TEACHING GUIDE 2

The SCIENCE Factor

FOR PRIMARY CLASSES

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INTRODUCTION

About this series

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

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

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

Salient features of the series

- **consistent with the nature of learning**

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

- **coherent**

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

- **developmentally appropriate**

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

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

- **comprehensive**

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

- **feasible**

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

- **useful and relevant**

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

General suggestions and advice on teaching science

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

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

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

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

C — Constantly encourage student participation and involvement.

I — Investigate the topic and follow students' interests.

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

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

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

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

About this teacher's guide

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

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

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

UNIT 1 THE HUMAN BODY

Background

In this unit, students will learn about parts of the human body in greater detail. They should be able to describe the functions of the brain, heart, lungs, bones, and muscles. Students should have prior knowledge of the basic parts of their body. Recall the idea that some body parts are not visible, such as the skeleton, heart, brain, lungs and kidneys. Locate the brain, heart, lungs, bones, and muscles with them in the human body through interesting hands-on activities and highlight the importance and function of each. Use the pictures and activities in the text to make your lesson lively and interesting.

Expected learning outcomes for the unit

Students should be able to:

- locate the main parts of the human body
- outline the functions of the brain, heart, lungs, muscles, and skeleton

1.1 Brain

Learning outcomes

Students should be able to:

Student's Book and Workbook

- locate the brain in the human body
- explain that the brain sends messages to different parts of the body

Resources

You will need:

- Student's Book page 4

Student's Book steps

1. Welcome the children into the classroom and ask them to sit in a semicircle with you in the centre. Explain that they are going to learn about the human body.
2. Ask if they can recall the song 'Heads, shoulders, knees, and toes'.
3. Play or sing the song 'Heads, shoulders, knees, and toes' (go to http://www.youtube.com/watch?v=d8FwBSITW-4 to see a version). Ask the children to stand and direct them to touch the different body parts as they sing the song. Speed up the singing so that the children have to do the actions very quickly. They will enjoy moving to the song, so encourage them to sing and repeat the song and actions.

Extension: Encourage the children to come up with different lyrics to the song—make sure they refer to parts of the body.

4. Ask the children to sit down and read aloud from the Student's Book as they follow in their own books.
5. Emphasize that the brain directs our bodies to do things. The brain sends messages to parts of our body. Explain that it is very important to look after our brain because it controls the body. Use the example of motorcyclists wearing helmets.
6. Pause after each statement and look at the picture, asking different students to describe what they can see.
7. Ask the students to stand up and pick up various objects as described in the Student's Book.
8. Read aloud the question in 'Did you know?' and give time for different students to answer the question. Encourage students to suggest why their head is so hard and give possible feedback.

Activities

Play 'Simon Says!'—Explain that you are going to ask the students to perform some actions, e.g. hop, wriggle their fingers, nod, etc. but they should only do the action if you say 'Simon says' before you give the instruction. If you do not say 'Simon says', any student who performs the action will be 'out' and have to sit down. Play the game until there is only one child left. You may wish to play 'Simon Says!' a few times as the children will enjoy playing and it will help them to listen carefully. Speed up the instructions to make the game more challenging.

Answers to Student's Book 1.1

1. The cerebrum is the largest part of the brain and it helps you to think.
2. The left side of the cerebrum helps you to think about maths, science, words, and language. The right side helps to remember colours, music, and shapes.

1.2 Heart

Learning outcomes

Students should be able to:

Student's Book and Workbook

- identify where the heart is located in the human body
- explain that the heart pumps blood around the body

Resources

You will need:

- Student's Book page 6
- the chart of the human body
- some popular music with the word 'heart' in it

Student's Book steps

1. Play the music with the word 'heart' in it as the children enter the room.
2. Let the students listen to the music for some time and to talk about the music.
3. Stop the music and ask the children if they enjoyed the music and whether they know of any other songs with the word heart in them.
4. Explain that lots of very famous songs have been sung about the heart as a source of love. Explain that the heart is what keeps us alive by pumping blood around our bodies.
5. Read aloud from the Student's Book as the students follow in their own books.
6. Pause after each statement and question and encourage different children to attempt to answer the question. Give positive feedback for all answers. This will encourage participation and reassure the students that it is good to try—even if you don't get the right answer.

