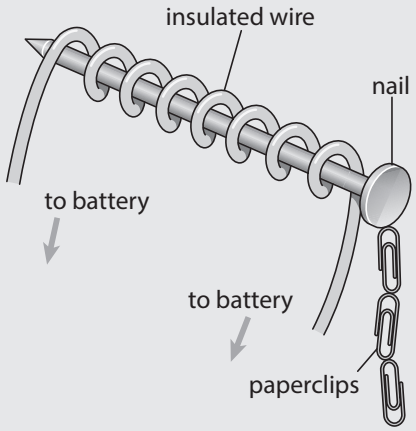
Make your own magnet

III. Electromagnets:

An electromagnet is a magnet that can be switched on and off with electricity. When the current flows it works like a magnet, when the current stops, it goes back to being an ordinary metal.

Electromagnet shows that electricity can produce magnetism. When an electric current passes through a wire, a magnetic field is set up around the wire.

If a small compass is placed near the wire carrying a current, the compass needle moves due to the magnetic field around the wire.



UNIT 8 STRUCTURE OF THE EARTH

Background

This unit explains the structure and water sources of the Earth. This unit also covers the difference between different types of soil. Use the activities in this guide as well as the Student's Book and Workbook to make your lesson enjoyable. They will also help to strengthen and reinforce these concepts.

Expected Learning Outcomes

Students should be able to:

- describe the structure of the Earth (i.e., crust, mantle, and core) and the physical characteristics of these distinct parts.
- Describe sources of water of Earth.
- identify similarities and differences among different types of soil.
- investigate the composition and characteristics of different soils.

Resources

Student's Book pages 83-87

Workbook pages 47-48

Flashcards/pictures of sources of water

Sand, silt, clay, loam

Student's Book and lesson ideas

1.

- Welcome the students into the class and ask them to sit at their tables.
- Explain to them that they will be learning about the things that make up the earth's surface i.e. soil and water.
- Explain the sources of water on Earth using flashcards and asking students to name them.
- Explain what soil is made up of
- Show the students different types of soil and allow them to feel it one-by-one

- Ask them to describe their characteristics/features and then explain them
- Ask the students to make a 3-D model of the structure of the Earth at home and present/display in next class.

2.

- Welcome the students into the class and ask them to sit at their tables.
- Review what they had discussed in the previous class and encourage students to ask questions.
- Ask students to one-by-one come to the front of the class and show their models, describe it and explain how they made it (show and tell)

Activities

- Arrange the students in groups or individually and read aloud the activities. Follow the instructions given in the Student's Book and Workbook.
- Help the students answer the questions from "In your notebook" and "Learning is fun" etc. Remind them that all the answers are in the Student's Book.

Workbook steps

Help the students solve answers and activities in the Workbook. They may do these individually in class or as homework or they may work in groups of 2-3. After completing each task from the workbook, students may compare their answers and check their answers with each other.

ANSWERS

Book Answers

In your Notebook (pg 86)

Soil is made up of many different types of minerals, water, air, and organic matter.

Organic matter is the remains of dead plants and animals.

They decay in the ground and once broken down become part of the soil. Organic matter provides nutrients to the soil.

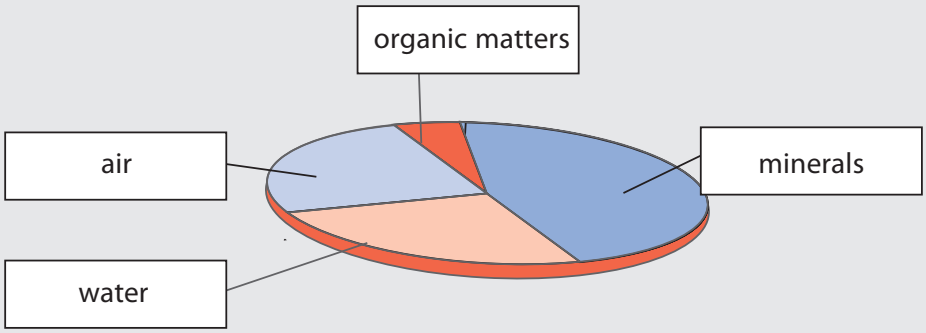
Unit 8 Review

1. There are three main types of soil:
   - clay
   - sand
   - silt
   - Clay soil has fine grains with very little air between the grains. Sand is made up of weathered limestone, granite, quartz, and shale rocks; it has large grains with lots of air between them. Silt is made up of minerals and organic particles with lots of nutrients; silt particles are larger than clay particles but smaller than sand particles.

2. Loam. It is a combination of clay, sand, and silt. It also contains organic matter. It is considered as the best soil for plants because it retains enough water for plants to get the nutrients they need but allows air to pass through.
3. There are many activities that take place in the soil. For example, the activities by microorganisms and animals. These include:
    - Bacteria breaking down dead organisms so that the nutrients from these can be used by new plants.
    - Bacteria converting chemicals that are harmful to some plants, such as nitrogen, into nutrients that are good for plants.
    - Fungi breaking down dead organisms and releasing the nutrients for new plants.
    - Fungi passing on nutrients directly to plants, particularly plants on the floor of rainforests where they don't get the sunlight they need to produce their own food.
    - Animals including worms, centipedes, millipedes, mites, beetles, slugs, snails and others use soil as their habitat.
    - Their burrowing and other movements create space in the soil for air and water, both of which are essential for plant life.
    - They eat dead plant and animal matter and return the nutrients back to the soil. These animals are called decomposers.
4. Soil does not always stay in one place. Heavy rain, wind or floods can pick up and carry soil from one place to another, leaving behind an area of land no longer suitable for plants. This is called soil erosion.
5. Sand, silt, clay, loam

Workbook Answers

What is soil made from?



Sources of water

Students may discuss any two of the following:

Oceans

An ocean is a large body of saltwater. Most of Earth's surface, about 71%, is covered with oceans. The water in the ocean is always moving. In some places, people remove the salt out of water before using this water.

Rivers And Streams

Rivers usually begin as streams in the mountains. The water comes from rain or snow. All rivers run into the ocean.

Standing water

Standing freshwater fills up holes in the ground. Examples are ponds, lakes, and reservoirs.

A reservoir is a human-made lake that is used to store water. Reservoirs are often made by building a dam across a river.

Groundwater

Many towns, farms, and factories depend on groundwater which is the water found beneath the surface. As rainwater seeps down into the ground, it eventually reaches a layer of rock that it cannot seep through. Groundwater builds up above that layer. People dig wells to get this water.

Most towns and cities are built near streams and rivers. These forms of running water bring rainwater and melted snow from mountains to homes, farms, etc.

Freshwater

Water that is not salty is called freshwater. About 1% of water on Earth is freshwater. Most freshwater is frozen. A small amount of freshwater is found in rivers and lakes.

Much of Earth's freshwater is frozen in huge sheets of ice or glaciers.

A glacier is a huge mass of ice that moves slowly over land. Pakistan contains more glacial ice than any other country on earth outside the polar regions.

Types of soil:

clay

Clay soil has fine grains with very little air between the grains. This means that it retains water. As a result, clay soil is rich in nutrients for plants because the nutrients are not washed away. There is so much water in clay that it is difficult for plants roots to take hold.

Sand

Sand is made up of weathered limestone, granite, quartz, and shale rocks. It has large grains with lots of air between them. This means that water drains away quickly. As a result, nutrients are easily washed away, making it hard for plants to grow. During hot weather, plants in sandy soil need to be watered regularly or have some sort of water storage system, like in cacti.

Silt

Silt is made up of minerals and organic particles with lots of nutrients. This aspect of silt makes it good for plants. Silt particles are larger than clay particles but smaller than sand particles. This means nutrients are

- **Loam**

Loam is a combination of clay, sand, and silt. It also contains organic matter. It is considered as the best soil for plants because it retains enough water for plants to get the nutrients they need but allows air to pass through.

UNIT 9 SPACE AND SATELLITE

Background

This unit builds on defines space and satellites and demonstrates their importance and applications. This unit will show us the significant milestones in space technology and different types of satellites. Moreover, it also tells us about the moons in the solar system. Use the activities in this guide as well as the Student's Book and Workbook to make your lesson enjoyable. They will also help to strengthen and reinforce these concepts.

Expected Learning Outcomes

Students should be able to:

- define the term 'satellite' and emphasize the need to explore it.
- recognize the role of NASA (National Aeronautics and Space Administration) in space exploration.
- define the term satellite and describe its importance.
- describe the natural satellite of the planets of the Solar System.
- define artificial satellite and explain their importance in exploring the Earth and space.
- recognize the key milestones in space technology.
- describe the uses of various satellites in space, i.e. geostationary, weather, communication and Global Positioning System (GPS).

Resources

Student's Book pages 88-93

Workbook pages 48- 51

video showing space (planets, sun, galaxies etc.) and satellites (natural and artificial)

pictures of the phases of the moon

Student's Book and lesson ideas

1.

