4

New Get Ahead

SCIENCE

Teaching Guide

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Based on Revised Pakistan National Curriculum

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Introduction to the Guide

The Teaching Guides for the *New Get Ahead Science* series provide guidelines for help of the teacher in classroom. This Teaching Guide includes:

- An introduction on how to approach *New Get Ahead Science* in class.
- Teaching strategies mentioned in the national curriculum.
- Sample lesson plans.
- Suggested answers to the exercises in the textbook.
- Suggested worksheet for assessments.
- Suggested scheme of work.

How to Approach *New Get Ahead Science*

To teach *New Get Ahead Science* in a more constructive manner, teachers are advised to make classrooms more Student-centered. Students are to be given a more active role in the classroom, to be encouraged to present their thoughts and ideas confidently, and be instructed to respect differing opinions. In order to achieve this, teachers are to facilitate students so that they can take more responsibility for their learning journeys. The following summarizes the methodology with which all units of *New Get Ahead Science* are to be approached, in order to make classroom more Student-centered:

- Students to be given a chance to work independently, as well as collaboratively i.e. in groups. Real-life examples to be discussed by teachers and students.
- Students to be given tasks where they share opinions with each other and with the teacher. They are to be encouraged to give reasons for their opinions.
- Teacher to role-model the ideals of respect, collaboration, and active learning in the classroom. During group discussions, all students should be encouraged to work together.
- Teacher should facilitate students only when directions are needed; most of the time, students should work on their own while reading, writing, and discussing the lessons in specific units.

Contents and Sequence of the Teaching Guide

The Teaching Guide for *New Get Ahead Science* contains suggestions for starting a lesson and provide teaching strategies for each unit. The instructional model focuses on exploring background knowledge, where students participate actively.

Recommended Schedule for an Active and Student-centered Classroom

Exploring knowledge through essential questions	5 minutes
Teaching Methodology/Activity	25 minutes
Assessment	10 minutes

The first part of each unit contains basic suggestions for taking the lesson forward in a constructive manner. The second part of the lesson contains answers to all questions present in the book. Students should be advised to come up with their own answers and teachers can use the Teachers Guide to assess students' understanding and knowledge.

Teaching Strategies as per General Science National Curriculum

Examples of effective instructional strategies include, but are not limited to, the following:

- inquiry
- questioning and discussion
- investigation and problem solving
- demonstration and laboratory work
- problem based learning
- utilizing whole class, group, and individual work
- incorporating literacy strategies (reading, writing, speaking and listening)
- using student work to inform instruction

For detailed support on teaching strategies of Science, please visit Chapter 7 pages 55 to 64 in the General Science National Curriculum 2006.

Assessment Strategies as per General Science National Curriculum

Teachers learn about student progress not only through formal tests, examinations, and projects, but also through moment-by-moment observation of students. To assess students' science knowledge, skills, and attitudes, teachers require a variety of tools and approaches, such as:

- selected response
- constructed/ created response
- performance assessment
- personal communication
- students' self-assessment

For detailed support on assessment strategies of Science, please visit Chapter 8 pages 65 to 73 in the General Science National Curriculum 2006.

Division of Syllabus into Three Terms:

1st Term Unit 1 Our Body and Healthy Living
Unit 2 Matter and Its States
Unit 3 Heat

2nd Term Unit 4 Characteristics and Needs of Living Things
Unit 5 Food and Health
Unit 6 Forces and Machine
Unit 7 Electricity
Unit 8 Magnetism

3rd Term Unit 9 Living Things and their Environment
Unit 10 Introduction to Sound
Unit 11 Movement of the Earth

Scheme of Work

Unit	Lesson No.	Topic wise allocation of periods	Student Outcome
Our Body and Healthy Living	Lesson 1	4 periods	Identify major parts of the human body. State functions of the major parts of the body.
	Lesson 2	2 periods	State functions of the major parts of the body.
	Lesson 3	3 periods	Identify common disorders of various parts of the body and their causes. Suggest ways to keep their body healthy.
Characteristics and Needs of Living Things	Lesson 1	2 periods	Identify factors necessary for both animals and plants to survive. Compare characteristics of living things and non-living things. Perform an experiment to show that living things can grow while non-living things cannot grow. Demonstrate an understanding of how characteristics are inherited from parents.
	Lesson 2	3 periods	Compare the life cycle of two different animals
	Lesson 3	2 periods	Draw and label key stages in the life cycle of a plant.

Food and Health	Lesson 1	2 periods	Properties of food groups. Identify the sources of common food. Explain the properties of major food groups.
	Lesson 2	3 periods	Differentiate between a balanced diet and an unbalanced diet. Suggest a balanced meal from the given list of foods and explain why each food was chosen.
	Lesson 3	3 periods	Interpret a food pyramid to show the relative importance of various food groups. Explain the effect of an unbalanced diet.
Living Things and their Environment.	Lesson 1	4 periods	Define environment. Explain components of an environment with examples. Differentiate between various types of environment. Explain how animals and plants adapt themselves to survive in a particular environment.
	Lesson 2	3 periods	Define producer, consumer, and decomposer. Classify animals on the basis of the food they eat. Differentiate between carnivore, herbivore, and omnivore with the help of examples.
	Lesson 3	3 periods	Explain the importance of consumers, producers, and decomposers in a food chain. Make a simple food chain to show the relationship between producers, consumers, and decomposers.
Matter and its States	Lesson 1	2 periods	Define matter and give examples. Identify the three states of matter with examples. Compare solids, liquids, and gases on the basis of their shape and volume.
	Lesson 2	3 periods	Demonstrate and explain how matter changes its state when heated. Explain how one state of matter (solid, liquid, gas) dissolves into another.
	Lesson 3	3 periods	Predict and demonstrate how various materials mix with water. Demonstrate separation of insoluble solids from water by distillation and filtration.

Forces and Machines	Lesson 1	2 periods	Define force by giving examples. Define the state of rest and motion. Investigate ways in which the motion of an object can be changed. Demonstrate how force can change the position and shape of an object. Explain that the greater the force the greater the distance covered by the object. Demonstrate that some objects can return to their original shape after force is removed. Differentiate between elastic and inelastic materials.
	Lesson 2	2 periods	Define speed and give its relation with distance.
	Lesson 3	2 periods	Define simple machines using examples from the environment. Demonstrate how simple machines make work easier.
Heat	Lesson 1	2 periods	Learn about temperature. Understand the working of a thermometer.
	Lesson 2	3 periods	Differentiate between two types of temperature scales. Learn about different types of thermometers. Learn to read the temperature on a thermometer.
Introduction to Sound	Lesson 1	2 periods	Comprehend that sound is produced by vibrating objects. Differentiate between high and low sounds. Differentiate between loud and soft sounds.
	Lesson 2	2 periods	Demonstrate that sound can travel through solids, liquids, and gases. Explore the effects of noise on human health. Suggest ways to reduce noise pollution and plan an awareness campaign.
Electricity	Lesson 1	2 periods	Define electricity. Define static electricity. Understand where negative and positive charges come from. Identify the charged particles in an atom.
	Lesson 2	2 periods	Explain the production of static electric charges in some common materials. Explain the phenomenon of lightning.

Magnetism	Lesson 1	2 periods	Investigate by using a magnet that some materials are magnetic and some are nonmagnetic. Recognize that a magnet has poles.
	Lesson 2	2 periods	Demonstrate that like poles repel each other and unlike Poles attract each other. Investigate that a freely suspended magnet always points in the NS direction.
	Lesson 3	2 periods	Learn how magnets are formed. Differentiate between temporary and permanent magnets. Identify the various uses of magnets in daily life.
Movement of the Earth	Lesson 1	2 periods	Comprehend concepts about the Earth's axis. Differentiate between day and night. Describe the movement of the Sun, the Moon, and the stars.
	Lesson 2	3 periods	Explain that the Earth is tilted on its axis and this tilt causes the seasons. Know about the Great Bear. Know about the Pole Star.

UNIT 1

Our Body and Healthy Living

Lesson Plan 1

Student learning outcomes

Identify major parts of the human body. State functions of the major parts of the body.

Material

a model skeleton from the laboratory, charts on body parts

Vocabulary

framework, skeleton, delicate, organs, muscles, nerves, distributes, arteries, veins

Overview

This lesson will introduce the students to the different part of the human body. The functions of the bones, muscle, brain and heart will be discussed, so that the students develop an understanding of how each organ functions.

Teaching methodology

Exploring knowledge through essential questions	10 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. What is the human body compared to?
2. Which part of the brain acts like the computer?

Method

- A machine has many parts which together enable it to work. Our body is similar to a machine. It also has many parts which function together, and allows us to move, think, and work. Read page 2 of the Students' Book in the classroom.
- Show the students model of a skeleton and point out the skull, the rib cage, the bones of the arms and legs, and the backbone. Explain that the bones are the framework of the body. This framework is known as the skeleton. There are 206 bones in an adult human body; there are 270 bones at the time of birth, but many get fused together as we grow into adulthood. Bones protect the delicate organs. The bones help us to move our legs and arms.

- Ask the students to press the muscles of their arms. Explain that muscles are the stretchy tissues that are attached to the bones. They pull the bones to make them move. The muscles are under our skin. Muscles are like ropes which tie the different parts of the body together. There are 600 different kinds of muscles in our body.
- The brain is protected with a hard covering called the skull. The brain is the command centre for the body. The brain sends the commands to all parts of the body. These messages are conveyed through the nerves. If any part of the brain is damaged, it will affect both the physical and mental health.
- Name the organ of the body which pumps blood. The heart is like a water pump. It is located between the second and seventh rib. The size of your heart is the size of your fist. A normal human heart can beat from 60 -100 times per minute in a relaxed sitting condition. The heart pumps blood to all parts of the body. The tubes which carry the blood are known as arteries and the veins. We can feel the arteries through our skin. This is called the Pulse.

Assessment

Activity 1, 2, 3, and 4 can be done in pairs.

Reinforcement/homework

1. Fill in the blanks.
    1. The human body is like a _____.
    2. The _____ is a framework of the body.
    3. The brain is protected by the _____.
    4. The _____ protect the lungs and the heart.
    5. There are _____ bones in the body.
    6. The ropes in the body are known as _____.
    7. There are _____ muscles in the body.
    8. _____ takes messages to all parts of the body.
    9. The male heart beats _____ times.
    10. Blood travels through _____ and _____.
2. Make a cardboard skeleton.

Lesson Plan 2

Student learning outcome

State functions of the major parts of the body.

Material

pictures of different parts of the body

Vocabulary

breath, lungs, oxygen, carbon dioxide, kidney, urea, urine, stomach, digestive, muscular, converts

Overview

This lesson is a follow up of the previous lesson. The students will now understand the working of the lungs, kidneys and stomach.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. How do we breathe?
2. Which organ of our body purifies the blood?
3. Where is food digested?

Method

- Begin the lesson by reading pages 4 and 5 of the Students' Book in the classroom. Explain that air enters into our body through the nose. Then it passes through the windpipe into our lungs. Inside the lungs, our blood takes up oxygen from the air. Carbon dioxide leaves the body when we breathe out. The human body has two lungs protected by the ribs. They are soft and spongy. The students will be asked to take in deep breaths and then breathe out. How did it feel?
- Kidneys are the two bean-shaped organs on either side of the spinal cord. They have a very important task of cleaning the blood in our body. The extra water, salt, and urea is passed out as urine. A normal adult kidney is around 11 cm long.
- The stomach helps in the digestion of the food we eat. It is a muscular organ that gives out digestive juices to break down the food into a liquid-like mixture. The food pipe in our throat takes the food into the stomach. Food gets digested in the stomach and then pushed out of the body as excreted waste.

Assessment

1. Activity 5 and 6, page 4 (to be done in pairs, under the supervision of the teacher)
2. Activity 7 and 8, page 5
3. Exercise questions 2 and 3, page 8

Reinforcement /homework

1. Exercise questions 6 and 7, page 9
2. Give short answers.
   i. Describe the lungs?
   ii. What gas do we breathe out?
   iii. What is the shape of the kidneys?
   iv. What does the kidney clean in our body?
   v. What does urine contain?
   vi. How does the stomach break the food in the stomach?
   vii. How does food pass into the stomach?

Lesson Plan 3

Student learning outcome

Identify common disorders of various parts of the body and their causes. Suggest ways to keep their body healthy.

Material

Chart on common body disorders. Picture of different healthy foods.

Vocabulary

mental, physical, exercising, fluids, hygiene

Overview

The students have previously gained knowledge of functioning of the various organs of the body. In this lesson, the students will be explained the importance of maintaining good health to keep the body organs free from different illness.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. What do you understand by good health?
2. How do we keep good health?

Method

- Good health means that a person is free from illness and injury. A person has to take care of himself by making sure that all his body organs are functioning correctly and free from disorder. Show the chart on common body disorders. The students will be led to understand that most of the illnesses are due to unhealthy eating habits, lack of exercise, infections, and pollution. Read pages 6 and 7 of the Students' Book in the classroom.
- What can be considered as good habits? Eating good healthy food, like meat, grains, vegetables or fruits, and 8 glasses of water daily. Drinking water is important as it is needed to digest food, and to rid the body of waste products. Eating French fries, burgers, and drinking cold drinks does not make you healthy.
- It is important that we do some exercise every day, for e.g. in the form of playing field games, to keep our body fit. Having a bath daily, wearing clean clothes, and brushing teeth twice a day, are considered to be healthy habits. Washing hands before meals and after coming back home from school, an outing or using the washroom, is also necessary for good health. Young children must also go to bed early at night to get enough rest.