Activities

Display the chart of the human body and ask the children to point to the heart.

Going further

Ask the students to run on the spot and jump up and down and then feel their own heartbeat. Explain that when we move our hearts beat faster.

Answers to Student's Book 1.2

1. The heart is made of muscles which squeeze and relax to pump blood to every part of the body.
2. The heart beats faster because it has to pump blood around the body faster.

1.3 Lungs

Learning outcomes

Students should be able to:

Student's Book and Workbook

- describe where the lungs are located in the human body
- explain that the lungs allow us to breathe

Resources

You will need:

- Student's Book page 8
- a balloon for each student

Student's Book steps

1. Welcome the children and ask them to sit in a semicircle with you at the centre. Ask them to recall what they have learnt about the human body so far.
2. Write the words 'Brain' and 'Heart' on the board and list all the points they can recall from the previous lessons about the brain and the heart.
3. Read aloud from the Student's Book as they follow in their own books. Pause after each statement and ask different children to describe the pictures—encourage interaction.
4. Ask the students to take deep breaths and feel their lungs getting bigger when they breathe in and smaller when they breathe out. Explain that this is their lungs filling with air and then emptying.

Going further

Give each student a balloon and ask them to blow it up and tie it; you may need to help them do this. Explain that the balloon is now filled with air from their lungs—and this means it floats. Allow the children to play with their balloons and have fun seeing how many times they can tap it to each other or how long they can keep it in the air. Encourage them to interact with each other and invent games with the balloons. Allow them to take the balloons home. You may need some spare balloons as some may burst.

Answers to Student's Book 1.3

1. The lungs help you to breathe.
2. Our lungs get bigger as we breathe in and get smaller when we breathe out.
3. a. oxygen b. carbon dioxide

1.4 Bones

Learning outcomes

Students should be able to:

Student's Book and Workbook

- explain that humans have a skeleton
- explain the purpose of bones in our body

Workbook

- identify the brain, heart, and lungs
- explain the function of the skeleton

Resources

You will need:

- Student's Book page 10
- Workbook page 1
- A3 copies of Worksheet 2 for all the children
- 'Dem Bones' song [go to http://www.youtube.com/watch?v=e54m6XOpRgU for a version]

Student's Book steps

1. Play or sing the song 'Dem Bones' as the children walk into the classroom. Encourage the children to move to the lyrics and sing along.
2. After some time, for response to the song, ask the children to respond to the song. Ask the children to sit down in a semicircle with you at the centre. Slowly read out the lyrics and point out the different body parts that the song mentions.
3. Ask the children to stand up. Play or sing 'Dem Bones' and ask the children to point to and wriggle the part of the body that is being sung about. Play or sing the song a few times to encourage the children to learn the lyrics and practise their movements.

   Extension: Make up actions to the song and have a concert where different groups of children perform their own version of the song for the class.
4. After some time, signal to the children to stop and listen. Ask them to show their outline of the human body with the lungs, heart, and brain coloured in and labelled. Display these posters around the room. They may wish to colour and label other parts of the human body before the work is displayed.
5. Read aloud from the Student's Book as the students follow in their own books. Pause after each statement or question and encourage the children to respond. Ask individual children to answer and give positive feedback.

Activities

Hand out Worksheet 2 and ask the children to colour in the skeleton. Write the words 'skull', 'hip' and 'ribs' on the board and ask the children what parts of the skeleton the words describe. Help them label their skeleton correctly. They could cut around the skeleton which could be hung from the ceiling of the classroom.

Workbook steps

Help the children to identify the heart, brains, and lungs in their Workbook and copy the correct word next to each organ. Discuss the role of the skeleton in the body (keeping it upright—sort of like a clothes hanger). Help the children write a sentence about the function of the skeleton. They could draw the human body without a skeleton at home.

1.5 Joints

Learning outcomes

Students should be able to:

Student's Book

- differentiate between fixed and moving joints

Resources

You will need:

- Student's Book page 11
- a chart of a human skeleton

Student's Book steps

1. Introduce the topic of the lesson to the students.
2. Show them the chart and ask them what it shows.
3. Revise the fact that the skeleton is made up of bones. Extend students' knowledge by telling them that the place where two bones meet is called a joint. Give examples of the elbow and the knee.
4. Write the word 'joint' on the board and extend two lines from it. Write moving joints and fixed joints at the ends of the lines.
5. Explain these two types of joints by using suitable examples and the Student's Book page 11.