- Welcome the students into the class and ask them to sit at their tables.
- Start your class by asking students what they understand about the motion of the Earth, the Sun, and other planets, such as:
  * Who can describe the difference in size between the Earth and the Sun?
  * Is it true that the Earth orbits the Sun or that the Sun orbits the Earth?
  * What are the factors that influence the Earth's seasons?
  * What is the difference between the rotation and revolution of the Earth?
- Explain to the students what space and satellites are using a 2-3 min video
- Explain the different types of satellites and their functions/uses
- Educate the kids about the importance of NASA's contributions to space exploration and technological advancements (use this link for reference: www.nasa.gov for research).

2.

- Welcome the students into the class and ask them to sit at their tables.
- Review what they had discussed in the previous class and encourage students to ask questions.
- Ask the students what makes the solar system and how many moons can be found on the solar system
- Ask the students to recall the planets and write down the number of moons in those planets
- Demonstrate the phases of the moon using pictures
- Teach the students how we measure our months according to the moon and how lunar months can occur
- Ask the students to make the solar system at home and present in the next class – either a painting, 3-D model, a DIY lamp of the solar system or whichever way they want to be creative.

Activities

- Arrange the students in groups or individually and read aloud the activities. Follow the instructions given in the Student's Book and Workbook.
- Help the students answer the questions from "In your notebook" and "Learning is fun" etc. Remind them that all the answers are in the Student's Book.

Workbook steps

Help the students solve answers and activities in the Workbook. They may do these individually in class or as homework or they may work in groups of 2-3. After completing each task from the workbook, students may compare their answers and check their answers with each other.

ANSWERS

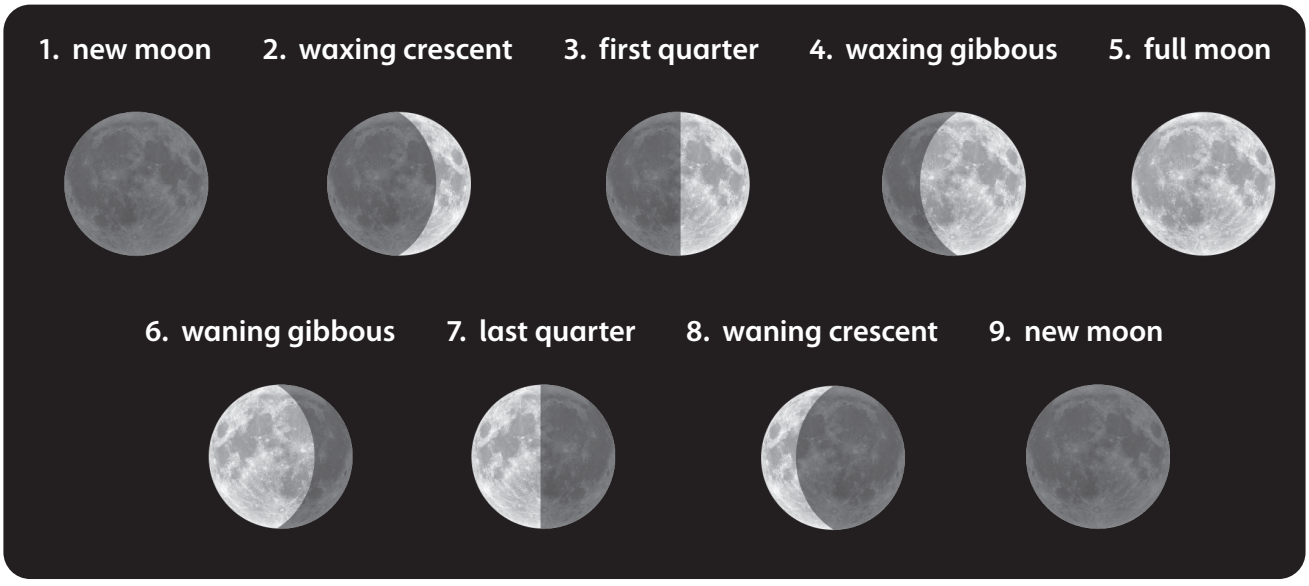
Book Answers

In your Notebook (pg 91)

1. Space is the general term given to everything beyond the Earth's atmosphere. Space is the area in which planets, stars, moons, and other bodies exist. Space is everywhere except within the atmospheres of these bodies.
2. NASA
3. Neptune
4. Uranus

Unit 9 Review (pg 93)

1. Natural satellites are moons and sometimes big or small stones, which orbit a planet. An Artificial satellite is an electronic device sent into space from Earth, which orbits the earth itself or other planets, providing communication and information, etc.
2. 7 phases.



3. Space is the general term given to everything beyond the Earth's atmosphere. Space is the area in which planets, stars, moons, and other bodies exist. Space is everywhere except within the atmospheres of these bodies. People have always had a fascination with celestial bodies, such as the sun, moon, and stars. Technology has made it possible for humans to explore not only the Earth, but also the sky and the space beyond. This has helped to clear the many myths and misconceptions the ancient people had about earth, sun, moon, and stars. Since the 1950s, technology has enabled humans to physically explore space to learn more about it.
4. All the planets in the solar system, except Mercury and Venus, have natural satellites known as moons. There are 193 moons orbiting planets in our solar system. The satellites also differ significantly in

composition. The Moon, for example, consists almost entirely of rocky material. Saturn's moons consist of 50 percent ice.

- The Earth has one moon.
- Mars has two moons; Deimos and Phobos, they are very small and oddly shaped.
- Mercury and Venus have none.
- Neptune has at least 13 moons, the largest of which is named Triton.
- Uranus has at least 27 moons; five of which are considered large for moons.
- Saturn has at least 62 moons; the largest, Titan is the second-largest moon in the solar system. The smallest are less than 1 kilometre across.
- Jupiter has at least 67 moons; most of them are very small but there are four large ones that are known as Galilean moons; their names are Io, Europa, Ganymede, and Callisto. Ganymede is the largest known moon in the solar system.

5. Timeline of space exploration and technology
   - 1957 Sputnik 1 from U.S.S.R. becomes the first satellite sent into space
   - 1959 First photograph of Earth taken from space
   - 1961 Yuri Gagarin from U.S.S.R. becomes the first human into space
   - 1966 Lunar 10 from U.S.S.R. becomes the first satellite to orbit the Moon
   - 1969 Neil Armstrong and Buzz Aldrin from U.S.A. become the first humans to walk on the Moon
   - 1971 Salyut 1 from U.S.S.R. becomes the first space station in space
   - 1990 Voyager 1 from U.S.S.R. takes first photo of the Solar System
   - 2009 Launch of Kepler space telescope to search for Earth-like planets by NASA
   - 2014 Rosetta probe by the European Space Agency makes a landing on a comet
   - 2015 First food grown in space (lettuce) eaten
   - 2020 First private (non-government) space flight sending humans into space (SpaceX).
6. a. They help our understanding of the planets by collecting information about them, such as, information about weather. The information sent by satellites orbiting the earth has helped us understand weather patterns, effects of greenhouse gases and climate change. Communication satellites provide images from all around the world that we can watch live on television.

   b. GPS or Global Positioning System (GPS) technology provides us with mapping information to help us get from place to place in the quickest time.

   c. A communications satellite is relays and amplifies radio telecommunication signals, establishing a communication link between a source transmitter and a receiver in various parts of the Earth. It helps with communications and live traffic updates, etc.

Workbook Answers

Which planet am I?

1. Mars
2. Mercury
3. Venus
4. Uranus
5. Neptune
6. Jupiter
7. Earth
8. Saturn

Space exploration

Fill in the blanks

1. Space
2. Moon
3. Hubble
4. Gravitational pull
5. 193
6. 27
7. 50

Crossword

Across

- 3. Sputnik1
- 4. Salyut1

Down

- 1. lettuce
- 2. nasa

UNIT 10 TECHNOLOGY IN EVERYDAY LIFE

Background

This unit builds on demonstrates how technology has changed our lives and made it better. Moreover, it will also explore how safety measures and drills work in emergencies. Use the activities in this guide as well as the Student's Book and Workbook to make your lesson enjoyable. They will also help to strengthen and reinforce these concepts.

Expected Learning Outcomes

Students should be able to:

- Enlist and practice safety procedures while carrying out the activities.
- Make moveable van, bus, trolley etc.
- Make a model of foot bridge and bookshelf.
- Make a musical instrument from easily available resources.
- Use spirit level/water level to level different objects (table, picture, frame etc.).
- Use a plumb line to install a flag pole vertically.
- Prepare LED light strings working with 12 volt battery.
- Use first aid box to dress a wound.
- Practice shifting a person to hospital.
- Practice earth quake, fire and flood drill.

Resources

Student's Book pages 94-104

Workbook pages 52-54

Recyclable materials

Bandages

Student's Book and lesson ideas

1.

- Welcome the students into the class and ask them to sit at their tables.
- Explain to the students the basic safety protocol in case of an emergency.
- Ask the students to bring a bandage and tell them to practice the steps given below to bandage any wounds and injuries.
- Demonstrate a practice drill for earthquakes, fire, and flood in class.
- Help the students practice shifting a person to hospital.
- Ask students to make any object they like using recyclable materials left at their homes and present in the next class.