Assessment

1. Take a coloured A4 paper and write at least 6 Good Habits which will keep you fit and healthy.
2. Exercise question 4, page 8

Reinforcement/homework

1. Complete this table.

Activity	Time	Activity	Time
Get up		Do homework	
Take a bath, brush teeth		Play outside	
Have breakfast		Have dinner	
Go to school		Brush teeth	
Come back from school		Go to bed	
Rest			

   Make a list of good habits.
2. Exercise question 1, page 8
3. Exercise question 5, page 9

Characteristics and Need of Living Things

Lesson Plan 1

Student learning outcomes

Identify factors necessary for both animals and plants to survive. Compare characteristics of living things and non-living things. Perform an experiment to show that living things can grow while non-living things cannot grow. Demonstrate an understanding of how characteristics are inherited from parents.

Material

chart showing difference between living and non-living things,

Vocabulary

growth, reproduce, movement, nutrition, sensitivity, respiration,

Overview

This lesson will explain the characteristics of a living thing. Students will understand the difference between the living and non-living things. The students will learn the importance of air, water, sunlight, and food in the life of a living thing.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. Can non-living move and grow?
2. What do all living things need to survive?

Method

- Begin the lesson by reading pages 10 and 11 of the Students' Book in the classroom. Ask the class can the stationery on your desk move by itself? What about you? Can you move, talk, hear, eat, sleep? Now what about your desk and chair: can they do the same things that you can? Activity 1 on page 11 can be discussed in class.
- The difference between a living thing and a non living things is that living things can move, grow, breathe, eat food, reproduce, excrete, and are able to respond. A

non-living thing remains almost the same shape and size, as it was when it was made. Living things also require air, water, sunlight and food to survive, while non-living do not.

- The teacher will then put up the chart on the soft board.
- Ask the students to share their photographs as a baby with the class. Notice how each student has become bigger, taller and stronger. Discuss how they are able to play games which they could not when they were babies.

Assessment

1. Activity 3, page 11 (can be conducted as a class project, under the supervision of the teacher)
2. Activity 4, page 11

Reinforcement/homework

In your notebooks, make two columns. In one, write what livings can do and in the other, list what non-living things can do.

Lesson Plan 2

Student learning outcome

Compare the life cycle of two different animals

Material

Charts showing the life cycle of a butterfly and a frog.

Vocabulary

species, metamorphosis, hatches, spawn, tadpole, froglet, unique

Overview

This lesson focuses on the life cycle of an insect and a frog. Students should be aware of growth in animals. Some animals look different until they become adults.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. Have you seen a butterfly or a frog?

2. Where does a butterfly and the frog lay their eggs?

Method

- The teacher will begin by reading pages 12 and 13 of the Students' Book in the classroom. Explain that all living things give birth to young ones. When animals grow their size changes, as they get older. Some animals have a life cycle which consists of four stages.
  1. Egg 2. Baby 3. Young 4. Adult

     Most insects also have a life cycle of four stages.
  1. Egg: a female insect lays hundreds of eggs on the underside of a leaf.
  2. Larva: also sometimes called a caterpillar, hatches from an egg and feeds on the leaf.
  3. Pupa: after a few days the larva turns into a pupa.
  4. Insect: the pupa changes into a full grown insect which flies off.
- The ant and the house fly both complete their life cycles in four stages. This is known as metamorphosis.
- A frog is an amphibian, which means lives on both, water and land. It also has a unique life cycle.
- The frog lays eggs covered with a jelly-like substance in the water. This is called Spawn. Baby frogs known as the tadpoles hatch out of these eggs. They look like fish with a tail to move in water. After some time, the two back legs and then the two front legs grow, the tail also grows longer, and the tadpole still breathes with gills. Next, the back and front legs grow further and the tail falls off. The gills are replaced by the lungs. It can now live on land. A baby frog is known as a Froglet. The froglet looks like its parents. Activity 5 on page 14 to be conducted in class.
- Do you look like your parents? Which one of your siblings resemble your parent? If you have a pet animal and it has given babies, does the baby animal have the same characteristics as the older animal? Living things reproduce young ones of their own. The young animal resembles his parents, i.e. same or similar skin, fur, eyes, nose, same physical structure and characteristics, etc. Activity 6 on page 15 can be discussed in class.
- Similarly, the seedling also grows same as its parent plant. This is called inheriting characteristics from their parents. Human beings also share similar characteristics with their parents and grandparents. Colour of eyes, hair, complexion, height, and the physique.

Assessment

1. Activity 7, page 15
2. Exercise questions 2 and 3, page 19

Reinforcement/Activity

1. Draw the life cycle of the ant in your notebooks.
2. Write the stages of a frog's life cycle.
3. Exercise question 4, page 20
4. Answer the following questions.
   i. What is metamorphosis?
   ii. What is the name given to the frog's eggs?
   iii. Where the butterfly does lay its egg?
   iv. How do tadpoles breathe?

Lesson Plan 3

Student learning outcome

Draw and label key stages in the life cycle of a plant.

Material

A few chickpeas, cotton wool, plate or empty jam bottle. Chart to show the life cycle of a plant.

Vocabulary

germination, develops, photosynthesis

Overview

The students are already acquainted with the germination of a seed. In this lesson, they will learn about the life cycle of a plant, and what they need for their survival.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. What do plants need in order to grow?
2. Do plants also have life cycle as the insects?

Method

- A life cycle of a plant begins with the germination of the seed. It keeps on growing until it has developed into a full grown plant with its own seeds. Some plants grow

flowers yearly and make seeds. All plants need water, warmth, light, and air. Water is need by the seeds to make strong stems and leaves. If it is too cold or too hot the plants do not grow. Plants need light for the process of photosynthesis by which plants make their food.

- The teacher will show the chart of the life cycle of the plant to further explain the steps.
  i. A seed contains food for the new plant.
  ii. Germination- requires water and the right temperature. The seed splits open, the roots come out and push into the soil to get water and minerals.
  iii. Leaf growth- the plant now pushes out a single stem and small leaves appear.
  iv. Flowering–plants produce flowers that turn into fruit. The fruit contains the new seeds.

  Thus the new cycle begins.

Assessment

1. Activity 8, page 18
2. Draw the diagram on the life cycle of a bean in your notebook.

Reinforcement/homework

1. Take a plate or an empty jam jar, put some cotton wool and a few chickpeas in it. Sprinkle some water on the cotton wool. Put the whole set up in a warm, well-lit place. Sprinkle water daily. Fill the observation sheet on the growth of the chickpeas.

Day	**Observation**
Day 1	
Day 2	
Day 3	
Day 4	
Day 5	
Day 6	
Day 7	

2. Exercise question 1, page 19

UNIT 3

Food and Health

Lesson Plan 1

Student learning outcomes

Properties of food groups. Identify the sources of common food. Explain the properties of major food groups.

Material

The teacher will bring to class a number of pictures of different foods of the five food groups.

Vocabulary

proteins, carbohydrates, vitamins, minerals

Overview

In this lesson, the students will learn how foods are classified. The importance of eating food from each food group, which provide proper nutrition to the body, so that it has the energy to do work.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. What do you like to eat?
2. What do you usually have for breakfast?

Method

- Begin by reading pages 21 to 23 of the Students' Book in the classroom. Explain to the students why it is important to have food. Think what would happen to the body if a person did not eat food for several days. The body is like a machine which needs to have healthy food for doing work. In order for it to work efficiently it needs a lot of energy. The food that we eat provides the body with energy which enables it to work.

- When the body is properly nourished, it makes us feel good, we grow, and we are able to work hard. On the other hand, without food we are unable to concentrate on our work and we are always sleepy and tired. This is because we do not have any energy.
- Food has important nutrients which are necessary for the wellbeing of the body. Food nutrients help our body to grow and some also help us fight diseases. Some nutrients give us energy. It is not healthy to eat only one kind of food, as it does not help the body to function properly. It is necessary to eat a variety of foods to stay healthy.
- What do you think will happen if you eat only fast food? It will not provide you with the nutrients needed for a healthy body. There are five main food groups, we must eat one or two foods from each group to have the energy to do work, and to grow healthy.
- Divide the class into five groups and randomly hand out the pictures of different kinds of food. Each group will have to sort out the foods according to the different food group.
- Which food group helps us to build our muscles and tissues? Proteins containing foods are meat, poultry, fish, lentils, eggs, and dairy products.
- Carbohydrates provide instant energy, they are the main source of energy for our body. Fruits, vegetables, grains, and cereals contain carbohydrates and sugar. Starch is a common carbohydrate.
- Vitamins and minerals are important for the body to grow better, to fight off infections, and generally function better. Vegetables, fruits, fish, nuts, poultry, yoghurt, and milk have a rich amount of vitamins and minerals.
- The body also needs fats but in a small amount. Fats are present in the following foods. Butter, nuts, oils, and dairy products are all good sources of fat. It is also a good form of energy for the body.
- Our own body is made up of 70% of water. Our body needs water to make it work properly. Water is needed to help the blood carry the nutrients to all parts of the body. It helps the body to digest food and removes the wastes from the body. You should drink at least 6 to 8 glasses of water daily.

Assessment

1. Activity 1 and 2, page 23
2. Activity 3, page 24
3. Exercise questions 2 and 3, page 28

Reinforcement/homework

1. Fill in the table with the names of food you ate for a week.

Day	Breakfast	Lunch	Dinner
1st			
2nd			
3rd			
4th			
5th			
6th			
7th			

2. Answer the following questions.
   i. How many food groups are there?
   ii. Why do we need to eat food?
   iii. How do proteins help our body?
   iv. What gives us the energy to do work?
   v. How does water help our body?

Lesson Plan 2

Student learning outcome

Differentiate between a balanced diet and an unbalanced diet. Suggest a balanced meal from the given list of foods and explain why each food was chosen.

Material

The students will all bring a picture of one food from each food group.

Vocabulary

balance, components, unbalanced, exercise

Overview

Students already have previous knowledge of the five different food groups. In this lesson, they will learn why foods are to be eaten for their food values. Food has to be eaten to keep healthy and to repair the damaged parts of the body. It is very important that we have a diet which contains a balance of the different foods.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. Is it important to have vegetables and fruits in our diet?
2. Should we eat more proteins or carbohydrates?

Method

- Begin the lesson by reading pages 24 and 25 of the Students' Book in the classroom; further discuss with them about what they had eaten for breakfast? Help them understand why they need to have protein and carbohydrates in their diet. Why do you think it is important to have a food from each food group? They provide energy and growth for our body. What about cold drinks and burgers, do they provide the necessary nutrients for our body? It is important that a healthy diet should be eaten as it helps in repairing the damaged body tissues and keep us fit. A balanced diet contains a variety of foods to give the body the nutrients it needs. It is a mixture of proteins. Carbohydrate, fats, minerals, fruits and vegetables.
- An unbalanced diet contains a large amount of food from the same food groups. This does not provide the necessary nutrients that a body needs for healthy growth. If we eat too many carbohydrates, the sugars will be stored in the body as fats. This will make us gain weight.
- It is also important that a certain amount of exercise should be done daily, in order to maintain good health.

Assessment

1. Activity 4, page 25
2. Exercise question 4, page 8

Reinforcement/homework

1. Make a chart showing a balanced diet and an unbalanced diet. Draw the foods or paste pictures.
2. Write a short note on which diet will be considered as healthy and nutritious.
3. Exercise question 5, page 29

Lesson Plan 3

Student learning outcome

Interpret a food pyramid to show the relative importance of various food groups. Explain the effect of an unbalanced diet.

Material

Chart on the Food Pyramid. Chart on the importance of each food group.

Vocabulary

calcium, phosphorus, iron, sodium, potassium, iodine

Overview

The students are aware of the food groups and the necessity of eating a balanced diet. A food pyramid is used as a guide to help us to choose foods which are healthy. It is important that we eat more of the foods at the bottom of the pyramid than from the top. This will lead to healthy growth.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. Is it important to eat only fruits and vegetables?
2. Why is eating bread, and pasta are good for us?

Method

- Discuss this lesson by using the chart or the diagram of the Food Pyramid in Students' Book on page 26. Begin by asking the students why are oil and sugar at the top of the pyramid? This is because oil and sugar do not get digested easily and collects in the body as fats. This makes you unhealthy.
- Why is meat and vegetables in the centre of the food pyramid? Eating meats is healthy, if you eat just enough to help you grow healthy. Vegetables and fruits contain a lot of natural minerals and vitamins which help in making strong bones and teeth, good eyesight, healthy skin and blood formation. Why are the carbohydrates towards the bottom? This is because they provide us with energy to do work.

Assessment

1. Activity 6, page 26
2. Make a food pyramid of all that you ate last week. Do you think it was a balanced diet?
3. Exercise question 1, page 28

Reinforcement/homework

Complete this table.

Food group	Good source	Benefits	Deficiency
Proteins		Body growth, repair of body tissues	Headache, anaemia
Carbohydrates	Wheat, rice, potatoes, sugar		
Fats	Ghee, butter, oil		Poor growth, dry skin, low body weight
Vitamins and minerals		strong bones and teeth, good eyesight	Night blindness, tooth decay, general weakness
Water	Milk, juices, fruit and vegetables		Constipation and dehydration

UNIT 4

Living Things and Their Environment

Lesson Plan 1

Student learning outcome

Define environment. Explain components of an environment with examples. Differentiate between various types of environment. Explain how animals and plants adapt themselves to survive in a particular environment.

Material

Pictures of different kinds of environment.

Vocabulary

component, habitat, organism

Overview

Students are already aware of the term habitat. In this lesson, they will further learn that a habitat consists of two different parts, the living and the non-living.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. What do you understand by habitat?
2. Do we find the same plants and animals in all the environments?