Activities

Guide the students to attempt the questions from 'In your notebook'.

Answers to Student's Book 1.5

1. Bones make up the structure of our body and help to keep us upright.
2. It is important to have strong bones because they protect parts of the body.

1.6 Muscles

Learning outcomes

Students should be able to:

Student's Book and Workbook

- explain that muscles help us to move
- locate our main muscles

Workbook

- demonstrate an understanding of muscles

Resources

You will need:

- Student's Book page 12
- Workbook pages 2 and 3

Student's Book steps

1. Welcome the children to the classroom and ask them to sit in a semicircle with you at the centre.
2. Read aloud from the Student's Book pausing after each statement and question and encouraging children to react to what they can see and what they are hearing.
3 Ask the children to try bending their arms and feeling one of their muscles. Emphasize that muscles help our bodies to move.
4. Ask individual children to share what they have learnt about the human body so far; ask questions such as:

   Where is your heart located?

   What does your heart do?

   When you breathe in and out what is working?

Activities

- Read aloud Learning is fun A. Help the children to complete the sentences by putting in the missing words.
- Read aloud the questions for Learning is fun B. Discuss the possible answers as a class. Ask the children to write the correct answer.

Workbook steps

1. Start on page 2 of the Workbook and ask the children to complete the exercise individually. They may use their Student's Book as a reference. Explain that all the answers are in their Student's Book. When they have finished, discuss the answers as a class asking individual children to provide answers. Praise them even if the answer is incorrect. The children could complete the Word search at home.
2. Put the children in small groups of two or three and ask them to complete page 3 of the Workbook as a group. Walk around to each group and ask them how they have come up with their answers. When all the groups have finished, discuss the answers as a class.

Answers to Student's Book 1.6

A. 1. lungs
2. bones
3. heart
4. brain
5. muscles

B. 1. Ribs protect our heart and lungs.
2. The skull protects our brain.
3. Strong muscles can be kept by being active, getting enough rest and eating healthy food.
4. The place where two bones meet is called a joint.
5. Moving joints let you twist, bend and move different parts of your body. Examples can be stated also.
6. Milk and dairy products keep your bones healthy.
7. No. The left lung is smaller than the right lung as the heart is fit next to it.
8. They look pink and rubbery.
9. The heart carries oxygen and other good things around our body.
10. The left side helps us to do our homework.

Answers to Workbook

(Page 2)

A. Students will label the brain, lungs, and the heart.

B. The skeleton helps to keep the body upright and also protects some body parts.

C. Drawings will vary. Students should draw a picture of a body collapsed on the ground similar to that on page 10 of the Student's Book.

(Page 3)

A. 1.a 2. b, c, d 3. b 4. c

B.

O	P	B	R	A	I	N
I	N	O	G	H	J	S
L	U	N	G	S	W	M
V	X	E	C	Y	H	J
M	U	S	C	L	E	S

(Page 4)

1. The brain helps us to speak and think.
2. Moving joints and muscles are used for movement.
3. It is hard because it contains the skull which protects the brain.
4. The heart has a beat that goes 'thump thump'.
5. The ribs protect the heart.
6. It is smaller because the heart has to fit next to it.
7. The muscle moves when we bend an arm.
8. The heart beats faster when a person exercises.

Answers to Worksheet 1

Students will label the skull, hip, and ribs.

Answers to Worksheet 2

1. A 2. B, C, D 3. B, D 4. A 5. C

6. C 7. C 8. C 9. D 10. B

UNIT 2 THE ANIMAL WORLD

Background

Students will be introduced to differences in the animal world. They will learn that animals are classified on the basis of these differences. Explain that classification means putting animals into groups on the basis of some characteristics that they share. This makes it easier for scientists to study them. Give the example of how shelves in a supermarket are arranged. You will find cereals together, toothpastes together, and so on. Elicit how this helps the customers. Classification serves the same purpose for scientists. Explain that one way of classifying animals is on the basis of the type of skeleton they have and another is how they control their body temperature. Using a flow chart here would be helpful. Also, help students to imagine what type of animal they would like to be. Ask them for reasons. You can refer to Super Scientist's pictures in Unit 2.1 to build up a fun lesson.