Activities

- Arrange the students in groups or individually and read aloud the activities. Follow the instructions given in the Student's Book and Workbook.
- Help the students answer the questions from "In your notebook" and "Learning is fun" etc. Remind them that all the answers are in the Student's Book.

Workbook steps

Help the students solve answers and activities in the Workbook. They may do these individually in class or as homework or they may work in groups of 2-3. After completing each task from the workbook, students may compare their answers and check their answers with each other.

ANSWERS

Workbook Answers

Fill in the blanks

1. Spirit level
2. A first aid box
3. Clean bandages/bandage tape

Crossword

Across

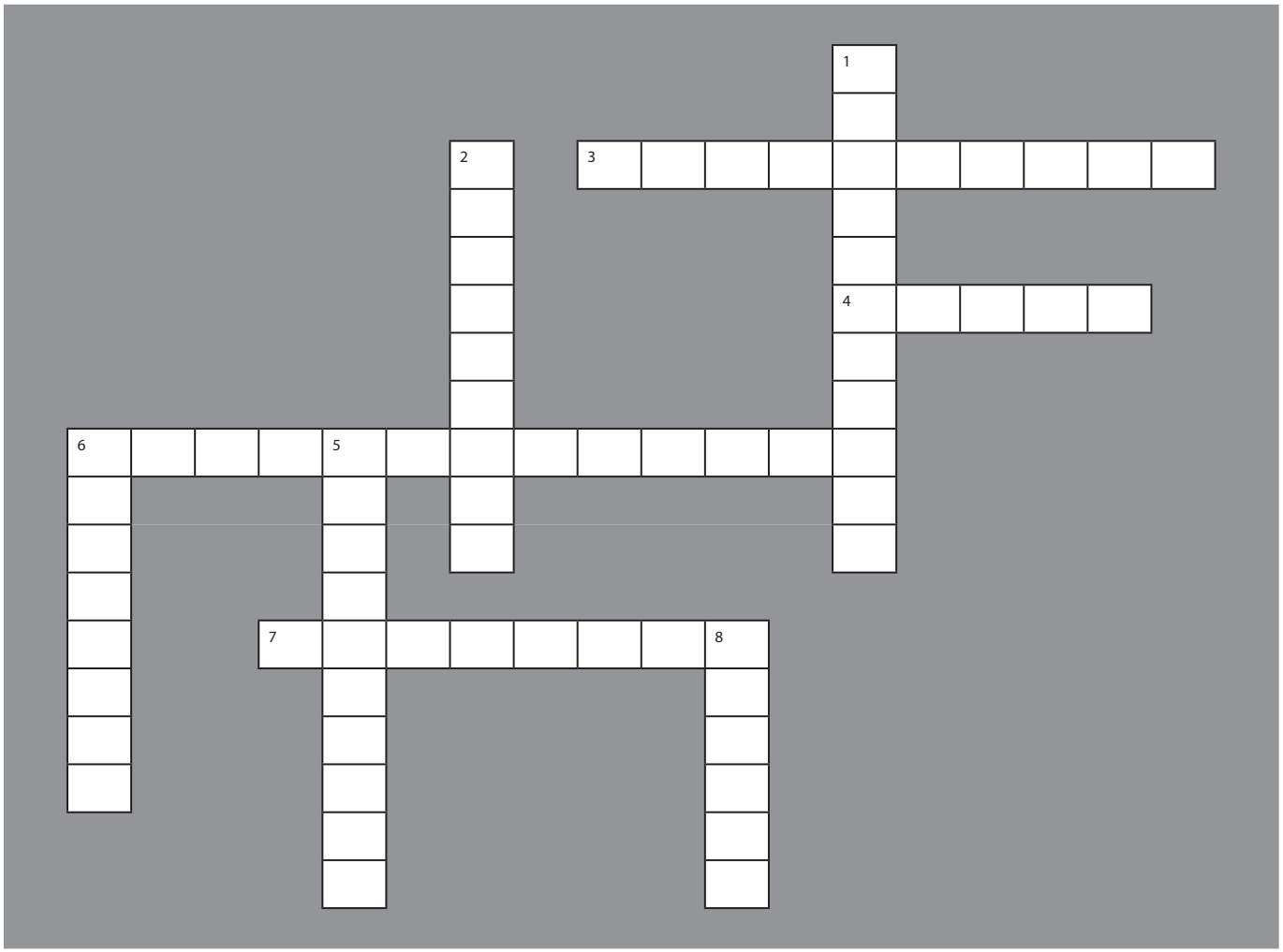
3. led
4. thermometer

Down

1. plumbline
2. elevators

WORKSHEETS

Name: _____ **Date:** _____



Across

3. they are the major source of food for most other animals
4. They have scales but only on their legs and feet.
6. Their flowers have petals which are either 3 or multiples of 3.
7. they are the largest group of invertebrates.

Down

1. it have a backbone and is less than 5% of all animals on Earth
2. This insect kills more humans than any other animal by spreading of diseases
5. They all have star-like appearance.
6. The examples of this type of vertebrates are : Cats, dogs, rats, kangaroos, koalas, opossums,platypus and the echid
7. These are types of reptiles that don't have four legs

Name: _____ **Date:** _____

Q1) Word Scramble:

1. BIANMPHI _____
2. SGSPAOPSHRRE _____
3. ESHAORES _____
4. RAIADNCNIS _____
5. GSPESON _____
6. NRAMESOSPIG _____
7. RPSOTATI _____

Q2) Give reasons why:

a) A dog is alive:

Answer: _____

b) A paper is not alive

Answer: _____

Q3) Write down the name of the plant reading the below descriptions:

Flowers with petals are fours or fives _____

One cotyledon _____

Flowers with petals in threes _____

Leaves with parallel veins _____

Chickpea is an example _____

Name: _____ **Date:** _____

B	G	S	M	K	F	Y	S	A	B	F	V
Y	I	N	F	E	C	T	I	O	N	F	A
A	N	T	I	B	I	O	T	I	C	S	C
K	E	P	J	A	L	X	F	A	F	Q	C
C	O	R	O	N	A	V	I	R	U	S	I
D	H	P	C	W	P	N	I	K	Q	T	N
T	O	O	T	H	D	E	C	A	Y	E	E
D	S	P	R	O	T	O	Z	O	A	C	S

Find the following words in the puzzle. Words are hidden → and ↓.

ANTIBIOTICS
CORONAVIRUS
INFECTION
PROTOZOA
TOOTH DECAY
VACCINES

Name: _____ **Date:** _____

Q1. Fill the below table:

Microorganisms	Disease
	cholera, typhoid, TB (Tuberculosis), food poisoning, and throat infection.
Viruses	
Algae	
	Ringworm and athlete's foot

Q2. State the Reasons:

1) Why should we wash our hands before eating?

Answer:

2) Why should we take proper and a healthy diet?

Answer:

Q3 TRUE/FALSE:

1. The Symptoms of dengue include severe headache, pain behind the eyes, muscle and joint pains, nausea, vomiting, rash etc
2. Human is made up of trillions of cells
3. Cholera and typhoid are spread through infected food and water.
4. Protozoa have an animal-like cells.
5. Yeast is a plant, and it is used to bake bread.
6. Micro means big and organisms means extinct

Name: _____ **Date:** _____

Q1) Colour and complete the structure of the flower.

Name: _____ **Date:** _____

Q2) Choose the correct words:

1) The _____ is a seed leaf that emerges from the seed when it germinates.
   a) Germ seeds
   b) Mature seeds
   c) Cotyledon
2) Peas and beans, lack an _____.
   a) embryo
   b) Endosperm
   c) Monocot
3) _____ involves the use of male and female reproductive cells and pollination.
   a) Asexual Reproduction
   b) Germination
   c) Sexual Reproduction
4) _____ is the transfer of pollen grains from the anther to the stigma of the same flower.
   a) Fertilization
   b) Self-Pollination
   c) Cross-Pollination
5) The sepal protects the _____ before it opens into a flower.
   a) Stamen
   b) Bud
   c) Ovule

Name: _____ **Date:** _____

Q1) Put the steps of Germination of seeds in order.

_____ Now the plant is no longer relying on the food in its seed. As it produces more of its own food, it grows more leaves. It also grows bigger and eventually produces seeds that eventually form new plants.

_____ The seed soaks up water from the ground. When the water enters the seed, it breaks down the food that is stored inside the seed.

_____ The embryo plant gets too big for its seed and breaks through the case. The case has been softened by the water.

_____ The first parts of the plant to break through the seed are the roots.

_____ When the food inside the seed breaks down, it releases energy. This energy causes the embryo plant to grow inside the seed.