Method

- Begin the lesson by asking the students if there are frogs in the desert? Or a giraffe in the forests? This is because each living thing lives and finds all that it needs to grow and to reproduce in its own habitat. Read pages 30 and 31 of the Students' Book in the classroom.
- Each habitat comprises of two types of features, the living and the non-living. A living habitat consists of humans, animals and plants. Non-living consists of water, air, light, rock and soil. The type of animals and plants found in plains is different from the ones found near rivers and seas.

- Why do animals have fur and the fishes have scales, and the birds have wings? Animals have fur on their body to protect them in their habitat. Polar bears have thick white fur so that it fits into the polar environments. Fishes have scales and tails that help it to swim in the water. The animals that live in water are adapted to their life in water. The birds have wings and a light body that enables them to fly in the air
- The three major types of environment which surround all living things are air, water, and land.

Assessment

Activity 1, page 31

Reinforcement/homework

1. Draw any two habitats in your note copy.
2. Write short notes on how the following animals have adjusted to their environment.
   i. fishes
   ii. birds

Lesson Plan 2

Student learning outcomes

Define producer, consumer, and decomposer. Classify animals on the basis of the food they eat. Differentiate between carnivore, herbivore, and omnivore with the help of examples.

Material

pictures of different animals and birds

Vocabulary

herbivorous, carnivorous, omnivorous

Overview

The students already know that plants make their food with the help of sunlight and water. Animals depend on plants and smaller animals for their food. Animals are classified into three groups—herbivorous, animals that eat plants; carnivorous, animals that eat smaller animals; omnivorous, animals that eat both plants and other animals. The importance of growing plants and their importance will also be studied.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. What do goats and cows eat?
2. What do lions and tigers eat?
3. What do you eat?

Method

- Draw three columns on the board: herbivorous, carnivorous, omnivorous. The students will be shown pictures of animals and birds and the students will be asked to help the teacher note them in the correct column. Read page 32 of the Students' Book in the classroom.
- Herbivorous animals are animals which eat only plants. Cows, goats, giraffe, elephant, squirrel, parrots, and pigeons are classified as herbivorous animals. They have teeth to help them chew grass and leaves. The birds have beaks to peck on grains and fruit.
- Carnivorous animals are animals which eat meat. They are also known as predators, as they hunt other animals for food. Cats, dogs, lions, eagles, tigers, and leopards are carnivorous. They have sharp teeth and claws to grip and tear the meat of the hunted animal.
- Omnivorous animals are those which eat both plants and animals. Humans, hens, crows, rats, and bears are classified as omnivores.
- Human beings, animals, and plants are all interdependent on each other. We use the plants for food, to clothe ourselves, provides warmth and shelter. We eat beef, mutton, and chicken. Cows and goats give us milk from which other dairy products such as yoghurt, butter, and cheese is made. We use the horse, donkey, and camels to ride on or to pull carts.
- We must plant more trees. We must take care of the plants, as not only do they provide herbivorous animals with food, but some of these animals, like cows and goats, also are used by us. We eat the meat and also drink the milk of these animals. This shows that all living things are interdependent on each other.

Assessment

1. Activity 2, page 34
2. Activity 3, page 35
3. Exercise question 1, page 38

Reinforcement/homework

1. Fill in the table with five animals classified under these headings.

	Herbivorous	Carnivorous	Omnivorous
1.			
2.			
3.			
4.			
5.			

2. Paste pictures of the animals you have mentioned in the table in your note copy.
3. Answer the following questions.
   i. What do herbivorous animals eat?
   ii. What is another name given to carnivorous animals?
   iii. What kind of teeth to carnivorous animals have?
   iv. Which animals are called omnivorous?
   v. What do omnivorous animals eat?

Lesson Plan 3

Student learning outcome

Explain the importance of consumers, producers, and decomposers in a food chain. Make a simple food chain to show the relationship between producers, consumers, and decomposers.

Material

charts showing different food chains

Vocabulary

consumers, decomposers, producers, glucose

Overview

In this lesson, the students will learn that we are all dependent on plants. All living things need food in order to get energy to work and grow. The food chain will focus on the producers as the first link in the chain, and continue with the carnivores and the omnivores, and end with the decomposers.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. What is your favourite dish?
2. What do we need to make biryani?

Method

- Write biryani on the board, the students will be asked to name the ingredients that are in biryani. Rice, meat, tomatoes, potatoes, oil, yoghurt, and other spices. Now the students will be asked to put the ingredients under the heading plants or animals. Can we use mutton instead of chicken?
- Where did the goat or chicken get its food from? The plants. Now, where did the plants get their food from? The plants make their food by a process of using sunlight. This gives energy to plants to produce sugar, known as glucose to grow the other parts of the plant. That is why plants are known as producers.
- Animals cannot make their own food. They feed on other living things. The animals that eat plants are known as herbivorous. Animals that are predators hunt and eat other smaller animals. These animals are known as carnivorous.
- Animals are consumers as they do not make their own food, they eat plants or smaller animals.
- When animals and plants die, they are eaten by organisms known as decomposers. The decomposers break the dead animals and plants into simpler substances.

  The food chain can be understood by this line diagram.

  SUN → PRODUCER → PRIMARY CONSUMER → SECONDARY CONSUMER

  PLANT HERBIVOROUS CARNIVOROUS/OMNIVOROUS

  Examples: SUN → PLANT → RAT → EAGLE

  CARROTS → RABBIT → FOX → LION

  GRASS → GRASSHOPPER → FROG → SNAKE → EAGLE

Assessment

1. Activity 4, 5, and 6, page 36
2. Exercise question 2, page 38

Reinforcement/homework

1. Make food chains in your notebooks in the correct order.
    i. Birds, grain, cats
    ii. Crocodile, snails, ducks
    iii. Owl, snails, snake, bird
2. Name 3 herbivores, carnivores, and omnivores in your note copy.
3. Exercise question 3, page 39

UNIT 5

Matter and its States

Lesson Plan 1

Students learning outcomes

Define matter and give examples. Identify the three states of matter with examples. Compare solids, liquids, and gases on the basis of their shape and volume.

Materials

a solid object like a table, water in a glass, balloons and an air pump, empty jam jars, a packet of beans

Vocabulary

particles, matter, weight, space, attraction, liquid

Overview

This lesson will introduce to the students that everything around us is matter. Matter is found in three states-- solid, liquid, and gas. They will also learn how the particles of solid, liquid, and gas are arranged to make them different from each other.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. What is matter?
2. How many states of matter are there?

Method

- Everything around us is made of matter. Matter is anything which has weight and occupies space. Name some things in the classroom which are matter? Even air and water are matter. All matter is made of small particles. Matter is found in three states–solid, liquid, and gas.
- Fill a glass of water to the brim. A few erasers will be added to the glass until the water in the glass spills. Why? It spilled because there was no more space in the glass of water. This showed that all matter has volume. Activity 1 on page 40 can be conducted in class.

- A solid has particles which are packed close to each other because of their close attraction to each other. This gives solid a definite shape and volume. Activity 2 on page 40 to be done in class.
- A liquid has particles which are further apart than the solids, and lesser attraction between the particles. So it is easier for them to move about, that is why liquids have the ability to move and to take the shape of the vessel they are kept. Activity 3 on page 41 should be done in class.
- Gas has particles which are even further far apart than in a solid or liquid. They do not have a very strong attraction among them. It is due to this reason that gas spreads quickly into the space available. Activity 4 on page 41 to be done in class.

Assessment

Activity 5, page 42

Reinforcement/homework

Draw the table shown on page 42 on the properties of the three states of matter, in your notebooks.

Lesson Plan 2

Students learning outcomes

Demonstrate and explain how matter changes its state when heated. Explain how one state of matter (solid, liquid, gas) changes into another.

Material

spirit burner, a beaker, some cubes in a thermos

Vocabulary

expand, vibrate, position, energy

Overview

This lesson will explain that a solid will change into liquid if it is heated. In the same way, if water is heated it changes into gas. It will be explained that the particles in a solid or liquid expand and start to vibrate fast till they break away from each other, changing the shape of matter.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. What happens to ice cream in your bowl after some time?
2. Have you seen the steam coming out from a hot cup of tea?

Method

- Begin the lesson by first putting some ice in a beaker. The students are to observe what happens to the ice. It will be noticed that the ice has begun to melt. Why does the ice melt? The ice melted because the particles of solids began to vibrate faster. It made the solid expand till it reached its melting point. The particles of the solid had broken away from their positions and had turned into a liquid. Different solids melt at different temperature.
- Read pages 43 and 44 of the Students' Book in the classroom.
- Now light the spirit lamp and place the beaker on it with some water. The students are once again asked to observe what happens in the beaker. After some time the water is heated to its boiling point and steam which is gas begins to rise. What is steam? Now the liquid had expanded by the particles getting more energy, they bump into each other and moved further apart to form gas.
- When a liquid is cooled to a certain temperature, the vibrations of the particles slow down. They finally slow down to the extent of turning into a solid. Different solids freeze at different temperature.

Assessment

1. Activity 6, 7, and 8, page 44
2. Exercise questions 2 and 3, page 47

Reinforcement/homework

1. Perform the following experiments at home with the help of your parents or elders. Take an ice cube tray fill the containers with, water, juice, and oil. Which substance took the longest to freeze? Which substance froze quickly? Write your observations in your notebooks.
2. Take a candle which is a solid. Light the candle with a match stick. Note the time, now observe how long it took to melt. Note your observations in your note copy.

Lesson Plan 3

Student learning outcomes

Predict and demonstrate how various materials mix with water. Demonstrate separation of insoluble solids from water by distillation and filtration.

Material

beakers, a cup of tea with tea leaves, a strainer, sugar, some garden soil, filter paper, small pebbles and sand, a jug full of water

Vocabulary

mixture, solution, suspension, filtration, sedimentation, distillation

Overview

Students now have an understanding of what matter is. Matter can change its form by change in the temperature. In this lesson, they will learn that some changes can be made possible without changing the temperature.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. Why does the red sherbet have such a good flavour?
2. Why do we strain the tea in the teacup?

Method

- Begin the lesson by first arranging all the material on the table, and asking the students to come nearer. First, the students will be given an explanation of what a mixture is. The strainer will be put on one empty beaker, the contents of the teacup will be poured on it. What did you observe? The tea leaves were left behind on the strainer and the water in the beaker now has a brown colour. This was a mixture of the tea leaves and water. A mixture is a combination of two or more different materials. The materials can't be changed back to its original form from the mixture.
- Conduct Activity 11 on page 45 in the classroom.
- A solution is a mixture in which a solid is added to a liquid and it dissolves. They do not separate even if they are left for some time. There are some substances which dissolve in liquid completely. Sugar, salt, and coffee are good examples of soluble substances. There are some substances which do not dissolve in liquid and are known as insoluble substance. Pebbles and chalk are good examples. Take a beaker and pour water in it. A few spoons of sugar are added to the water. After some time the sugar in the beaker could not be seen. What happened to the sugar? It had

dissolved in water. Sugar is a soluble substance. Try adding pebbles to water. What did you observe? They did not dissolve in water.

- Suspension can be shown by adding some garden soil to water in the beaker of water. What did you observe? After sometime the soil settled at the bottom of the beaker and the dry leaves and grass were floating on the top. What is the colour of the water? It is muddy brown.
- Conduct activity 12 in the classroom.
- Take two beakers one with the garden soil and water and the other with a funnel set with filter paper. The teacher will pour that muddy water on the filter paper. What did you observe? The water in the second beaker will be clean and the sand, dry leaves and grass will be left on the filter paper. Filtration is used to separate insoluble substances from a liquid. The clear liquid is called filtrate and the solid on the filter paper is the residue.
- Conduct activity 13 on page 46 in the classroom.
- Take a beaker of water, add soil and pebbles into it. Stir it and leave it for about 15 minutes. Slowly pour the water into the other beaker. The insoluble substances of soil and pebbles that were left behind are the sediments. The settlement of these particles is called sedimentation. The pouring of the water into the other beaker is known as decantation.
- Conduct activities 14 and 15 in the classroom.

Assessment

Exercise question 4, page 47

Reinforcement/homework

1. Answer the following questions.
   i. What is a mixture?
   ii. What is a filtrate?
   iii. What is sediment?
   iv. What is insoluble and insoluble?
   v. What is decantation?
2. Draw the diagrams on filtration and decantation, given on page 46 in your Students' Book, in your notebooks.
3. Exercise question 1, page 47

Forces and Machines

Lesson Plan 1

Student learning outcomes

Define force by giving examples. Define the state of rest and motion. Investigate ways in which the motion of an object can be changed. Demonstrate how force can change the position and shape of an object. Explain that the greater the force the greater the distance covered by the object. Demonstrate that some objects can return to their original shape after force is removed. Differentiate between elastic and inelastic materials.

Material

a pencil box, a toy car, a football, an empty cold drink can, a rubber band

Vocabulary

unbalanced, straight, curved, circular, balanced, motion

Overview

Force can simply be defined as a push or pull. The students will learn that force can have different effects on an object. The shape of an object can be changed by the use of force. Force can change the direction of an object and even increase the speed.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. Can the table move by its self?
2. Do non-living things move?
3. How do you make non-living move?

Method

- Ask the students to look at the picture on page 48. The students will be asked to list all the things moving in the picture. Draw two columns on the board. One for PUSH and the other for PULL. The students will now point out the push and pull

action in the picture. Explain that things move in different ways. A student will be asked to open the door. Did he push it or pull it? He pulled it. Move the desk. Did he push or pull? He pushed it. Now in the picture, the swing is being pushed, the ball is being pushed, the toy car is being pulled, the baby stroller is being pushed, and the girls are playing in a push and pull to be able to go around. All things move in a straight line, in a circular path, up and down and in a back and forth movement. All moving things are in a state of motion and things that are not moving are in a state of rest.