Expected learning outcomes for the unit

Students should be able to:

- identify some of the different features of animals
- explain that animals have different characteristics for different reasons
- differentiate between the types of animal skeleton
- explain that some animals are warm-blooded and some are cold-blooded

2.1 If I could be a different animal …

Learning outcomes

Students should be able to:

Student's Book and Workbook

- explain that different animals have different characteristics

Workbook

- identify different animals

Resources

You will need:

- Student's Book page 14
- Workbook page 5
- modelling clay
- a relevant book about different animals

Student's Book steps

1. Welcome the children to the classroom and ask them to sit in a semicircle with you at the centre. Explain that they are going to be learning about animals.
2. Ask individual children to name their favourite animal and explain why it is their favourite. Ask questions such as:

   What special features does your favourite animal have?

   Can it fly?

   Can it make loud noises?

   Where does it live?

   What does it like to eat?
3. Tell the children that humans are animals too.
4. Read a relevant book about animals and encourage the children to predict what will happen based on the pictures.
5. Read aloud from the Student's Book as the students follow in their own books.
6. Pause after each statement or question and encourage the children to interact.

Activities

- Using the modelling clay, encourage the children to make all sorts of different animals—they can be made up or resemble real animals. Walk among the children as they are making the different animals and talk to them about what they are doing.
- Help the children to write down the type of animal they would like to be and the reasons why. They could draw pictures of themselves with different features of different animals at home and bring it to the following lesson to share. They may draw themselves with wings like a bird so they can fly, or with the long tail of a monkey so they can swing from tree to tree.

Going further

Play 'Animal Charades' : a child should act like a particular animal but can't make any noise. The rest of the class has to try and guess what animal they are. Encourage the students to think about the way that particular animal moves; asking questions such as:

Why does this animal moves so fast?

How big is its body?

What is it trying to do when it runs this fast?

Why does this animal fly?

Does the length of its wings have anything to do with how quickly it flaps its wings?

Why do you think this is? Does the animal move differently on water and on land?

Workbook steps

Read aloud the directions on page 5 of the Workbook. Ask the children to guess the animal from the different questions. They can finish the drawings at home.

2.2 Differences in the animal world

Learning outcomes

Students should be able to:

Student's Book and Workbook

- explain how animals can be grouped according to their different features

Workbook

- demonstrate understanding of how animals are grouped

Resources

You will need:

- Student's Book page 16
- Workbook pages 6, 7, and 8

Student's Book steps

1. Ask the children to sit at their tables and look at the board. Explain that in order to study animals scientists put animals into groups. Explain that there are two main ways of grouping animals: the type of skeleton they have and their body temperature.
2. Write 'Type of skeleton' on the board and two arrows down—one to 'endoskeleton' and one to 'exoskeleton'.
3. Practise saying the new words with the children so they can use them confidently.
4. Look at the pictures in the Student's Book with the children and explain that they have a skeleton inside their bodies. Emphasize that the human skeleton is inside our body.
5. Look at the pictures of the insects and shellfish in the Student's Book with the children and explain that these animals have a skeleton on the outside of their body.
6. Explain that the other main way of grouping animals is from their body temperature.
7. Write 'warm-blooded' and 'cold-blooded' on the board.
8. Explain that the body temperature of warm-blooded animals stays the same regardless of whether it is hot or cold outside. Emphasize that humans are warm-blooded animals. Look at pictures of warm-blooded animals in the Student's Book.
9. Explain that the temperature of cold-blooded animals changes depending on the temperature around them. Look at pictures of cold-blooded animals in the Student's Book.

10. Read aloud from the Student's Book as the children follow in their own books. Pause after each statement to look at the pictures and encourage the children to ask questions or to comment on what they are seeing and hearing.

Activities

- Play the 'Who are we?' game. Put the children in small groups and ask them to discuss their answers to the question in the Student's Book for 'Who are we?'.

  Extension: Ask the groups to create more 'Who are we?' questions and test other groups.