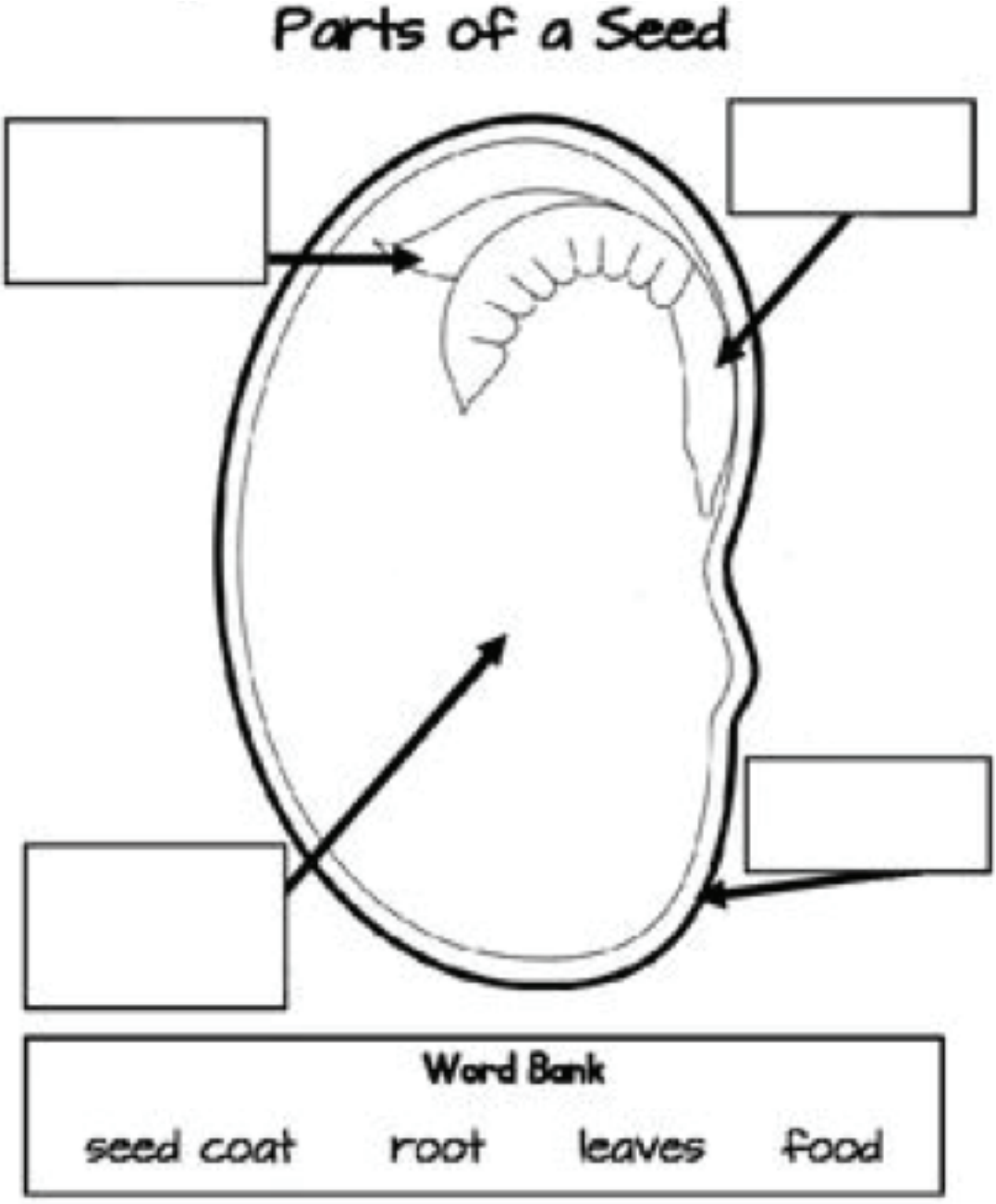
_____ The next part to emerge is the cotyledon.

_____ Once the shoot breaks through the surface, light and heat from the Sun enable the plant to start producing its own food. The cotyledon leaves turn green.

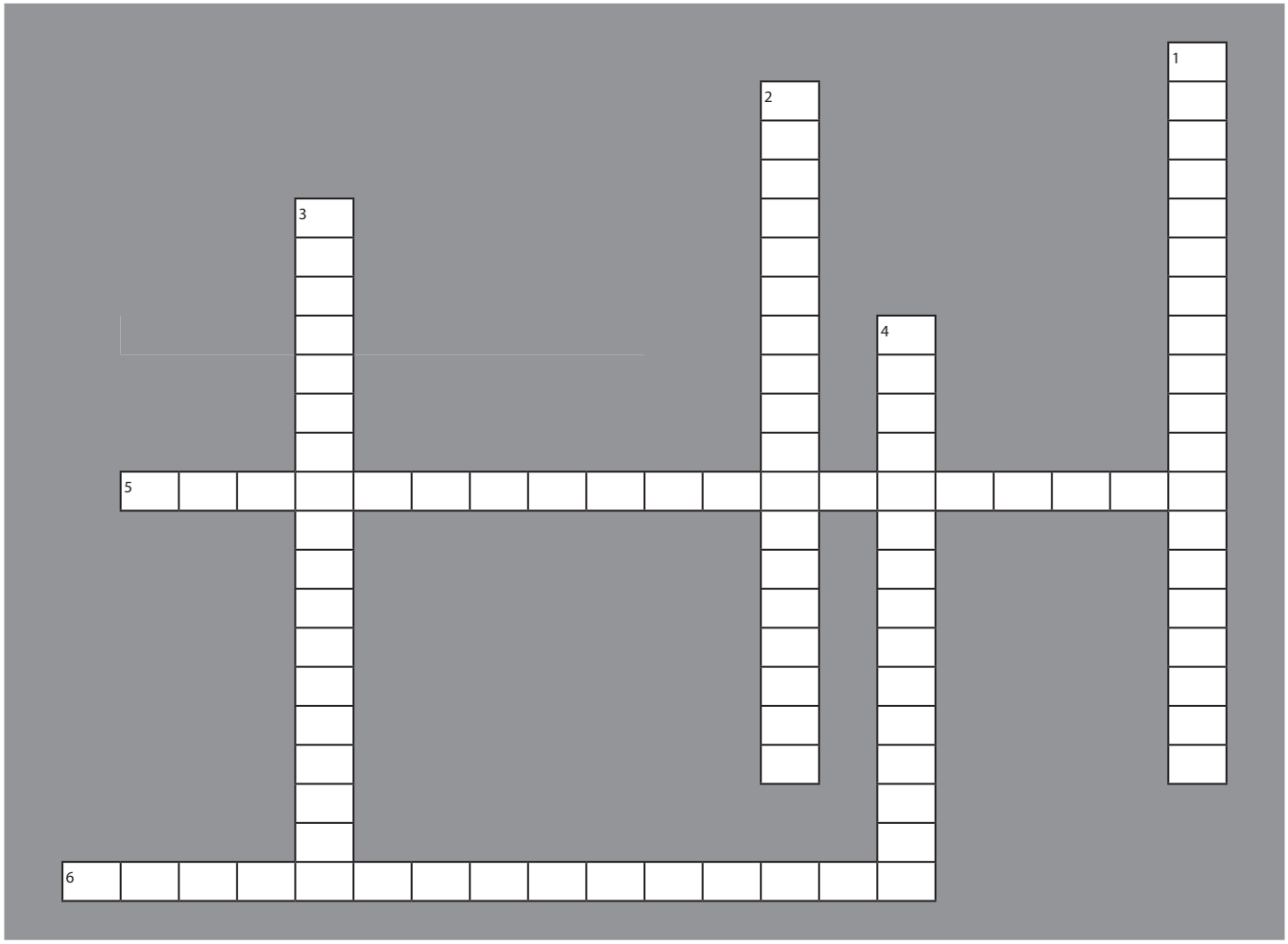
_____ the roots grow downward and anchor the plant to stop it from being blown or washed away.

Name: _____ **Date:** _____

Q2) Complete the below parts of the seeds using the word bank:



Name: _____ **Date:** _____



Across

5. Fruit and vegetable peel are the examples of this waste
6. In human, this type of pollution can cause hearing loss, stress, lack of sleep an

Down

1. When fossil fuels (oil, gas, and coal) are burnt, they release some gases into the air.
2. It is the presence of large objects on the landscape,
3. It doesn't decompose naturally
4. Dumping of Rubbish

Name: _____ **Date:** _____

Q1) Match the Following:

1.noise pollution	a) makes the life of water impure.
2.water pollution	b) causes desertification.
3.land pollution	c) causes the problem of hearing
4. air pollution	d) contaminates the indoor or outdoor environment.

Q2) List the characteristics of visual pollution:

_____

_____

_____

Q3) Which is the best method to help the environment for each thing below:

	reduce	reuse	recycle
	reduce	reuse	recycle
	reduce	reuse	recycle
	reduce	reuse	recycle
	reduce	reuse	recycle

Name: _____ **Date:** _____

Z	F	R	U	S	T	I	N	G	V	L	C
L	G	S	O	L	U	T	I	O	N	S	E
H	E	D	T	S	O	L	I	D	C	J	H
T	E	M	P	E	R	A	T	U	R	E	B
C	O	N	D	E	N	S	A	T	I	O	N
D	B	U	R	N	I	N	G	I	J	R	D
J	U	A	S	M	E	L	T	I	N	G	X
E	V	A	P	O	R	A	T	I	O	N	L

Find the following words in the puzzle. Words are hidden → and ↓.