- Read pages 48 to 50 of the Students' Book in the classroom. What is force? It is simply push and pull. When a force acts on an object it can make it move. It can increase or decrease the speed of the moving body. It can also change the direction of a moving body. It can stop a moving body. It can even change the shape of the object.
- Call a few students to the table and give some students a rubber band, an empty cold drink can, a piece of aluminium foil, and some play dough. They will be asked to use force to change the shape. A ball will be rolled on the floor or on the table, between the two hands. What was observed, could the ball move without a push? What about the play dough, and the empty can, with force did they shape change? Yes, force made things move and change shape.

Assessment

1. Activity 2 and 3, page 49
2. Exercise question 4, page 54

Reinforcement/homework

Exercise question 1, page 54

Lesson Plan 2

Student learning outcome

Define speed and give its relation with distance.

Material

a few toy cars

Vocabulary

distance, increased, decreased

Overview

The students already know that if more force is applied on an object, it will take less time to reach its distance. In this lesson, they will learn how to calculate the speed of a moving object.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

- How do we calculate the speed a car is travelling?

Method

- Begin by asking some students to come and push the toy cars, while the other students watch. Of the two, one car was faster and it reached the finish line first, while the other cars came a little later. How did the first car reach there first? It was due to the force the students must have applied to make it move fast. Speed is due to the greater force applied on an object. In a given time a car moving at a slow speed will take longer to reach its destination than a car which is moving at a faster speed. Read page 51 of the Students' Book in the classroom.
- Conduct activity 5 on page 51 in the classroom.
- The distance an object moves is measured in meters and the time taken to cover a distance in seconds. Calculations can be done using this formula. Speed = Distance/ Time

Assessment

1. Activity 4, page 50
2. Exercise question 2, page 54

Reinforcement/homework

1. Fill in the correct answer.
   i. Speed can be_by using greater force.
   ii. A car moving at a slow speed will cover the distance in a time.
   iii. The speed of the car is measured in per .
   iv. The distance covered by an object is measured in_.
   v. The_taken to cover the distance is measured in seconds.

Lesson Plan 3

Student learning outcomes

Define simple machines using examples from the environment. Demonstrate how simple machines make work easier.

Material

a wedge, a wheel and axle, a steel ruler, simple screw, pulley, a stapler, scissors, wheel barrow

Vocabulary

triangular, inclined plane, pulley, screw, scissors, lever

Overview

In this lesson, the students will learn, how machines help us to make our work easier. The students should be able to name some simple machines. The complex machines use more than one simple machine.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. Can you name some machines?
2. How do the machines help us?

Method

- Machines help to make work easier for us. We can push and pull easily. A simple machine does not have many parts.
- The teacher will then give the students a closed tin of coffee or paint. The tin will be passed around so that everyone can try their luck to open it. No one could do so. What simple things was used to open it? A spoon is a simple machine. It was pressed under the rim of the can and pushed up, the tin was now open.
- Read pages 52 and 53 of the Students' Book in the classroom. The students can now brainstorm in the class to name simple things which help us to do the work easily. Knife, coin, scissors, window blinds, toy cars, trolley bags.

- The simple machines are the wedge, wheel and axle, lever, inclined plane, simple screw and the pulley.
- A complex machine has more than one simple machine and a number of moving parts.

Assessment

Exercise questions 3 and 5, page 54

Reinforcement/homework

1. In your notebook make a list of simple machines and give examples of their use in our daily life. Draw pictures.
2. Make a list of complex machines which we use in our day to day life. Paste pictures in your notebook.

UNIT 7

Heat

Lesson Plan 1

Student learning outcomes Learn about temperature. Understand the working of a thermometer.

Material thermometer from the school laboratory, clinical thermometer

Vocabulary temperature, thermometer, boiling, freezing

Overview

This lesson will explain that heat is an energy which is produced by the movement of particles in the object. The students already know that the Sun is the main source of heat. The instrument that is used to measure heat is the thermometer.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. If you stand outside in the Sun, how do you feel?
2. What does the bottle in the freezer feel like to touch?

Method

- Ask all the students to rub both their hands vigorously. The students are then asked to touch their face. Do the hands feel warm? This is due to the heat produced by the rubbing of two objects, in this case the hands. Heat is a type of energy which is produced due to the movement of tiny particles in a solid, liquid, or gas.
- Some students will be asked to put their pencil box in the sun. After a few minutes they will be asked if the pencil box was warm or cool. The pencil box made of steel will be hot, while the ones made of plastic will be warm. We usually find out if something is hot or cold by feeling it, as our skin is sensitive to the temperature. We wear light clothes in summer to keep cool and thick clothes in winter to keep warm. How do find the correct reading of the temperature of an object? In order to find the correct reading of the temperature we have to use a thermometer.

- A thermometer is an instrument used to measure the temperature of an object. What are the marks on the thermometer called? The thermometer is marked into degrees. There is a boiling point, when water begins to boil and a freezing point, when water turns into ice.
- Show the thermometers in the class. Ask the students if the doctor or their mother had checked their temperature if they were sick.
- The thermometer is a narrow tube made of glass with another thin tube placed inside. This inner tube is filled with special metal called mercury. The mercury in the tube rises and falls according to the temperature. If the temperature is high, the mercury expands and rises up. If the temperature is low the mercury contracts and fall to show a fall in temperature.
- Take the thermometer and put it in a warm glass; the reading is noted. Then the thermometer is placed in a cold glass; the reading is noted. The outer tube is marked with the numbers or degrees, so the reading can be read easily.

Assessment

1. Activities 2 , 3, and 4, page 56 (to be performed under the supervision of the class teacher)
2. Exercise question 3, page 58

Reinforcement/homework

1. Exercise question 2, page 58
2. Answer the following questions.
   i. What is heat?
   ii. What do you understand by temperature?
   iii. Which part of our body can feel the temperature?
   iv. What kind of clothes do we wear in summer and winter?
   v. How do we measure temperature?
   vi. What are the small lines on the thermometer called?

Lesson Plan 2

Student learning outcomes

Differentiate between two types of temperature scales. Learn about different types of thermometers. Learn to read the temperature on a thermometer.

Material

Thermometers with the Celsius scale and the Fahrenheit scale.

Vocabulary

Celsius, Fahrenheit, upright, degrees, measure, maximum, minimum

Overview

The students in this lesson, will learn how the thermometer works. There are two types of scales, the Celsius and the Fahrenheit. The freezing and boiling points of both the scales are different.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. What are the marks on the thermometer called?
2. Why do we need these marks?

Method

- The marks on the thermometer are known as degrees. There are two types of scales: Celsius and Fahrenheit.
- Celsius scale measures the level of heat on the scale of 0 to 100. 0 is the freezing point and 100 is the boiling point of water as measured by this scale.
- The Fahrenheit scale measures the level of heat on a scale of up to 212. The freezing point of water is 32 and the boiling point is 212 as measured by this scale.
- Show thermometers of both the scales, the students will also be told the normal body temperature is 37 on the Celsius scale and 98.6 on the Fahrenheit scale. Read pages 56 and 57 of the Students' Book in the classroom.
- Thermometers are also used for different purposes. A clinical thermometer is used to measure the temperature of the human body. Another type of thermometer is used to check the maximum and minimum temperature during the day and night.
- Explain to the students on how to use the thermometer in the laboratory.

Assessment

1. Activity 5, page 57
2. Draw two thermometers and mark the freezing and boiling points of both the scales.
3. Exercise question 1, page 58

Reinforcement/homework

Answer the following questions

i. Name the liquid which is filled in the glass bulb of the thermometer.

ii. Does the mercury contract or expand when it is heated?

iii. How can we read the temperature on the thermometer?

iv. What is the boiling point of water on the Celsius scale?

v. What is the freezing point of water on the Fahrenheit scale?

UNIT 8

Introduction to Sound

Lesson Plan 1

Student learning outcomes

Comprehend that sound is produced by vibrating objects. Differentiate between high and low sounds. Differentiate between loud and soft sounds.

Materials

objects that make a sound, a steel scale, a steel pencil scale, an empty cold drink bottle, a bell, a baby rattle, water in a basin

Vocabulary

vibrations, visible, invisible, frequency, Hertz, disturbance

Overview

In this lesson, the students will be introduced to sound. How is sound made? How does it reach us? Learning about sound waves, which causes vibration through the air. There are loud and soft sounds which are measured in decibels. Then there the high and low sounds, some which humans cannot hear.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. Name some sounds you usually hear in the school ground.
2. Which sounds are loud?

Method

- Begin the lesson by asking the students to close their eyes and listen carefully. Sounds will be made by using the steel scale, pencil case, empty bottle, a bell, a baby rattle, banging the door shut. The answers are noted on the board. Now ask which sounds were loud and which were soft.
- The students will shake their steel pencil cases, and thump their desk. Sound produced was a disturbance caused by vibrations which made the sounds. When

you shake a rattle, or your pencil case the air began to vibrate, producing sound. These sounds are sometimes visible. Read pages 60 and 61 of the Students' Book in the classroom.

- Sound travels in waves. Put the basin of water on the table. The students are asked to come closer. One student is asked to dip his finger in the water. A few waves were formed which moved outwards, then several students dipped their fingers, there were a larger number of waves. Sound moves in a similar way in air. The sound waves are measured in Hertz.
- Sounds with a high frequency of waves are called high pitched sounds. Sound of bird chirping or whistle are considered to be of high frequency, due to a large number of sound waves produced. Sound of low frequency are considered as low pitch as the sound waves reaching us are fewer in number. The sound of drums is considered to be low.
- When the sounds are loud or soft, it is known as the volume of the sound. Volume is measured in decibels. The volume of the radio or TV can be controlled by making it loud or soft. The sound of the ambulance siren is loud and the sound of water is soft. A human ear can hear 80 decibels.

Assessment

1. Activity 4, page 62
2. Exercise questions 2 and 3, page 65

Reinforcement/homework

Answer the following questions.

i. How does sound reach our ears?
ii. How are sound waves measured?
iii. What are high and low sounds?
iv. Name two sounds which are soft and two sounds which are loud.
v. How do we measure the sound volume?

Lesson Plan 2

Student learning outcomes

Demonstrate that sound can travel through solids, liquids, and gases. Explore the effects of noise on human health. Suggest ways to reduce noise pollution and plan an awareness campaign.

Material

water, table, clock an alarm, plastic bag

Vocabulary

vibrations, pollution, noise

Overview

Sound can travel through solid, water, and air. The sound of our voice is produced by the vocal chords. They will understand that noise is sound which irritates. They will learn about the negative effects of noise pollution on our wellbeing.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. Can you hear the doorbell in a room with the door closed?
2. What is **noise**?

Method

- Fill a zip lock plastic bag with water. A few students will be called near the teacher's table. The students will be asked to hear the clock's ticking. One student will be asked to put his ear on the table and tell the class what he can hear. He heard the ticking of the clock. Block one ear of the student and on the other ear, place the zip lock bag with water on his ear and then place the clock. Could he hear the ticking? Yes, he could. This showed that sound can travel through solid, liquid, and gas. Read pages 63 and 64 of the Students' Book in the classroom.
- Everyone has a different voice. This is due to our vocal chords.
- Noise is sound which is unpleasant to the ears. It can even affect our hearing ability. The sound of the bus pressure horns, aircraft flying in near the airport. The loud noise of heavy traffic, loud music, construction machinery, and even generators cause a lot of noise pollution. Noise pollution effects young babies, elderly and the sick. Many people suffer from hearing loss as well.
- Initiate a poster making competition, an awareness program in school about the draw backs of having heavy traffic and pressure horns in public vehicles moving within the city, unnecessary use of loud speaker, ban the use of horns near educational institutes and hospitals.

Assessment

1. Exercise questions 3 and 4, page 65
2. Exercise question 1, page 65

Reinforcement/Homework

Draw posters on A-4 sheets for your class on Noise Pollution Awareness Day.

UNIT 9

Electricity

Lesson Plan 1

Student learning outcomes

Define electricity. Define static electricity. Understand where negative and positive charges come from. Identify the charged particles in an atom.

Material

Pictures of electrical appliances. A plastic scale, small pieces of torn paper, chart showing the parts of an atom.

Vocabulary

electrical, appliance, static, generated, cables, electrons, protons, neutrons, nucleus, negative, positive

Overview

Student know that electricity makes many machines and home appliances work efficiently. This lesson will explain that electricity is also a form of energy. Static electricity is electricity which does not move. Students will also learn about the atoms which are the tiniest part of an object.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. Name some household appliances.
2. What makes these appliances work?

Method

- Show pictures of different appliances. The students will tell the class if these appliances work with the help of electricity. What is electricity? Electricity is a form of energy resulting from charged particles. How do we get electricity in our homes? Electricity is produced in power stations with the help of oil, gas, and coal. However, it can also be generated by water, solar, nuclear, and wind power. The power stations

distribute this electricity to substations through power lines. The electric cables are then connected to our homes.

- Read pages 67-69 of the Students' Book in the classroom.
- What happens to your hair when you comb them in winter? The hair gets stuck to the comb, and when you pull the comb you get a shock. If you touch the car door in winter, the sweater or your uniform gives you a shock, this is due to static electricity. What is static electricity? There are two types of charges—positive and negative. Where do these charges come from? The answer to this question should include the fact that all objects are made up of tiny particles called Atoms.
- Draw a diagram of an atom and then explain how protons, electrons, and neutrons are positioned in an atom. All objects are made of tiny particles called atoms. Atoms contain even tinier particles which are called electrons, protons, and neutrons. The protons and neutrons lie in the centre of an atom, known as the Nucleus. Electrons, are the smallest part of an atom and carry a negative charge.

Assessment

1. Activity 3, page 69
2. Exercise questions 1 and 2, page 71

Reinforcement/homework

1. Draw a diagram of an atom in your notebooks.
2. Answer the following questions.
   i. What is the name given to the tiniest particle of an object?
   ii. What two smaller particles lie in the centre of the atom?
   iii. What charges does a proton carry?
   iv. What charge do the electrons carry?
   v. What charge does the neutron carry?
   vi. Which is the smallest part of an atom?

Lesson Plan 2

Student learning outcomes

Explain the production of static electric charges in some common materials. Explain the phenomenon of lightning.

Material

balloons, a sweater

Vocabulary

attraction, repulsion, lightening, charges

Overview

This lesson will explain that electricity has positive and negative charges. Like charges repel and unlike charges attract. Rubbing two different objects produce these charges. The lightening during a thunderstorm is due to the movement of the positive and negative charges in a cloud.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. How do the like charges in the atom in one object react to the like charges of another object?
2. What about the reaction of the unlike charges?

Method

- Read page 68 of the Students' Book in the classroom and explain with the help of balloons, a sweater and a silk scarf. A few students will be called up to fill the balloon with air. Two balloons will be suspended on a wooden rod. The teacher will rub both the balloons with the sweater. The third balloon will be rubbed with the silk scarf. The students are to observe what happened. The two balloons rubbed with the sweater had got the same charge, so they repelled one another. The third balloon was rubbed by the scarf had a different charge and it attracted the other two balloons. This showed that objects with like charges repel and unlike charges attract.
- Lightning is the streak of light which comes with the rain storm. The rain clouds have frozen raindrops of different sizes, travelling at very speeds, which rub against each other while moving through the air. This creates electrical charges. The positive charges collect towards the top of the cloud and the negative charges remain behind, towards the bottom of the cloud.
- If too many negative charges move from one cloud to another, a spark is formed which is called lightning. Lightning can damage property if it hits the earth.

Assessment

Exercise questions 3 and 4, page 71

Reinforcement/homework

1. Draw the two diagrams of activity 3 on page 69.
2. Answer the following questions.
   i. How is the electrical charge made in a thundercloud?
   ii. Where are the positive charges on the clouds?
   iii. Where are the negative charges on the clouds?
   iv. Does lightening cause damage on Earth?

UNIT 10

Magnetism

Lesson Plan 1

Student learning outcomes

Investigate by using a magnet that some materials are magnetic and some are nonmagnetic. Recognize that a magnet has poles.

Material

things made of paper, wood, metal: paper pins, steel bowl, keys; different shapes of magnets

Vocabulary

magnetic, magnetism

Overview

A Magnet is a piece of metal which can pull certain metals to itself. In this lesson, students will learn that a magnet has poles, which are the strongest part of the magnet.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. What is the difference between an ordinary metal and a magnet?
2. What is magnetism?

Method

- Arrange all objects on the table. Student will come to the teachers table and use one of the magnets to pick up the objects placed there. The observations will be noted in table given for activity 1 on page 72.
- Objects made by iron, cobalt and nickel were attracted to the iron but objects made of wood, cloth, plastic were not attracted. Magnets only attract objects made of these metals. They are magnetic materials. This attraction is known as the magnetic force. Are all magnets of one shape? No, magnets can be of different shapes—rod, bar,

and u-shaped. The ability of a magnet to attract certain other materials is known as magnetism.

- Do magnets have poles? This can be shown through the activity 2 on page 73. The ends of the magnets are known as poles. The poles are the strongest part of the magnet. One end is the North Pole and the other is the South Pole.

Assessment

Activity 1, page 72

Exercise question 3, page 79

Reinforcement/homework

1. Draw the different shapes of the magnets. Label the magnets.
2. What is a magnet?
3. What do magnets attract?
4. Name three magnetic materials?
5. Name three non-magnetic materials?
6. What is the force of the magnet known as?

Lesson Plan 2

Student learning outcomes

Demonstrate that like poles repel each other and unlike poles attract each other. Investigate that a freely suspended magnet always points in the NS direction.

Materials

a bar magnet a string, a compass, two rod magnets, iron filings

Vocabulary

instruments, directions, magnetic, field

Overview

Students now understand the power of a magnet. In this lesson, they will learn how a compass always points to the North. Magnets are of different shapes. The space all around the magnet is known as the magnetic field.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. What is a compass?
2. In what direction is the needle of the compass pointing?

Method

- Activity 2 on page 73 will be conducted in the classroom to explain about the magnet. The students will be divided into groups to do activity 4 on page 74 to be done in class.
- Magnets repel and attract each other. Bring the north poles of two magnets close together. What happens to the magnets? The magnets repelled each other. Now bring unlike poles close. Observe what happens. The poles attracted each other.
- Place a bar magnet under a sheet of glass, she will then sprinkle the iron filings on the glass. Observe what happened. All the iron filings went towards the poles where the magnetic field was the strongest. Activity 5 to be done in class.
- The earth has a magnetic field, which is not strong. The compass needle will always point to the North Pole where the magnetic field is the strongest.

Assessment

1. Activity 5, page 75
2. Exercise question 1, page 78

Reinforcement/homework

1. Draw the diagram showing the magnetic field on page 75.
2. Answer the following questions.
    i. What is the space around the magnet called?
    ii. Where is the magnetic field of the Earth?

Lesson Plan 3

Student learning outcomes

Learn how magnets are formed. Differentiate between temporary and permanent magnets. Identify the various uses of magnets in daily life.

Material

a few bar magnets, strips of iron or iron filings

Vocabulary

magnets, temporary, permanent

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. Does the refrigerator door close easily?
2. How do we make a magnet?

Overview

Students will learn how strips of iron and steel become magnetized when they are put close to a magnet. They lose their magnetism once the magnet is removed. These are temporary magnets. Permanent magnets retain their magnetic properties for a long time. Magnets are also useful in many ways.

Method

- Begin class demonstration by taking an iron nail and stroking it on a strong magnet. The iron nail will become magnetised. However, the iron nail cannot retain magnetism after it has been moved away from magnet. Permanent magnets can be made, by repeatedly stroking a strip of steel on a magnet. Later, even if the magnet is moved away the steel bar will remain magnetised. It has now become a permanent magnet. Since the iron loses magnetism after some time, therefore it is a temporary magnet.
- Can you name some common uses of magnets? Refrigerator door, speakers, microphones, ATM cards, and many electronic items use magnets.

Assessment

1. Activity 6, page 76
2. Exercise questions 5 and 6, page 79

Reinforcement/homework

Make a list of things where magnets are used. Draw or paste pictures of these objects in your notebooks.

UNIT 11

Movement of the Earth

Lesson Plan 1

Student learning outcomes

Comprehend concepts about the Earth's axis. Differentiate between day and night. Describe the movement of the Sun, the Moon, and the stars.

Material

globe, plastic ball with a knitting needle pierced through it, torch

Vocabulary

axis, rotation, revolution

Overview

This lesson will focus attention toward the Earth's movement on its axis, which causes Day and Night, and called the rotation. The axis is the imaginary line which passes through the North and South Pole. The revolution around the Sun cause the Seasons.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. What is the shape of the Moon?
2. What causes day and night?

Method

- First pick up the plastic ball with the knitting needle, explain to the students that the needle is the imaginary line passing through the Earth. This rod is known as the axis. It is not straight. The teacher will then take the globe and ask one student to shine the torch on one side of the globe. Now explain that in a similar way, the places facing the Sun have day and the other part has night. The Earth takes 24 hours to complete one turn on its axis. This is known as rotation. Activity 3 on page 80 to be done in class by the teacher.

- The Earth not only rotates on its axis, it also goes around the Sun. This is called revolution. The Earth follows a path which is known as the orbit. It takes 365 days and 6 hours to complete one revolution.
- Activity 4 on page 81 to be done in class.
- Explain that when we are moving in the car, it seems that all the things outside are also moving in the opposite direction, even though they are not moving at all. The Earth moves west to east, while the Sun, the Moon and the Stars move east to west. This why we feel they are moving.

Assessment

1. Activity 6, page 82
2. Exercise questions 1 and 2, page 85

Reinforcement/homework

Answer the following question

i. What is rotation?

ii. What is revolution?

iii. What is the path that the Earth moves around the Sun called?

iv. How many days does the Earth take to go around the Sun?

v. What is the axis?

Lesson Plan 2

Student learning outcomes

Explain that the Earth is tilted on its axis and this tilt causes the seasons. Know about the Great Bear. Know about the Pole Star.

Material

a chart showing the position of the Earth during each season

Vocabulary

seasons, spring, summer, autumn, winter

Overview

Students will be taught that as the Earth is slightly tilted while revolving around the Sun, we have the seasons. The Great Bear is a group of stars known as a constellation. The Pole Star is the star around which other stars revolve. This constellation is in the Northern Hemisphere.

Teaching methodology

Exploring knowledge through essential questions	5 min
Method/activity	25 min
Assessment	10 min

Essential questions

Before starting the lesson, ask some questions to explore the background knowledge of students:

1. Name the four seasons.
2. What is the Great Bear and the Polar Star?

Method

- The Earth is slightly tilted on its axis, which causes the seasons. During the Earth's revolution around the Sun, for a few months the Earth is tilted towards the North Pole and faces the Sun, while for few other months the South Pole faces the Sun. The part which is facing the Sun has summer while the other side has winter. When the Sun is facing the Equator, it is either spring or autumn.
- Explain that we live on Earth, which has mountains, plains, and valleys. Three fourth of the Earth is water. There are some parts in the oceans which are deeper than the highest mountains on the Earth. There are areas in the sea near the beach, known as the continental shelf. This area is 183 meters deep and 16 to 160 kilometres wide. Sunlight reaches the continental shelf, so there are many plants and many kinds of fishes.
- The Great Bear is a group of stars arranged in a particular pattern. It is found in the northern hemisphere. These groups of stars are known as a constellation. The star to the right of the first two stars of the Great Bear is known as the Pole Star. The other stars seem to be going around it. The Pole Star does not move. It is used to find directions in the night. If you face the Pole Star then South is behind you, and east is to your right and west is to your left.

Assessment

1. Draw the diagram showing the four seasons (page 82) in your notebooks.
2. Activity 8, page 84

Reinforcement/homework

1. Exercise questions 3 and 4, page 85
2. Draw the Great Bear in your notebook.

Answers to the exercises

Unit 1

1. Answer the following questions
   i. Bones are important as they are the framework for the body and keep it upright.
   ii. Bones are found the head, arms, hands, legs, feet, rib
   iii. The muscles will be used.
   iv. The brain controls all the other body parts.
   v. I will advise him/her to eat a healthy diet, do exercise, sleep early, take a bath, and brush their teeth daily.
2. Connect the body parts with their function.

   Heart pumping blood

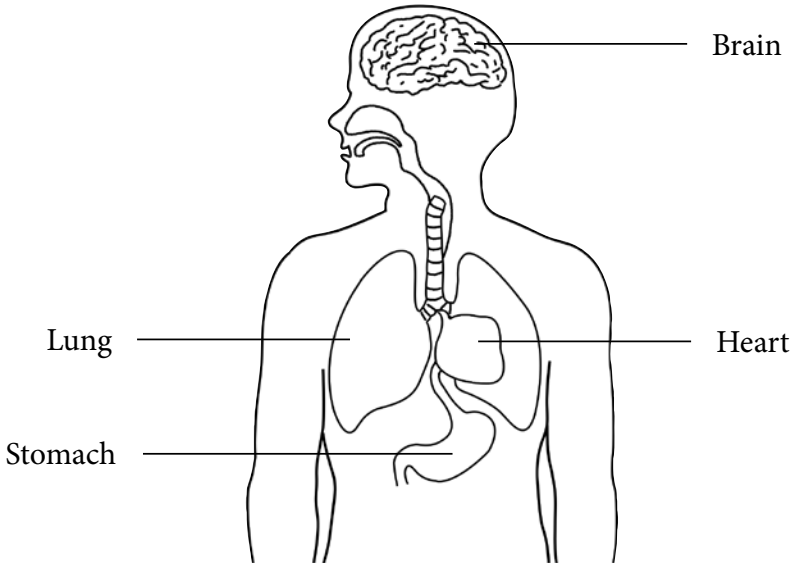
   Brain thinking

   Lungs breathing, adds oxygen to the blood and removes carbon dioxide

   Muscles make bones move

   Kidneys remove extra water and urea
3. Fill in the blanks.
   i. veins
   ii. oxygen
   iii. brain
   iv. nerves
   v. digestive juices
4. Write down four ways of keeping our body clean and healthy.
   i. Take a bath daily.
   ii. Cut nails weekly.
   iii. Wash hand before taking meals, coming back from outside, and after using the toilet.
   iv. Wear clean clothes.

5. Label the diagram in the Students' Book.



6. Write five common body disorders in notebook. Refer to page 6 for answers.
7. Draw the kidney, stomach, and lungs in student book. Refer to the Students' Book for reference diagrams.

Unit 2

1. Answer the following questions.
   i. Living things need air, water, sunlight and food for survival.
   ii. All living things move, grow, respire, sensitive, food, reproduce, and excrete.
   iii. The main stages of an animal's life cycle are, egg, larva, pupa and butterfly.
   iv. The seed grows first, as it contains the food source of the emerging plant.
   v. We resemble our parents because we inherit many of their characteristics.
2. Match column A with column B.