1 BURNING
CONDENSATION
EVAPORATION
MELTING
RUSTING
SOLID
SOLUTIONS
TEMPERATURE

Name: _____ **Date:** _____

Q1) True/False

1) Evaporation turns a solid into a gas _____.
2) A mixture is a combination of two or more different materials _____.
3) When heat is applied to certain materials such as ice or wax, they freeze _____.
4) A boiled egg cannot be turned back into a raw egg _____.
5) Condensation happens when a gas is cooled so much that it becomes a solid _____.
6) liquid water freezes at 0 centigrade or 320 Fahrenheit _____.
7) Heating solid matter doesn't gives the particles energy _____.
8) There are five main forms of matter _____.
9) All matter is made up of atoms _____.
10) In Chemical Change in a matter, a new substance is formed _____.

Q2) Answer the following:

Invite a volunteer to blow up a balloon and ask students:

a) What is inside this balloon?

Answer:_____

b) What are the bubbles in fizzy drinks?

Answer:_____

Name: _____ **Date:** _____

Q1) State two examples of the following:

a) Opaque objects _____

b) Transparent objects _____

c) Translucent objects _____

d) Luminous objects _____

e) Non-luminous objects _____

Q2) Choose the correct answer.

1. A bulb produces light / sound. 
2. A guitar produces sound / light. 
3. A speaker produces sound/ heat. 
4. The Sun produces heat / light / sound. 
5. A torch produces light / sound. 

Q3) Who am I:

1. I am a form of energy that helps you to see. I am _____.
2. I am a dark area where light from a light source is blocked by an opaque object. I am a _____.
3. I cannot travel through a vacuum. I am _____.
4. I am measured in units called hertz. I am _____.

Name: _____ **Date:** _____

Q1) State the reasons?

a) Is air around us always transparent? Explain?

Answer: _____

b) How is a shadow formed?

Answer: _____

c) Does light pass through a rock?

Answer: _____

d) Why does sound travel faster through woods than air?

Answer: _____

e) How does light and sound energy travel?

Answer: _____

Name: _____ **Date:** _____

Q2) True/False

1) Light can bend around objects T/F
2) Sound waves travel faster in cold water than in warm water T/F
3) A sound vibration makes tiny particles of the air bump into each other T/F
4) Light and shiny objects are bad reflectors of light T/F
5) Opaque objects form clear shadows because no light passes through them. T/F
6) We can see non-luminous objects in the dark T/F
7) The main source of light for the Earth is the moon. T/F

Name: _____ **Date:** _____

Q1) Match the following with the correct description:

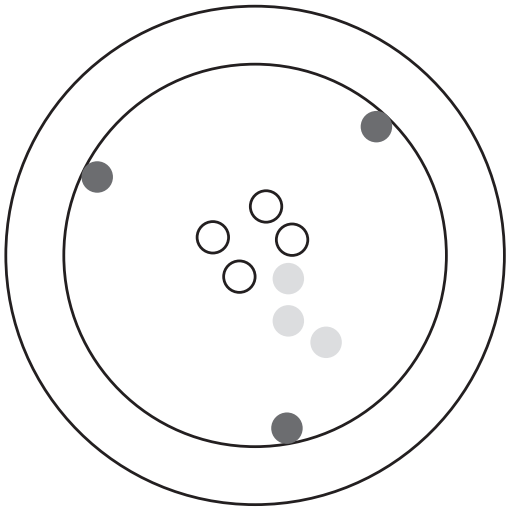
Electromagnets	It is a force that involves objects repelling or attracting one other
Switch Fuse	It comes in a form of blade
Magnetism	These are materials that do not allow an electrical current to flow through them easily.
Static Electricity	It is commonly found in household circuit breaker boards.
Atoms	There are neutral charged because the number of protons and electrons is equal.
Insulators	The type of electricity, caused by two objects rubbing together
Automotive fuse	When an electric current passes through a wire, a magnetic field is set up around the wire.

Q2) Write down the number of protons, neutrons and electron in the following atom:

●: Electron

○: Proton

●: Neutron



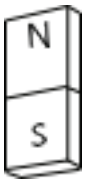
Name: _____ **Date:** _____

Electron _____

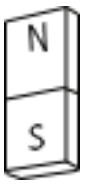
Proton _____

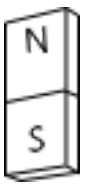
Neutron _____

Q3) State attract or repel to the following diagrams below:



_____





_____

Name: _____ **Date:** _____

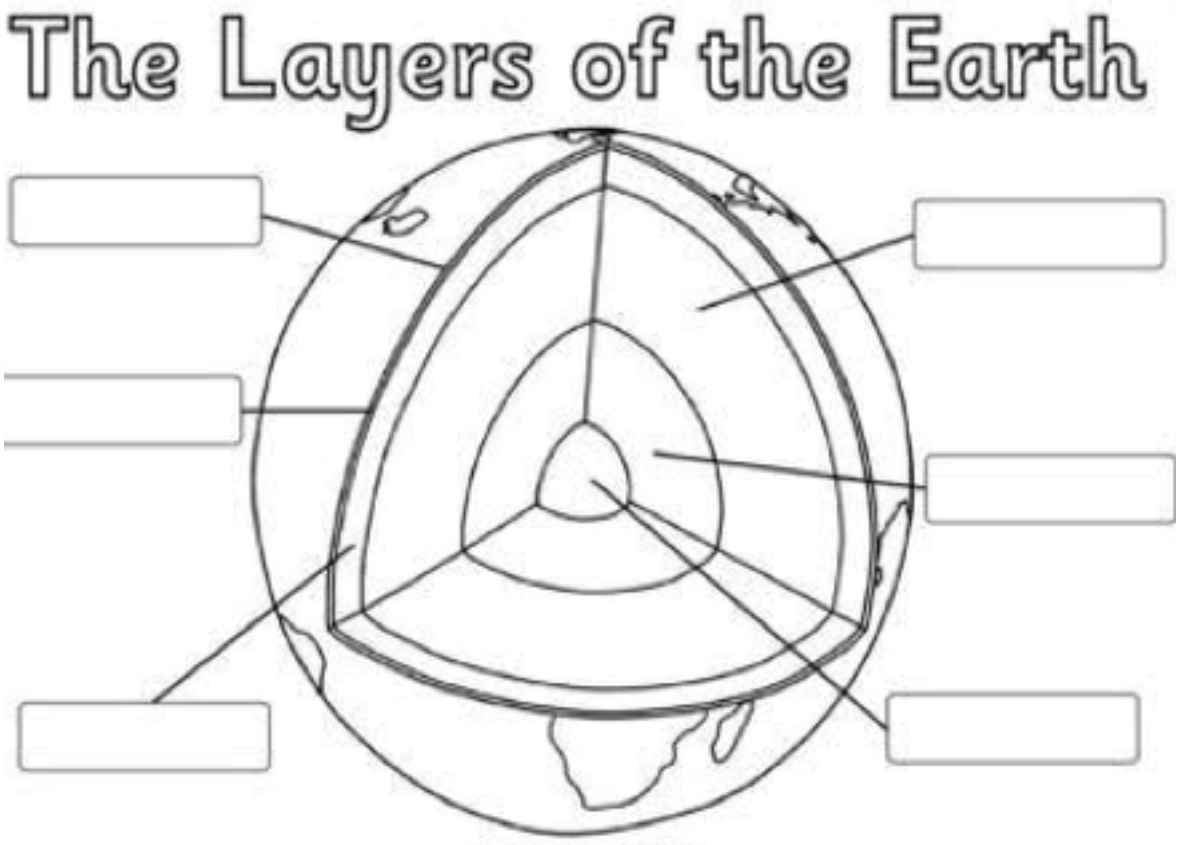
I	N	S	U	L	A	T	O	R	S	X	M
C	P	O	S	I	T	I	V	E	E	Y	A
T	R	A	N	S	F	O	R	M	E	R	G
L	I	I	U	F	E	N	O	R	T	H	N
S	U	B	S	T	A	T	I	O	N	Z	E
K	E	L	E	C	T	R	O	N	S	L	T
T	Z	O	F	R	I	C	T	I	O	N	S
C	O	N	D	U	C	T	O	R	S	Z	M

Find the following words in the puzzle. Words are hidden → and ↓.

TRANSFORMER CONDUCTORS INSULATORS SUBSTATION
ELECTRONS FRICTION POSITIVE MAGNETS
NORTH

Name: _____ **Date:** _____

Q1) a) Colour and Complete the layers of the Earth.



b) Answer the following questions:

a) Which layers do we live in?

b) Which is the hottest part in the structure of the Earth?

c) Which layer is made of hot liquid rocks?

d) Which is the thinnest layer of the Earth?

e) Which layer is responsible for the Earth's magnetic field?

Name: _____ **Date:** _____

Q2) Fill in the Blanks:

1. Most of Earth's surface, about _____ is covered with oceans.
2. The _____ is 6-7 km thick.
3. A _____ is a human-made lake that is used to store water.
4. Water that is not salty is called _____
5. _____ covers the top of the upper layer of the Earth.
6. Silt is made up of _____ and organic particles with lots of nutrients.
7. _____ is the best soil for plants.
8. A glacier is a huge mass of _____ that moves slowly over land.