   Tadpole a baby frog that looks like a fish

   Larva hatches from the eggs and feeds on leaves

   Froglet baby frog with lungs

   Spawn eggs protected in a jelly like substances
3. Correct the sentences
   i. A female butterfly lays many eggs.
   ii. A pupa changes into an adult butterfly.
   iii. A tadpole looks like a fish.

iv. A pencil does not grow.

v. A non-living thing does not respond to a stimulus.

4. In the space below, paste a picture of yourself and your parent as a child. Are there any similarities? Answer depends upon the students.

Unit 3

1. Answer the following questions

   i. We need to eat food to keep our body healthy and give us the energy to work.

   ii. A balanced diet is eating food that give the body proper nutrients. Unbalanced diet does not provide the necessary nutrients for healthy growth.

   iii. We should eat more from the carbohydrates group as it gives us energy.

   iv. If our food contains less fibre we will get constipation or appendicitis.

   v. The good source of fats are oil, ghee, butter, and cheese.

2. Fill in this chart with the kind of food eaten for breakfast, lunch, and dinner, for a balanced diet.

	Protein	**Carbohydrates**	**Fat**	**Vitamins and minerals**	**Water**
Breakfast	Milk/egg	bread	butter	banana	1 glass
Lunch	Meat/ vegetables	Roti/ rice	Ghee/oil	apples	2 glasses
Dinner	Chicken/ vegetables	Roti/rice	Ghee/oil	Mixed fruits	2 glasses

3. The reasons and benefits of eating these foods is that they provided to me with enough proteins and carbohydrates to give me the energy to work and play.

4. Definitions given below.

   i. Proteins helps the body to build muscles and tissues

   ii. Carbohydrate are the main source of energy for the body.

   iii. Vitamins and Minerals are needed by the body to function better and help us to grow.

   iv. Fats also provide us with energy, but they must be taken in s small quantity.

   v. Water is needed to flush out the waste products of the body by urine and excretion. Water is also needed for digestion and to help the blood to carry nutrients to all parts of the body.

5. Refer to the Students' Book for the answers.

Unit 4

1. Explain the following.
   ia. Producers are the green plants which make their food by taking Sunlight and using the energy to make sugar.
   ib. Consumers are animals that cannot make their own food. The herbivorous animals feed on plants. The carnivorous animals that hunt other animals are also called predators.
   ic. Decomposers are organisms that feed on dead organisms. They break down the dead remains of plants and animals into simpler substances.
   ii. grain-------rat-------cat
   carrots--------rabbit-------eagle
   plant--------goat--------crocodile
   iii. The energy of the Sunlight is used by the plant to make food and sugar
   iv. Plants provide us with wood to use as firewood, to make houses and furniture. Wood is also used to build boats. Trees also provide us with shade. Some crops are also used for grains such as rice and wheat. The cotton and jute plants give us fibre to make cloth. Trees also give us fruits, the leaves and bark of some trees are used for medicine. The fruits of some plants are used as vegetables. Animals provide us with meat, and milk. Some animals are used to pull carts and help on the farms.

2.

Herbivorous	**Carnivorous**	**Omnivorous**
Animals that eat plants.	Animals that eat other animals.	Animals that eat both plants and animals.

3. Write H for Herbivorous animals, C for Carnivorous, and O for Omnivorous for the pictures given. Refer to the Students' Book for the answers.

Unit 5

1. Answer the following questions.
   i. Anything which has weight and occupies space is matter. Solid, liquids, and gases
   ii. Refer to the Students' Book for the answer.
   iii. If ice, which is a solid, melts then it becomes a liquid. If water is heated, the steam changes into water vapour, which is a gas form. When liquid is frozen it becomes a solid.

iv. If salt is added to water, it dissolves after it has been left for some time. Salt is a soluble substance. Talcum powder added to water does not dissolve, as it is an insoluble substance.

v. We can separate a mixture of sand and water by filtration and decantation.

2. Fill in the blanks.
   i. steam
   ii. melts
   iii. way
   iv. more
   v. solid
3. Write true or false
   i. false
   ii. true
   iii. false
   iv. true
   v. true
4. Make a list of solutions in your daily life. Write the material in them.

   Answer depends upon the students.

Unit 6

1. Answer the following questions.
   i. Force can be defined as a push or pull. An unbalanced force acting on an object can make it move.
      a. Force can make a body move.
      b. Force can increase and decrease the speed of the moving object.
      c. Force can change the direction of a moving object.
      d. Force can stop a moving object.
      e. Force can change the shape of an object.

   iii. Answer depends on the students.

   iv. Machines help us to make work easier for us, by allowing us to push or to pull more easily and to a greater distance.

   v. Simple machines are devices or tools which are made up of either a few or no moving parts. Machines which have more than one simple machine and a number of moving parts are called complex machines.

3. Fill in the blanks.
   i. wedge
   ii. wheel and axle
   iii. lever
   iv. plane
   v. screw
   vi. pulley
4. Name some machine that you use. Answers depends on the students.
5. True or false
   i. true
   ii. false
   iii. true
   iv. true
   v. true

Unit 7

1. Answer the following questions.
   i. Temperature is the hotness and coldness of a substance or object. We use a thermometer to measure the temperature.
   ii. The two scales on the thermometer are the Celsius and the Fahrenheit.
   iii. The boiling point is the mark at which water starts to boil. The freezing point is the mark at which water turns into ice.
   iv. We get heat from the Sun, electricity, gas, coal and wood.
   v. The thermometer has to be held upright, keep your eyes on the liquid to see at what level it is, insert or immerse it in the substance and read the marking on which the level of the liquid has risen. The thermometer is made of glass. Use it carefully.
2. Draw three thermometers to show normal body temperature, the boiling and freezing point of water. Refer to the Students' Book for the answer.
3. The ice in the kitchen will melt faster than the ice in the bedroom, because the kitchen is warmer than the bedroom.

Unit 8

1. Answer the following questions.
   i. It is not possible to hear sound in space as there is no medium by which air can travel.

ii. Noise pollution affects the health. It causes people to get earache, and loss of hearing. The sleep of the babies, elderly and the sick is disturbed. People are generally disturbed by the constant noise around them.

iii. Hertz is the frequency of sound. The units for measuring sound are in decibels.

2. Fill in the blanks

   i. vibrations

   ii. waves

   iii. medium

   iv. solids

   v. noise

3. Differentiate between

High sound--sound having high frequency. It is also called a high pitched sound	Low sound—sound have a low frequency. It is also called a low pitched sound.
Loud sound—is the volume of the sound. It means sound of high decibels	Soft sound—is the volume of the sound. It means sound of low decibels.

Exercise questions 4, 5, and 6 can be done by the students under the supervision of the class teacher.

Unit 9

1. List some electrical appliances. Answer depends on the students.
2. Answer the following questions.

   i. Electricity is a form of energy like heat and light. It is supplied to our homes through cables from substations.

   ii. Electricity which is not moving is called static electricity. Static electricity is made when two objects rub against each other to produce electrical charges.

   iii. We should rub the balloon with another balloon to put some electrical charges on it.

   iv. No the comb will not pick the bits of paper. The comb will be rubbed against our hair or a woollen cloth to give it electrical charge to lift up the paper.

   v. An atom is a tiny particle, which is made up of tinier particles called proton, neutrons, and electrons.

3. Fill in the blanks.

   i. two

   ii. attract

iii. positive
iv. static electricity
v. negative

4. Write attract or repel
   i. 1.repel
   ii. 2.attract
   iii. 3.repel
   iv. 4.attract

Unit 10

1. Answer the following questions.
   i. Magnet is a piece of metal which attracts objects made of iron, cobalt and nickel. The force with which a magnet attracts an object towards itself is the magnetic force.
   ii. The two end known as the poles have the greatest magnetic force.
   iii. The compass is used to find directions.
   iv. The earth's magnetic field is not strong. The compass always points towards the north.
   v. Permanent magnets are those which retain the magnetic force. The temporary magnets are those which lose their magnetic force after some time.
2. Draw and colour a magnet. Label the poles. Refer to the Students' Book for the answer.
3. Correct the following sentences.
   i. The opposite poles of magnets attract each other.
   ii. The same poles of magnets repel each other.
   iii. Pieces of wood and cloth do no become magnets when placed near magnets.
   iv. The needle of the compass always points to the North.
4. Draw a picture and label it to show the magnetic field around the magnet. Refer to the Students' Book for the answer.
5. Complete the table.

Magnetic objects	**Non-magnetic objects**
Keys	A rubber ball
Steel bowl	Table
Paper clips	Pencil
Paper pins	Plastic lunch box

5. List four objects in which magnets are used.

   Refrigerator door, certain toys, speakers, and ATM cards.

Unit 11

1. Answer the questions.
   i. It takes the Earth 24 hours to complete one rotation.
   ii. It takes the Earth 365 days and 6 hours to go around the Sun.
   iii. The Polar Star remains in one position.
2. Draw a map of the world in your notebook. Colour the water blue and the land brown. Refer to the Students' Book for the answer.

   How much of the Earth is covered with land and how much with water? Three fourths of the planet is water and only one fourth is land.
3. Draw a picture of the Earth in your notebook. Mark the axis with an arrow. Refer to the Students' Book for the answer.
4. Colour the part of the Earth that has day yellow, and the part that has night black. Refer to the Students' Book for the answer.

Notes

Notes

کہ المونیم، نکل اور کوبالٹ جیسی مختلف دھاتوں/عناصر کے اشتراک سے کیسے مصنوعی مقناطیس بنائے جاتے ہیں۔

سرگرمی 1 کے لیے طلبا سے کہا جاسکتا ہے کہ وہ گھر سے مقناطیسی اور غیرمقناطیسی اشیا کے طور پر الگ الگ کرنے کے لیے جو چیزیں لے کر آئے ہیں، ان کی آزمائش کریں۔

آپ طلبا کو مختلف قسم کے مقناطیس جیسے سلاخ نما، گول، گھوڑے کی نعل نما، اور U کی شکل کے مقناطیس طلبا کو لاکر دکھایئے۔

سرگرمی 5 میں ہر قسم کے مقناطیس کے اوپر ایک کاغذی شیٹ رکھ دیجیے، باری باری طلبا سے کہیے کہ وہ مشاہدہ کریں کاغذی شیٹ کے اوپر بکھرے ہوئے لوہ چون (iron filings) کے ذرات کیسے مل کر مختلف اشکال اختیار کر لیتے ہیں۔

اضافی یا توسیعی سرگرمی کے طور پر کاغذی شیٹ کے نیچے دو بار مقناطیسوں کو مختلف انداز سے رکھ دیجیے، مثال کے طور پر دونوں ایک جیسے (مثبت یا منفی) سرے ایک دوسرے کے سامنے ہوں، دونوں کے مخالف سرے آمنے سامنے ہوں، دونوں مقناطیس ایک دوسرے کے متوازی ہوں وغیرہ وغیرہ، اور پھر طلبا سے کہیے مشاہدہ کرنے کا کہیے کہ کیسے ہر بار لوہ چون کے ذرات خود کو مختلف اشکال میں ترتیب دے لیتے ہیں۔

بعدازاں طلبا سے سوال کیا جاسکتا ہے کہ لوہ چون کے ذرات کاغذ پر اپنی ترتیب یا شکل بار بار بدلتے ہوئے کیوں مشاہدے میں آتے ہیں۔

باب 11

سرگرمی 1 اور 2 کی مدد سے طلبا کو زمین کے محور کے بارے میں بتایئے۔ سرگرمی 3 انجام دے کر روشنی کے تصوّر کو بیان کیجیے۔ طلبا سے پوچھیے کہ ان کے خیال میں جب زمین اپنے محور پر گھومتی ہے تو کیا ہوتا ہے۔ پوچھیے کہ ان کے خیال میں دن اور رات کیسے بدلتے ہیں۔ طلبا سے کہیے کہ رات میں آسمان پر ستاروں کا مشاہدہ کریں۔

کہیں کہ دوشاخہ کی دونوں شاخوں کی ارتعاشی حرکت کا بہ غور مشاہدہ کریں۔ پھر طلبا سے فرداً فرداً کہا جائے کہ وہ مرتعش دوشاخے کو اپنے کانوں کے قریب لے جائیں اور اس کے ارتعاش کی وجہ سے پیدا ہونے والی آواز سنیں۔کسی جسم یا اس کے ایک حصے کے ارتعاش اور نتیجتاً آواز کی پیدائش کے درمیانی تعلق کو اس سرگرمی کے ذریعے واضح طور پر بیان کیا جاسکتا ہے۔

سرگرمی 3 میں آپ پانی کی موجوں کے ماڈل کی مدد سے صوتی لہروں کی اپنے ارتعاشی ماخذ (source of vibration) سے ، جہاں سے یہ لہریں پیدا ہورہی ہیں، دور جاتی حرکت کی وضاحت کیجیے۔

سرگرمی 4 میں ٹک ٹک کی بلند آواز خارج کرتی دیوار گیر گھڑی یا کلاک کا استعمال کیا جائے گا۔توسیعی سرگرمی کے طور پر کلاک کو مختلف میٹیریلز یا اشیا جیسے تولیہ، ٹشوپیپر، روئی وغیرہ میں لپیٹ کر یہ مشاہدہ اور ریکارڈ کیا جاسکتا ہے کہ کس میٹیریل میں سے زیادہ یا تیز آواز گزر سکتی ہے۔

اسکول میں شور کی آلودگی (صوتی آلودگی) سے متعلق آگاہی مہم شروع کرنے کے سلسلے میں طلبا کی رہنمائی کی جاسکتی ہے۔طلبا کے تیار کردہ پوسٹرز بھی اسکول کے احاطے اور کلاس رومز میں مختلف مقامات پر لگائے جاسکتے ہیں۔ آپ کی رہنمائی میں اس موضوع پر ایک اسمبلی پریزنٹیشن بھی تیار کی جاسکتی ہے۔