Name: _____ **Date:** _____

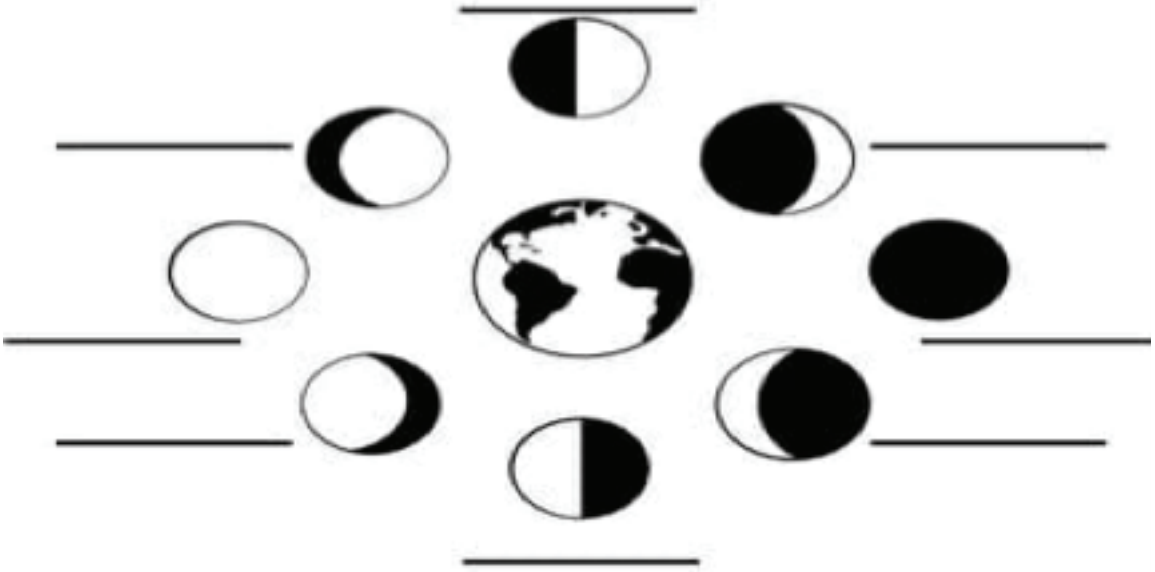
Y	M	A	N	T	L	E	B	O	D	X	G
Z	O	C	E	A	N	S	V	T	L	O	L
G	R	O	U	N	D	W	A	T	E	R	A
S	O	I	L	E	R	O	S	I	O	N	C
V	W	R	S	T	R	E	A	M	S	O	I
Q	U	A	R	T	Z	L	O	A	M	Q	E
H	R	I	E	A	R	T	H	P	R	E	R
D	L	L	I	M	E	S	T	O	N	E	S

Find the following words in the puzzle. Words are hidden → and ↓.

SOILEROSION
STREAMS
EARTH
GROUNDWATER
MANTLE
LOAM
LIMESTONE
OCEANS
SOIL
GLACIER
QUARTZ

Name: _____ **Date:** _____

Q1) a) Write down the phases of the moon:



b) Answer the following questions:

a) Which planet has at least 67 moons?

_____

b) Name the names of the moons in Mars?

_____

c) Which is the second-largest moon in the solar system?

_____

d) Which planet has the moon named Triton?

_____

Q2) Write down about Geostationary satellites and Artificial Satellites?

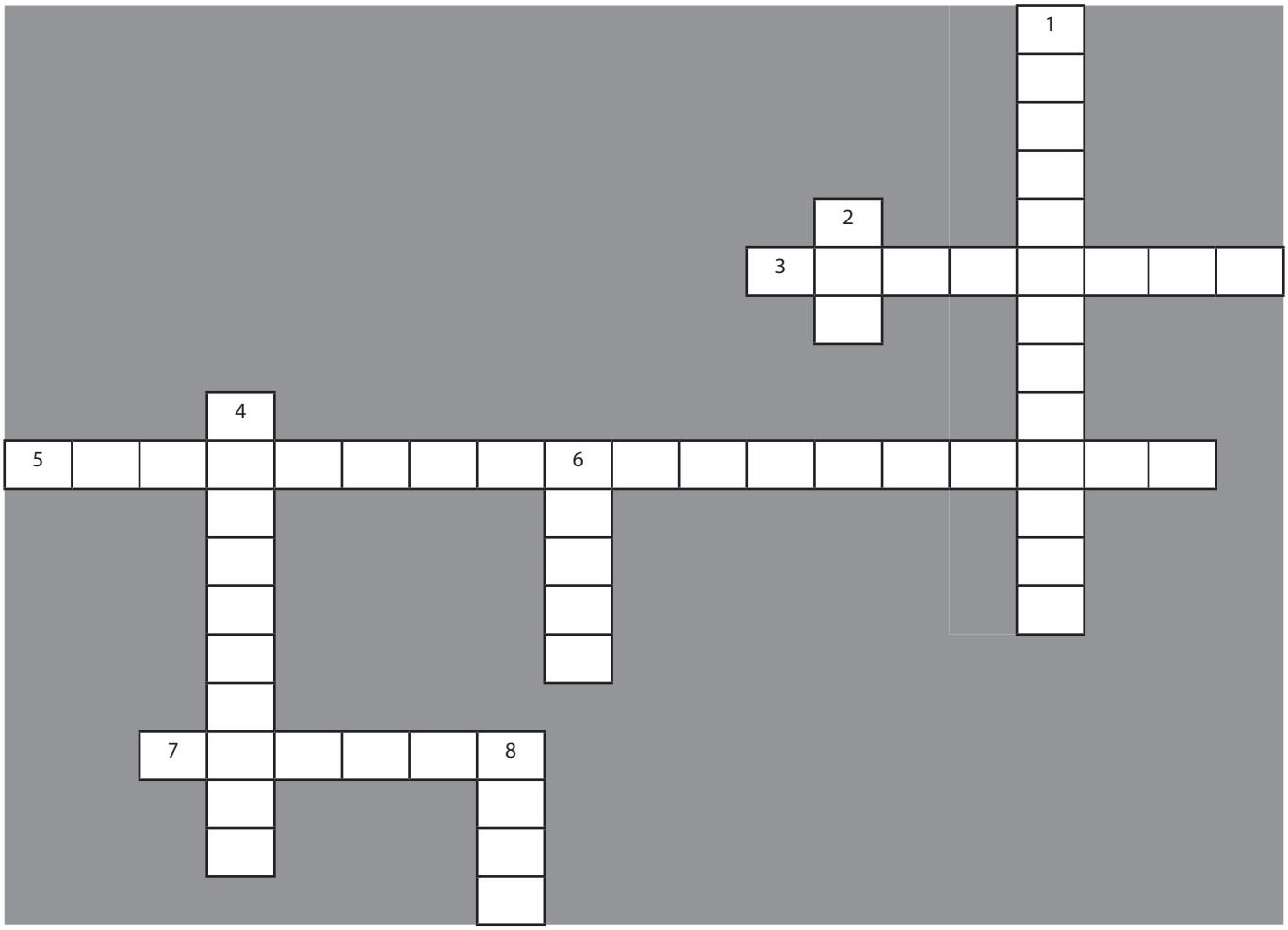
_____

_____

_____

_____

Name: _____ **Date:** _____



Across

3. First Satellite
5. is a tylt is type of satellite that is used to monitor the Earth's weather and
7. It has at least 62 moons.

Down

1. This satellite helps helps with communications and live traffic updates
2. It is the technology provides us with mapping information to help us get from place to place in the quickest time.
4. It is means still or not moving.
6. It is the general term given to everything beyond the Earth's atmosphere.
8. This is the organisation that has led the way in space exploration.

Q1) Write down the basic safety protocols during any emergency?

Q2) Name and Write down the function of the below technology?