باب 9

سرگرمی 1 اور 2 میں مختلف میٹیریلز یا اشیا کو آپس میں رگڑ کر اس عمل کے اثر کا مشاہدہ کیا جائے گا۔ اگر اس باب کو موسم سرما (winter term) کے دوران پڑھایا جائے تو یہ ایک اچھا خیال ہوگا کیوں کہ خشک موسم برق سکونی (static charges) کے مظہر کا عملی مظاہرہ کرنے کے لیے زیادہ موزوں ہوتا ہے۔

برق سکونی کے تصوّر کی وضاحت کرنے سے پہلے اس بات کی ضرورت ہے کہ طلبا کو ایک ایٹم میں موجود مختلف باردار ذرات کے تصوّر سے روشناس کرایا جائے۔

آسمانی بجلی کے چمکنے کے مظہر (phenomena) کی وضاحت طلبا سے یہ پوچھتے ہوئے کی جاسکتی ہے کہ کیا کبھی انھوں نے دروازے کی دھاتی ناب (knob) کو چُھوتے، سردیوں میں سویٹر اتارتے، یا سردیوں کی راتوں میں کمبل اوڑھتے ہوئے بجلی کا جھٹکا (shock) محسوس کیا ہے۔ اندھیرے میں متحرک باردار ذرات اسی طرح واضح طور پر دکھائی دیتے ہیں جیسے طوفانی بارش کے دوران آسمان پر بجلی چمکتی ہوئی دیکھی جاسکتی ہے۔

باب 10

کلاس کو ذہنی طور پر تیار کرنے کے لیے کچھ سوالات (warm up questions) یہ ہوسکتے ہیں:

1۔ ایک عام دھاتی ٹکڑے اور مقناطیس میں کیا فرق ہوتا ہے؟

2۔ مقناطیسیت (magnetism) کے مظہر سے آپ کیا سمجھتے ہیں؟

طلبا کو مقناطیس سے متعارف کروایا جائے، تعارف میں قدرتی طور پر پائے جانے والے مقناطیس جیسے معدنی مقناطیس (lodestone) یا سنگ مقناطیس (magnetite) اور انسانی ساختہ مقناطیسوں کے بارے میں معلومات شامل ہونی چاہییں، نیز یہ

باب 6

آپ طلبا سے قوت کی تعریف پوچھ کر اور پھر اصل تعریف کی جانب ان کی رہنمائی کرتے ہوئے سبق شروع کرسکتے ہیں۔ ان سے یہ بھی پوچھا جاسکتا ہے کہ قوتیں کیا کرسکتی ہیں، اور پھر ان کے جوابات کی مدد سے بلیک بورڈ پر جال (web) بنایا جاسکتا ہے۔ طلبا کو مختلف ساکن اور متحرک اشیا کی تصاویر بھی دکھائی جاسکتی ہیں۔ وہ کیا فرق مشاہدہ کرتے ہیں؟ آپ اس سرگرمی کے لیے اخبارات و جرائد سے تراشی گئی تصویریں چارٹ پیپر پر چپکا کر فلیش کارڈز بھی تیار کرسکتے ہیں۔

سرگرمی 3 کے لیے طلبا تجویز کردہ اشیا کے علاوہ بھی چیزیں جمع کرسکتے ہیں، اور پھر یہ دیکھنے کے لیے کہ یہ اشیا لچکدار ہیں یا غیر لچکدار مختلف طریقوں (کھینچنا، دبانا، موڑنا) سے ان پر قوتیں لگا کر ان کی آزمائش کرسکتے ہیں۔

آپ کھلونا گاڑی کی مدد سے کلاس میں عملی مظاہرہ بھی کرسکتے ہیں۔ کھلونا گاڑی کو ہر بار زیادہ قوت سے اور زیادہ فاصلے تک دھکیلا جائے۔ پیمائشی ٹیپ کی مدد سے ہر بار گاڑی کا طے کردہ فاصلہ ناپا جاسکتا ہے۔ یہ مشاہدات بلیک بورڈ پر بنائے گئے جدول (table) میں بحث کے لیے درج کیے جاسکتے ہیں، اور طلبا انھیں اپنی نوٹ بک میں بھی درج کرسکتے ہیں۔

طلبا سے کہا جائے کہ وہ کلاس میں اس موضوع پر پریزنٹیشن دینے کے لیے سادہ مشین کی ایک مثال لے کر آئیں کہ کام آسان بنانے کے لیے مشین کا استعمال کیسے کیا جاتا ہے۔ سادہ گھریلو مشینیں جیسے چاقو، قینچی، پیچ کس، کین اوپنر (can opener) وغیرہ اس سرگرمی کے لیے تجویز کی جاسکتی ہیں۔

باب 7

سرگرمی 2 اور 3 انجام دینے میں طلبا کی مدد کیجیے۔ طلبا پر واضح کیجیے کہ تھرمامیٹر کو کیسے پڑھا جائے۔

باب 8

ایک سادہ ابتدائی سرگرمی ہمارے اردگرد سے آتی مختلف آوازوں اور ان کی اقسام کا مشاہدہ اور ریکارڈنگ ہے۔ سرگرمی 1 کے لیے طلبا سے کہا جاسکتا ہے کہ اپنی آنکھیں بند کریں اور پہلے ان آوازوں پر توجہ مرکوز کریں جو انھیں کلاس میں بیٹھے ہوئے سنائی دے رہی ہیں، پھر باہر کھیل کے میدان میں جاکر وہاں سنائی دینے والی آوازوں پر غور کریں۔ طلبا کی آنکھوں پر پٹی باندھ کر ان سے کہا جاسکتا ہے کہ اپنے اردگرد سے آنے والی آوازوں پر غور کریں اور اپنے مشاہدات ایک جدول (table) میں درج کریں۔

اس سرگرمی کی توسیع کے طور پر، طلبا کو گھر کے لیے یہ کام دیا جاسکتا ہے جب وہ اپنی امّی یا ابّو کے ساتھ پارک یا مارکیٹ میں ہوں تو اپنے اردگرد کی آوازوں کا مشاہدہ اور انھیں ریکارڈ کریں۔

سرگرمی 2 میں آواز پیدا کرنے والی مختلف اشیا کا باری باری مشاہدہ کیا جائے اور طلبا کی حوصلہ افزائی کی جائے کہ وہ اس بات پر غور کریں کہ یہ آوازیں کیسے پیدا ہورہی ہیں اور کس قسم کی آوازیں ہیں؟ طلبا سادہ مٹیریل کا استعمال کرتے ہوئے آواز پیدا کرنے والی اشیا خود بھی بناسکتے ہیں جیسے چاول سے بھری ہوئی ماچس کی ڈبیا، ہوا سے پھولا ہوا غبارہ جس کے اندر دال وغیرہ کے کچھ دانے ہوں۔

طلبا کے لیے کلاس میں ایک دوشاخہ (tuning fork) کو ربڑ کی ہتھوڑی سے ضرب لگانے کا عملی مظاہرہ کیا جاسکتا ہے۔ طلبا سے

کھانے میں مدد ملے گی۔ طلبا کھانے کی صحت بخش عادات کے فروغ کے لیے صحت بخش غذاؤں پر مشتمل ایک بڑی پلیٹ بنا کر کمرۂ جماعت میں اس کی نمائش کر سکتے ہیں۔

متوازن غذا کی تدریس کرتے ہوئے، روزانہ غذائی اجزا کی مناسب مقدار لینے کے فوائد پر زور دینے کے لیے فوڈ گروپس پر بحث کیجیے۔

متوازن غذا کا چارٹ بناتے ہوئے طلبا خوراک میں غذائی اجزا کی سفارش کردہ مقدار کے فوائد بھی تحریر کر سکتے ہیں۔

ایک سرگرمی کا انعقاد کیجیے اور طلبا سے کہیے کہ صحت بخش غذائی اشیا لے کر آئیں جو وہ ایک دوسرے کے ساتھ مل کر کھا سکتے ہیں۔

اس سرگرمی کے ذریعے طلبا غذا کی متعلقہ فوڈ گروپ میں درجہ بندی بھی کر سکتے ہیں۔ سبق کی اعادہ سرگرمی (revision activity) کے طور پر یہ سرگرمی انجام دینے میں طلبا کی مدد کیجیے۔

باب 5

سبق کا آغاز طلبا کو کلاس میں اپنی تعداد شمار کرنے کی ہدایت کرتے ہوئے کیجیے۔ وہ کلاس میں طالب علموں کی مجموعی تعداد بتائیں گے۔ اس سرگرمی کا تعلق مادّے کے تصوّر سے بھی جوڑا جاسکتا ہے کہ 20 ڈیسک کے کمرۂ جماعت میں صرف 40 طلبا ہی کی گنجائش ہوسکتی ہے کیوں کہ صرف دو طالب علم ایک ڈیسک کی جگہ گھیر سکتے ہیں۔ لہٰذا اگر مزید 10 طالب علم 20 ڈیسک کے کمرۂ جماعت میں بیٹھنے کی کوشش کریں تو یہ گنجان یا تنگ ہوجائے گا۔

یہ تصوّر ذہنوں میں راسخ کرانے کے لیے کہ مادّہ وزن رکھتا ہے، طلبا کا وزن کرنے کی سرگرمی کا انعقاد کیجیے۔

طلبا سے کہیے کہ اپنے اردگرد موجود اشیا کی شناخت کریں جو وزن رکھتی اور جگہ گھیرتی ہیں۔ طلبا اپنی نوٹ بُک میں بھی انھیں درج کریں گے۔

طلبا کی میز پر چاک سے پنسل باکس، لنچ باکس، اور کتابوں کی آؤٹ لائن یا خاکہ بنانے میں ان کی مدد کیجیے تاکہ وہ جگہ گھیرنے کے تصوّر کو سمجھ سکیں۔ کوئی بھی شے جو جگہ گھیرتی ہے وہ لازماً وزن بھی رکھتی ہے۔

چاک کے چند ٹکڑے لے کر ایک بڑے گلاس میں ڈال دیجیے، طلبا سے کہیے ان کی شکل پہچانیں جب یہ گلاس سے باہر تھے اور پھر جب یہ گلاس کے اندر تھے۔ ان کی وہی شکل برقرار رہتی ہے۔ اب چاک کے تمام ٹکڑے ایک چھوٹے گلاس میں ڈال دیجیے، طلبا سے دوبارہ کہیے کہ چاک کے ٹکڑوں کی شکل میں تبدیلی کو پہچانیں اگر انھیں کسی اور شکل وصورت کے گلاس میں ڈالا جائے۔

اب یہ ظاہر کرنے کے لیے کہ ٹھوس کی مخصوص شکل وصورت ہوتی ہے اور اگر سمانہ (containers) بدل بھی دیا جائے تو بھی یہ اپنی شکل تبدیل نہیں کرتے، یہ سرگرمی پانی کے ساتھ انجام دیجیے۔ لیکن پانی کے معاملے میں صورت حال برعکس ہوتی ہے۔ اسے جس کنٹینر میں ڈالا جائے یہ اسی کی شکل اختیار کر لیتا ہے۔

کمرۂ جماعت پرفیوم لے کر آیئے، اسے چھڑکیے یعنی اسپرے کیجیے۔ پرفیوم کی خوشبو دور دور تک سونگھی جاسکتی ہے کیوں کہ پرفیوم کے ذرات ہر طرف پھیل جاتے ہیں۔

اسکول لیب میں ٹھوس برف کے ٹکڑوں کی پانی اور پانی کی بھاپ میں تبدیلی کے عمل کا مظاہرہ کیجیے۔ تقطیر (filtration) اور نتھارنے (decantation) کی سرگرمیاں انجام دینے میں طلبا کی مدد کیجیے۔

طلبا کی حوصلہ افزائی کیجیے کہ وہ حل پذیر اور ناحل پذیر اشیا کا مشاہدہ کرنے کی غرض سے کچھ مزید مختلف چیزوں سے محلول بنائیں۔

ربڑ دبا کر دو ہفتے تک رکھیں گے اور پھر دونوں کی نشوونما کا مشاہدہ کریں گے۔
طلبا سے کہیے کہ اگاؤ کے عمل (germination) کا مشاہدہ کرنے کے لیے باجرے یا پھلی کے بیج لے کر آئیں۔
مینڈک کے انڈوں کا جھول (spawn of frog's egg) دکھانے کے لیے تخم بالنگا (basil seeds) لے کر آیئے۔ نصف کپ پانی میں ایک چائے کا چمچہ تخم بالنگا ڈال کر 5 منٹ کے لیے چھوڑ دیجیے۔ یہ مینڈک کے انڈوں کے جھول کی شکل اختیار کر لے گا۔
سنڈی (caterpillar) کا مشاہدہ کرنے کے لیے مٹر کی پھلیاں (pea pods) لے آیئے۔ A Very Hungry Caterpillar کی کہانی بھی بیان کی جاسکتی ہے۔ طلبا نے اس سنڈی کی کہانی پڑھ رکھی ہوگی جو بہت زیادہ کھایا کرتی تھی اور آخرکار پیوپا میں بدل گئی تھی۔