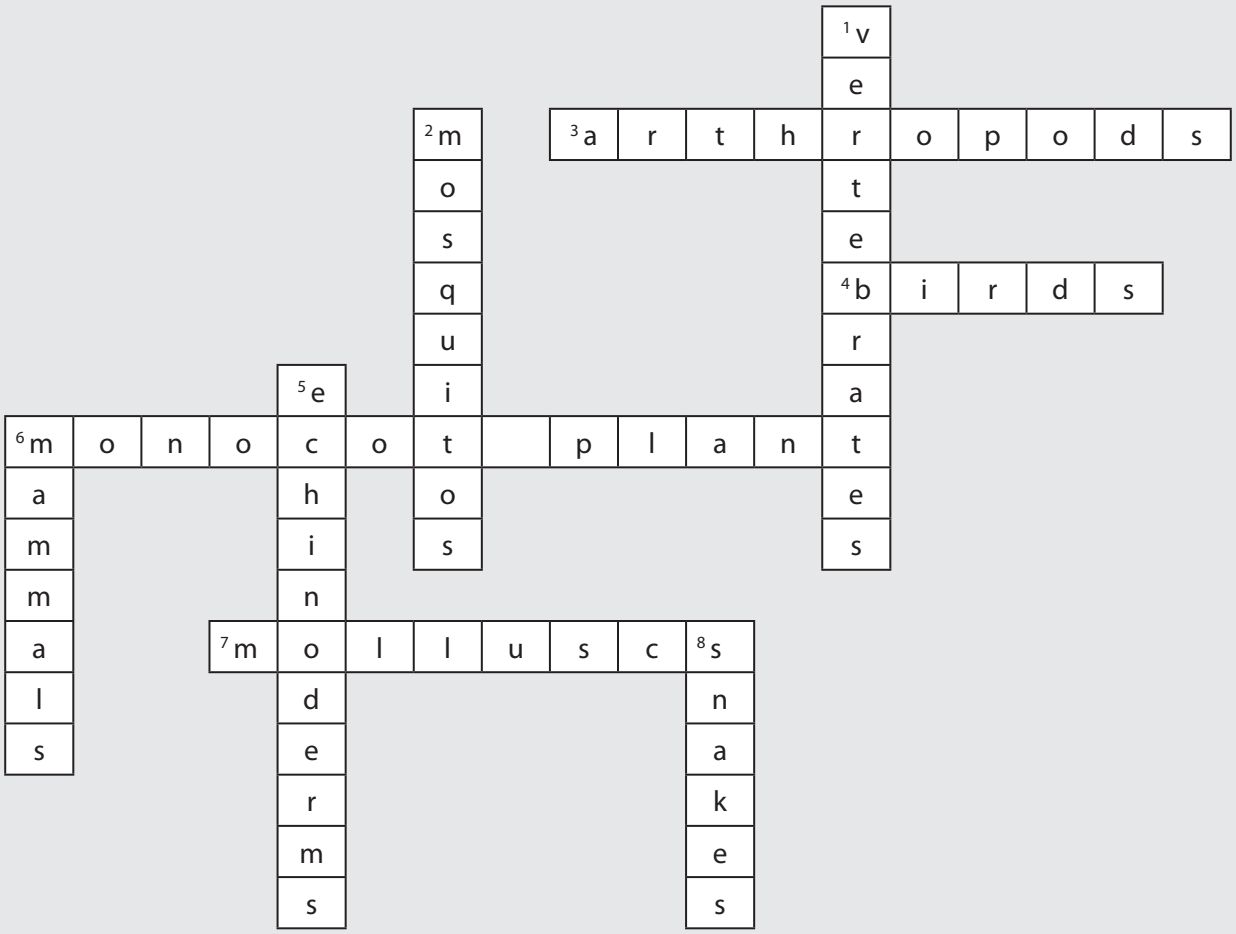
a) 

b) 

c) 

d) 

Characteristics of Living things



Across

3. they are the major source of food for most other animals **(arthropods)**

4. They have scales but only on their legs and feet. **(birds)**

6. Their flowers have petals which are either 3 or multiples of 3. **(monocot plant)**

7. they are the largest group of invertebrates. **(molluscs)**

Down

1. it have a backbone and is less than 5% of all animals on Earth **(vertebrates)**

2. This insect kills more humans than any other animal by spreading of diseases **(mosquitos)**

5. They all have star-like appearance. **(echinoderms)**

6. The examples of this type of vertebrates are : Cats, dogs, rats, kangaroos, koalas, opossums,platypus and the echid **(mammals)**

7. These are types of reptiles that don't have four legs (**snakes)**

Q1) Word Scramble:

1. BIANMPHI — AMPHIBIAN
2. SGSPAOPSHRRE — GRASSHOPPERS
3. ESHAORES — SEAHORSE
4. RAIADNCNIS — CNIDARIANS
5. GSPESON — SPONGES
6. NRAMESOSPIG — ANGIOSPERMS
7. RPSOTATI — PROTISTA

Q2) Give reasons why:

a) A dog is alive:

Answer: _____

b) A paper is not alive

Answer: _____

Q3) Write down the name of the plant reading the below descriptions:

Flowers with petals are fours or fives _____

One cotyledon _____

Flowers with petals in threes _____

Leaves with parallel veins _____

Chickpea is an example _____

											V
	I	N	F	E	C	T	I	O	N		A
A	N	T	I	B	I	O	T	I	C	S	C
											C
C	O	R	O	N	A	V	I	R	U	S	I
											N
T	O	O	T	H	D	E	C	A	Y		E
		P	R	O	T	O	Z	O	A		S

ANTIBIOTICS
CORONAVIRUS
INFECTION
PROTOZOA
TOOTH DECAY
VACCINES

Q1. Fill the below table:

Microorganisms	Disease
Bacteria	cholera, typhoid, TB (Tuberculosis), food poisoning, and throat infection.
Viruses	Common cold virus, influenza virus, measles virus, chickenpox virus, covid-19 coronavirus.
Algae	gastroenteritis
Fungi	Ringworm and athlete's foot

Q2. State the Reasons:

1) Why should we wash our hands before eating?

Answer:

2) Why should we take proper and a healthy diet?

Answer:

Q3. TRUE/FALSE:

1) True
2) False
3) True
4) True
5) True
6) False

Answers:

Q2)

1) Cotyledon
2) Endosperm
3) Sexual reproduction
4) Self-Pollination
5) Bud

Answers:

Q2)

H Now the plant is no longer relying on the food in its seed. As it produces more of its own food, it grows more leaves. It also grows bigger and eventually produces seeds that eventually form new plants.

A The seed soaks up water from the ground. When the water enters the seed, it breaks down the food that is stored inside the seed.

C The embryo plant gets too big for its seed and breaks through the case. The case has been softened by the water.

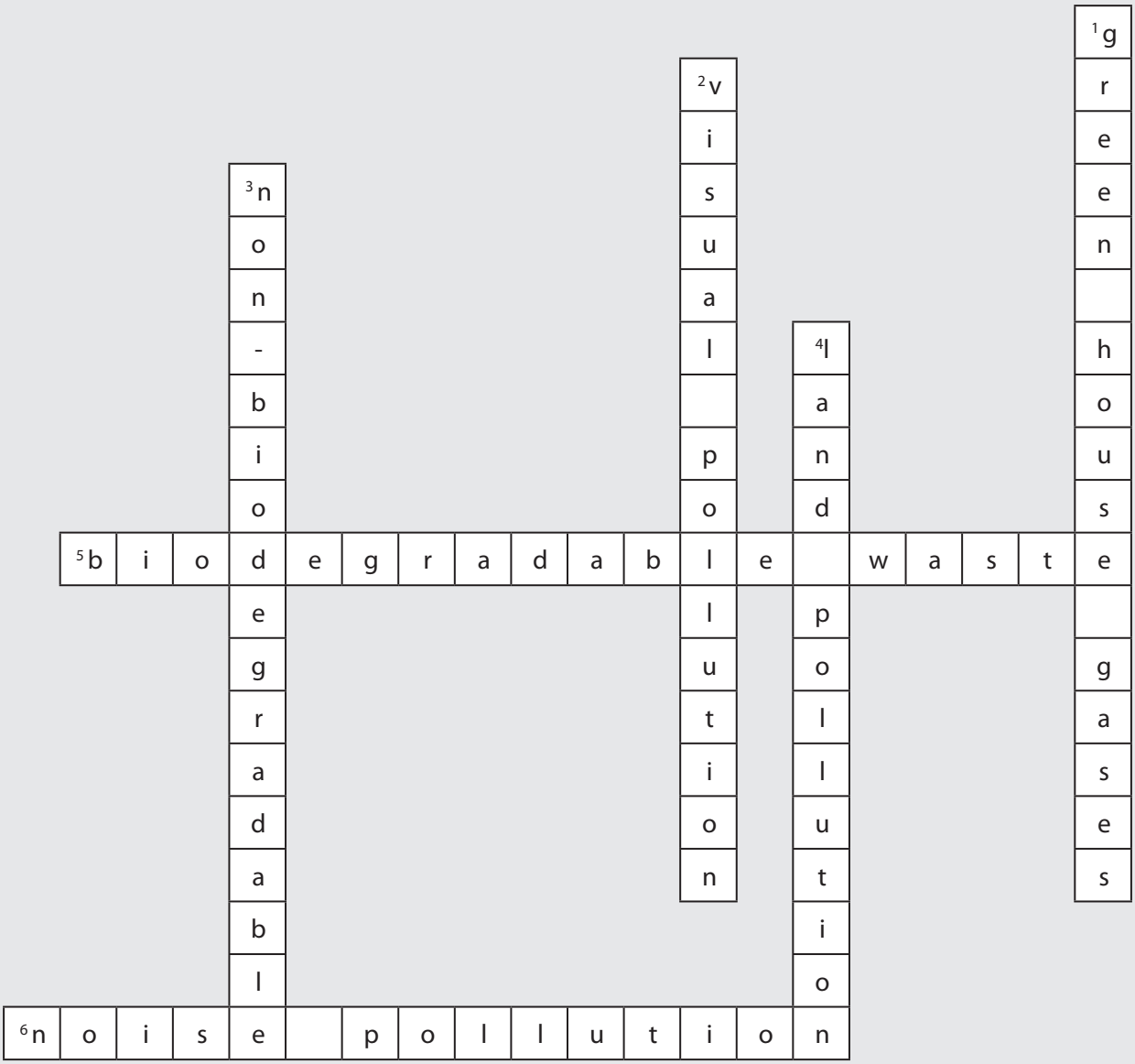
D The first parts of the plant to break through the seed are the roots.