باب 3

باب کے تعارفی صفحے پر دی گئی تصویر دکھاتے ہوئے سبق کا آغاز کیجیے۔ طلبا سے کہیے کہ تصویر میں دکھائی دینے والی جگہوں اور اشیا کی شناخت کریں۔ تعارف کے بعد سرگرمی 1 سے ماحول کے اجزا کو سمجھنے میں طلبا کو مدد ملے گی۔
خشکی، پانی اور فضائی ماحول کے تعارف کے لیے طلبا کو متعلقہ ماحول کی تصویریں دکھایئے اور ان سے کہیے کہ ہر ماحول میں نظر آنے والی اشیا کو پہچانیں۔
طلبا کو مختلف قسم کے ماحول دکھانے کے لیے ایک حقیقی جگہ پر لے جایئے۔
گائے، بکری، شیر، پانڈا اور کتے کی تصاویر دکھایئے اور طلبا سے کہیے کہ ان کی کھانے کی عادات میں فرق بیان کریں۔ جب طلبا جوابات دے چکیں تو پھر سبزی خور (herbivores)، گوشت خور (carnivores) اور ہمہ خور (omnivores) کے تصورات کو یکجا کیجیے۔
تینوں اقسام کے جانوروں کی شناخت کے لیے چڑیا گھر کی سیر ایک اچھی سرگرمی ثابت ہوسکتی ہے۔
پیداکار (producers)، صارفین (consumers) اور تحلیل کنندگان (decomposers) کے تصورات کو یکجا کرتے ہوئے مختلف ماحول میں غذائی زنجیر کو سمجھنے میں طلبا کی مدد کیجیے۔

باب 4

طلبا کو صحت بخش غذا کی کچھ تصاویر دکھا کر سبق کی ابتدا کیجیے۔ صحت مند اور چاق چوبند رہنے میں ان کی اہمیت پر بحث کیجیے۔ غیر صحت بخش غذا کے نقصانات پر بھی بحث کیجیے جو ہم سڑک کنارے موجود اسٹالز سے خریدتے ہیں یا پھر بغیر ڈھکی ہوئی خوراک جو خوانچہ فروش فروخت کرتے ہیں۔
بعدازاں، طلبا سے کہیے کہ ان غذاؤں کی فہرست بنائیں جو انھوں نے ناشتے میں کھائی ہیں۔ طلبا سے جوابات لیجیے اور انھیں بلیک بورڈ پر درج کر دیجیے۔ اب یہاں سے غذائی گروہوں (food groups) کے تصوّر کو یکجا کیجیے، کیوں کہ فہرست میں مختلف اقسام کی غذائی اشیا شامل ہوسکتی ہیں۔
کمرۂ جماعت میں نمائش کے لیے غذائی ہرم (food pyramid) بنانے میں طلبا کی مدد کیجیے، جس سے انھیں صحت بخش خوراک

نوٹس برائے اساتذہ

باب 1

طلبا کی حوصلہ افزائی کیجیے کہ وہ اسکول کی لیبارٹری میں جا کر اندرونی اعضا کے نمونوں یا ماڈلز کا مشاہدہ کریں۔ طلبا کے ساتھ بھرپور گفت وشنید (interactive discussion) اور تفصیلی وضاحت کے لیے اعضا کے ماڈلز کلاس میں بھی لائے جا سکتے ہیں۔ اسکول لیب سے استخوانی نظام یا ڈھانچا (skeletal system) لے کر آیئے اور طلبا سے کہیے کہ وہ ہڈیوں کے جوڑوں کا بہ غور مشاہدہ کریں۔ اس سرگرمی سے طلبا کو جوڑوں کی حرکت سمجھنے میں مدد ملے گی۔ طلبا کو ہمارے جسم کی اہم ہڈیوں کے نام پڑھایئے، مثال کے طور پر skull (کھوپڑی)، rib cage (پسلیاں)، collarbone (ہنسلی کی ہڈی)، spinal cord (حرام مغز)، hip bone (کولہے کی ہڈی)، thigh bone (ران کی ہڈی)، اور leg bone (ٹانگ کی ہڈی)۔ اس کے ساتھ ساتھ wrist bone (کلائی کی ہڈی) اور ankle (ٹخنہ) بھی پڑھائے جاسکتے ہیں۔ یہ عملی مظاہرہ سرگرمی 1 میں مددگار ثابت ہوگا۔

مرغ کی ٹانگ کا ٹکڑا لے کر آیئے اور طلبا سے کہیے کہ اس کے عضلات (muscles) کو پہچانیں۔ اسی طرح طلبا سے کہیے اپنے بازو کو دبا کر اس کے عضلات کو پہچانیں۔ اس سے طلبا یہ سیکھیں گے کہ ہڈیاں عضلات سے ڈھکی ہوتی ہیں جو حرکت کرنے میں معاون ہوتے ہیں۔

آپ استخوانی نظام میں کھوپڑی کو ایک حفاظتی خول (protective shell) کے طور پر بیان کرسکتے ہیں جو دماغ کو چوٹ (injuries) سے بچاتی ہے۔ دماغ کی ساختی نفاست دکھانے کے لیے آپ بکرے کا دماغ لاکر اس کے گرد موجود عصبیے (nerves) یا باریک رگیں (narrow tubes) دکھا سکتے ہیں جن کے ذریعے دماغ پیغامات بھیجتا اور وصول کرتا ہے۔

سرگرمی 4 کے لیے پہلے عملی مظاہرے کے ذریعے دکھایئے کہ دل کی دھڑکن کیسے شمار (count) کی جائے اور پھر طلبا کو اسی طرح کرنے کی ہدایت کردیجیے۔ سانس کے ذریعے ہوا اندر لے جانے اور خارج کرنے کے دوران پھیپھڑوں کی شکل اور جسامت میں تبدیلی کا عملی مظاہرہ کرنے کے لیے ایک غبارہ پُھلا لیجیے۔ طلبا کو ایک بکرے کا گردہ دکھایئے تاکہ وہ اس کی شکل وصورت اور رنگ کا مشاہدہ کرسکیں۔

باب 2

سبق کا آغاز جان دار اجسام کی خصوصیات کا مختصر اعادہ (revision) کرتے ہوئے کیجیے۔ کلاس میں سرگرمی 1 اور 2 انجام دینے میں طلبا کی مدد کیجیے۔ آپ جان دار اجسام کی خصوصیات کو ظاہر کرتی ہوئی تصویروں کا بھی استعمال کرسکتے ہیں۔

جان دار اور بے جان اشیا کے درمیان فرق کے لیے آپ طلبا سے دونوں قسم کی چیزوں کے مابین اہم فرق کے بارے میں پوچھ سکتے ہیں۔ اس کے بعد یہ فرق بلیک بورڈ پر درج کردیجیے۔

سرگرمی 3 کے لیے ایک مشاہداتی کونا (observation corner) بنایئے جہاں طلبا ایک چوزے کو پنجرے میں، اور ایک گملے میں

قومی نصاب برائے جنرل سائنس کے مطابق جانچ (Assessment) کی حکمت عملیاں

استاد طالب علم کی تعلیمی کارکردگی سے نہ صرف روایتی ٹیسٹ، امتحانات اور عملی کام (پروجیکٹ) کے ذریعے واقف ہوتے ہیں بلکہ طلبا کا لمحہ بہ لمحہ مشاہدہ بھی اس میں معاون ہوتا ہے۔ سائنس کے بارے میں طلبا کی معلومات، سائنسی مہارتوں، اور رویوں کو جانچنے کے لیے اساتذہ کو مختلف النوع اوزار (tools) اور طریقہ ہائے کار کی ضرورت ہوتی ہے۔ مثلاً:

- ☆ مخصوص ردعمل
- ☆ تعمیری/تخلیقی ردعمل
- ☆ کارکردگی کی جانچ
- ☆ ذاتی ابلاغ (personal communication)
- ☆ طلبا کی خود تشخیصی (self-assessment)

سائنس کی تشخیصی حکمت عملیوں پر مفصّل ہدایات کے لیے قومی نصاب برائے جنرل سائنس 2006 کا باب 8، صفحہ 65 تا 73 ملاحظہ کیجیے۔

رہنمائے اساتذہ کے مشتملات اور ترتیب

رہنمائے اساتذہ برائے نیو گیٹ اہیڈ سائنس میں سبق کا آغاز کرنے کے لیے تجاویز شامل ہیں نیز ہر باب کے لیے تدریسی حکمت عملیاں بھی فراہم کی گئی ہیں۔ ہدایاتی ماڈل کا مرکز ومحور سابقہ یا پہلے سے موجود معلومات کو کھنگالنا ہے جس میں طلبا کی سرگرم شرکت کی حوصلہ افزائی کی جاتی ہے۔

ایک فعال اور طالب علم محور کمرۂ جماعت کے لیے سفارش کردہ ترتیب کار (شیڈول)

سابقہ/ پہلے سے موجود معلومات کو کھنگالنا بذریعہ بنیادی سوالات	5منٹ
آموزش (learning) بذریعہ بحث/ سرگرمی	25 منٹ
نتیجہ/ ماحصل بذریعہ جانچ	10 منٹ

ہر باب کا ابتدائی حصہ تعمیری انداز میں سبق کو آگے بڑھانے کے لیے بنیادی تجاویز پر مشتمل ہے۔ دوسرے حصے میں کتاب میں موجود تمام سوالات کے جوابات دیے گئے ہیں۔ طلبا کی حوصلہ افزائی کی جائے کہ وہ اپنے ذہن سے کام لیتے ہوئے جوابات دیں اور پھر استاد ان جوابات کی بنیاد پر طلبا کی تفہیم اور معلومات کی جانچ کر سکتے ہیں۔

قومی نصاب برائے جنرل سائنس کے مطابق تدریسی حکمت عملیاں

مؤثر ہدایاتی تدریسی حکمت عملیوں میں مندرجہ ذیل شامل ہیں (تاہم حکمت عملیاں انھی تک محدود نہیں ہیں):

- تحقیق وتفتیش (انکوائری)
- سوالات اور گفتگو
- تحقیق اور مسئلے کا حل
- عملی مظاہرہ اور تجربہ گاہی کام (لیبارٹری ورک)
- مسائل پر مبنی آموزش (problem based learning)
- پوری جماعت، گروپ، اور انفرادی کام سے استفادہ
- خواندگی کی حکمت عملیوں (پڑھنا، لکھنا، بولنا اور سننا) کی شمولیت
- طالب علم کے کام کی بنیاد پر ہدایات کی فراہمی

سائنس کی تدریسی حکمت عملیوں پر مفصّل ہدایات کے لیے قومی نصاب برائے جنرل سائنس 2006 کا باب 7، صفحہ 55 تا 64 ملاحظہ کیجیے۔

تعارف

نیو گیٹ اہیڈ سائنس سیریز کے لیے تیار کردہ رہنمائے اساتذہ کمرۂ جماعت میں استاد کی معاونت کے لیے ہدایات فراہم کرتی ہیں۔ اِس رہنمائے اساتذہ میں شامل ہے:

- کمرۂ جماعت میں نیو گیٹ اہیڈ سائنس کی مؤثر تدریس کا طریقہ
- قومی نصاب میں مذکور تدریسی حکمت عملیاں
- سبق کی تدریس کی منصوبہ بندی کے نمونے
- نصابی کتاب میں دی گئی مشقوں کے مجوزہ جوابات
- جانچ (assessments) کے لیے مجوزہ ورک شیٹ
- کام کی مجوزہ اسکیم

نیو گیٹ اہیڈ سائنس کی تدریس کیسے کی جائے

نیو گیٹ اہیڈ سائنس کی مزید تعمیری انداز میں تدریس کے لیے اساتذہ کو مشورہ دیا جاتا ہے کہ طالب علم کو کمرۂ جماعت کا محور بنائیے۔ طلبا کو کمرۂ جماعت میں زیادہ فعال کردار دیا جائے، اُن کی حوصلہ افزائی کی جائے تاکہ وہ اپنے خیالات اور تصورات کو اعتماد کے ساتھ پیش کریں، نیز انھیں مختلف آرا کا احترام کرنا بھی سکھایا جائے۔ یہ تمام مقاصد حاصل کرنے کی غرض سے اساتذہ کے لیے ضروری ہے کہ طلبا کی معاونت کرتے ہوئے انھیں آسانیاں فراہم کیجیے تاکہ وہ زیادہ ذمے داری کے ساتھ اپنا سفرِ آموزش (learning journeys) طے کرسکیں۔ مندرجہ ذیل سطور میں ان تدریسی طریقوں کا خلاصہ کیا گیا ہے جن سے کام لیتے ہوئے کمرۂ جماعت کو زیادہ سے زیادہ طالب علم محور بنانے کے لیے نیو گیٹ اہیڈ سائنس کے تمام ابواب پڑھائے جائیں گے:

- طلبا کو انفرادی اور اجتماعی، یعنی گروپ میں، کام کرنے کا موقع فراہم کیا جائے۔ اساتذہ اور طلبا حقیقی زندگی سے مثالیں زیر بحث لائیں۔
- طلبا کو ایسے کام / ذمے داریاں تفویض کی جائیں جنھیں انجام دیتے ہوئے وہ آپس میں، اور استاد کے ساتھ تبادلۂ خیال کرسکیں۔ طلبا کی حوصلہ افزائی کی جائے کہ وہ اپنی رائے یا خیالات کے پس پردہ وجوہ بیان کریں۔
- استاد کے لیے ضروری ہے کہ وہ کمرۂ جماعت میں خود کو عزت و احترام، شرکت اور فعال آموزش (active learning) کے آئیڈیل کے طور پر پیش کریں۔ گروپ کے مباحثوں کے دوران مل جل کر کام کرنے کے لیے طلبا کی حوصلہ افزائی کی جائے۔
- استاد کو طلبا کی معاونت اس وقت کرنی چاہیے جب انھیں رہنمائی کی ضرورت ہو؛ پڑھتے، لکھتے اور مخصوص ابواب میں اسباق پر بحث کرتے ہوئے بیشتر وقت طلبا اپنے طور پر کام کریں گے۔