B When the food inside the seed breaks down, it releases energy. This energy causes the embryo plant to grow inside the seed.

F The next part to emerge is the cotyledon.

G Once the shoot breaks through the surface, light and heat from the Sun enable the plant to start producing its own food. The cotyledon leaves turn green.

E the roots grow downward and anchor the plant to stop it from being blown or washed away.



Across

5. Fruit and vegetable peel are the examples of this waste **(biodegradable waste**)
6. In human, this type of pollution can cause hearing loss, stress, lack of sleep an **(noise pollution)**

Down

1. When fossil fuels (oil, gas, and coal) are burnt, they release some gases into the air. **(green house gases)**
2. It is the presence of large objects on the landscape, **(visual pollution)**
3. It doesn't decompose naturally **(non- biodegradable)**
4. Dumping of Rubbish **(land pollution)**

Answer:

Q1)

1) c
2) a
3) b
4) d

Q3)

1) Reduce
2) recycle
3) Reuse
4) Reduce
5) Recycle

		R	U	S	T	I	N	G		
		S	O	L	U	T	I	O	N	S
				S	O	L	I	D		
T	E	M	P	E	R	A	T	U	R	E
C	O	N	D	E	N	S	A	T	I	O	N
	B	U	R	N	I	N	G			
				M	E	L	T	I	N	G
E	V	A	P	O	R	A	T	I	O	N

BURNING
CONDENSATION
EVAPORATION
MELTING
RUSTING
SOLID
SOLUTIONS
TEMPERATURE

Answers:

Q1)

1) False
2) True
3) False
4) True
5) False
6) True
7) False
8) False
9) True
10) True

Q2)

a) In a balloon, they are different types of gases present in it.
b) The bubbles you see in frizzy drinks are Carbon dioxide gas.

Answer key:

Q2)

1. Light
2. Sound
3. Sound
4. Light/ Heat
5. Sound

Q3)

1. Light
2. Shadow
3. Sound
4. Frequency

Answer key:

Q1.

a) Mostly, the air we see is transparent that is why we can see buildings, bird etc but due to the air pollution like smoke, fog etc make us difficult to see. Therefore, it is not always transparent.

b) When something gets in the way, the light is blocked. This is how a shadow is formed.

c) No, light is blocked by opaque objects such as rocks.

d) Because Sounds travel faster through solids than liquids or gases.

e) Light travels in straight lines called rays. Whereas, sound energy travels through waves.

Q2. True/False

1) True
2) False
3) True
4) False
5) True
6) False
7) False

I	N	S	U	L	A	T	O	R	S		M
	P	O	S	I	T	I	V	E			A
T	R	A	N	S	F	O	R	M	E	R	G
						N	O	R	T	H	N
S	U	B	S	T	A	T	I	O	N		E
	E	L	E	C	T	R	O	N	S		T
			F	R	I	C	T	I	O	N	S
C	O	N	D	U	C	T	O	R	S		

TRANSFORMER
SUBSTATION
POSITIVE

CONDUCTORS
ELECTRONS
MAGNETS

INSULATORS
FRICTION
NORTH

Answer key:

Q1) a) crust

b) inner core

c) outer core

d) crust

e) outer core

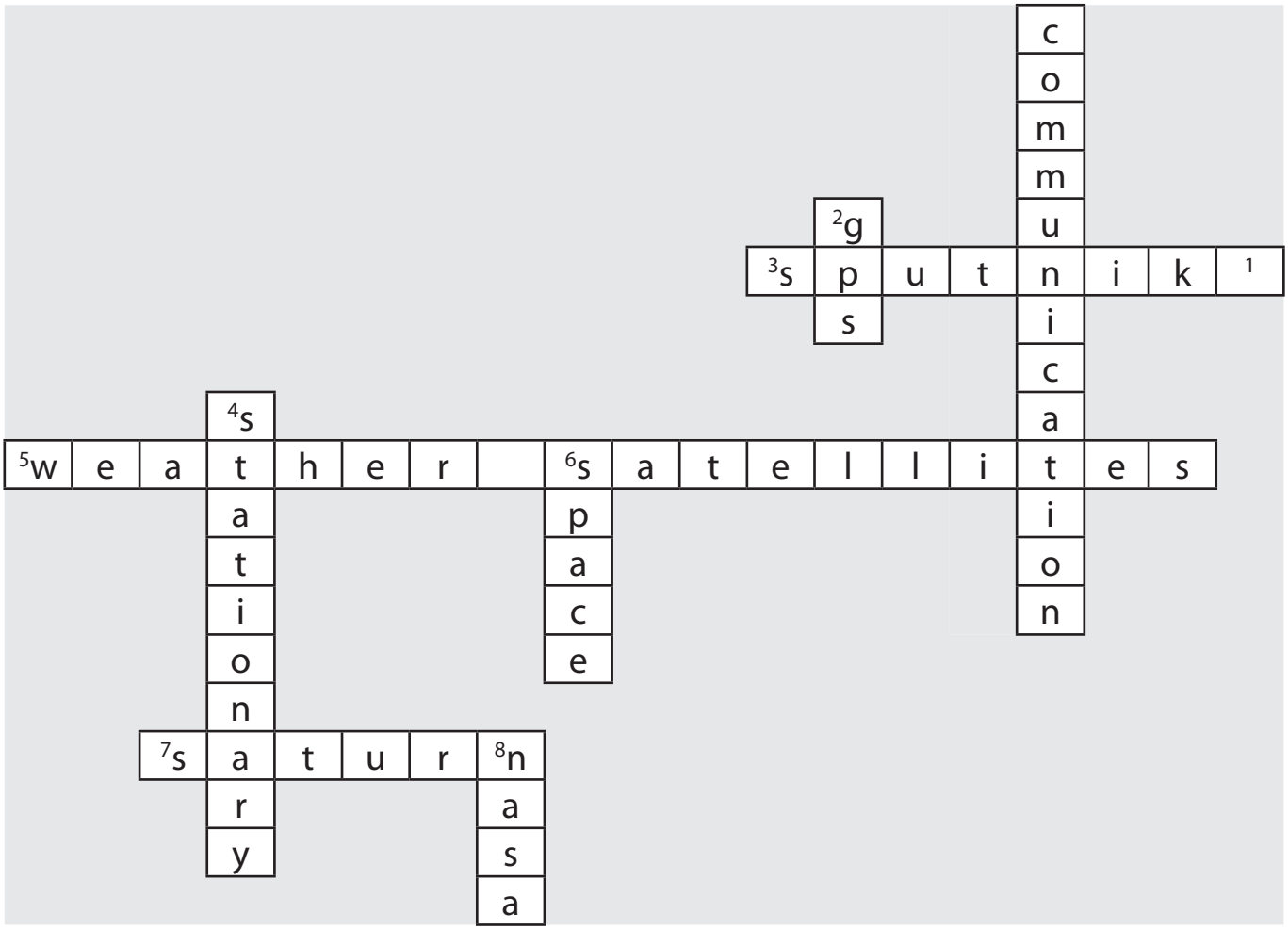
Q2) Fill in the Blanks:

1. Most of Earth's surface, about **71%**, is covered with oceans.
2. The **crust** is 6-7 km thick.
3. A **reservoir** is a human-made lake that is used to store water.
4. Water that is not salty is called **freshwater**.
5. **Soil** covers the top of the upper layer of the Earth.
6. Silt is made up of **minerals** and organic particles with lots of nutrients.
7. **Loam** is the best soil for plants.
8. A glacier is a huge mass of **ice** that moves slowly over land.

	M	A	N	T	L	E				G
	O	C	E	A	N	S				L
G	R	O	U	N	D	W	A	T	E	R	A
S	O	I	L	E	R	O	S	I	O	N	C
			S	T	R	E	A	M	S		I
Q	U	A	R	T	Z	L	O	A	M		E
			E	A	R	T	H				R
		L	I	M	E	S	T	O	N	E	

Find the following words in the puzzle. Words are hidden → and ↓.

SOILEROSION
STREAMS
EARTH
GROUNDWATER
MANTLE
LOAM
LIMESTONE
OCEANS
SOIL
GLACIER
QUARTZ



Across

3. First Satellite **(sputnik 1)**
5. is a tylt is type of satellite that is used to monitor the Earth's weather and **(weather satellites)**
7. It has at least 62 moons. **(saturn)**

Down

1. This satellite helps helps with communications and live traffic updates **(communication)**
2. It is the technology provides us with mapping information to help us get from place to place in the quickest time. **(gps)**
4. It is means still or not moving. **(stationary)**
6. It is the general term given to everything beyond the Earth's atmosphere. **(space)**
8. This is the organisation that has led the way in space exploration. **(nasa)**