- Help the children to answer the Learning is fun A questions. Remind them that the answers are in the Student's Book and they may need to look back and revise what they have learnt. Do the same for 'Learning is fun' B. Help the children write the missing words in the spaces.

Workbook steps

1. Read aloud from page 6 of the Workbook. The children can match the animal and its environment at home and colour the pictures.
2. Read aloud from page 7 of the Workbook. Allow time for the children to label the animals. Check the responses as a class and discuss the answers.
3. Read aloud from page 8 of the Workbook. Ask individual children to explain the key terms. Provide time for the children to put the correct words in the blanks. Check the answers as a class.

Answers to Student's Book 2.2

1. The type of skeleton, and how they control their body temperature.
2. It is a hard covering that is also called a shell. It supports and protects the bodies of some types of animals.
3. insects, shellfish, grasshoppers, cockroaches, crabs, lobsters, turtles. Answers will vary.

A. 1. Grouping animals makes it easier to study them.

   2. Amphibians are cold-blooded animals that live on land and in water. They do not have scales.

   3. Reptiles are also cold-blooded animals. They lay eggs and their skin is covered with scales.

B. 1. vertebrates 2. invertebrates 3. warm-blooded 4. cold-blooded

Answers to Workbook

(Page 5)

giraffe, snail, penguin, butterfly

(Page 6)

The bird, man, horse, and the cow are warm-blooded animals. They will be connected to the igloo.

The lizard, tortoise, snake, and the frog are cold-blooded animals. They will be connected to the camp-fire.

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inside—girl, fish, worm, lizard, and bird

outside—grasshopper, cockroach, and crab

(Page 8)

A. 1. amphibians 2. reptiles 3. warm

4. amphibian, cold-blooded, vertebrates 5. reptiles, cold-blooded, vertebrates

B. Drawings will vary.

Answers to Worksheet 3

Students could draw pictures of the named reptiles and amphibians in the boxes.

UNIT 3 THE PLANT WORLD

Background

This unit introduces the life cycle of a plant. Beginning with the germination of a seed, it explains the different stages before a seed turns into an adult plant. Reinforce the parts of a plant and their functions. A discussion about favourite plants will provide an ideal opportunity for student participation. Students should give reasons for their preference for a plant, most likely due to its advantages. Take the opportunity to remind them of the ways we use plants.

Expected learning outcomes for the unit

Students should be able to:

- describe some of the main features of plants
- outline the life cycle of a plant

3.1 My favourite plant

Learning outcomes

Students should be able to:

Student's Book and Workbook

- explain that plants are living things like animals, that need water and food to survive
- name some different plants

Resources

You will need:

- Student's Book page 20
- take the children outside into the school yard or bring in some plants for the children to touch, look at and smell, such as, mint, a flowering plant, and grass

Student's Book steps

1. If possible, start the lesson outside in a garden or bring some plants into the classroom. Welcome the children and explain that they are going to be learning about plants.
2. If you are outside, look around at the different plants and encourage the children to smell, touch, and look carefully at them. If you are in the classroom, encourage to smell, touch, and feel the plants you have brought in.
3. Point to the roots of a plant and remind the children that this is the correct word to describe this part of

the plant. Point to the soil and explain that it is from the soil that most plants get the food and water that they need to survive. Use the word soil. Point to the leaves and flowers of different plants and explain that it is through the leaves that the plant gets the sunlight that it needs to live, and the flowers are how it reproduces. Use the words leaves, flowers, seeds. and reproduces.

4. After some time, return to the classroom or if you are already inside, ask the children to sit down in a semicircle with you in the centre. Ask individual children to share what they observed when they looked carefully at the different plants, what sort of textures they felt, and what they smelt.
5. Explain that animals are not the only living things on Earth; plants are also living things.
6. Explain that plants, like animals, need water and food. Emphasize that plants and animals are living things that need water and food.
7. Read aloud from the Student's Book as the children follow in their own books.
8. Put the children into pairs or threes and ask them to think about the plant they like best and then to share their reasons why in their small group. Ask some children to tell the class about their favourite plants and the reasons why.

Activities

- Help the children to write down the names of the plants that they like best and the reasons why.
- Draw a table on the board and label the different columns JUST ANIMALS, JUST PLANTS, and BOTH ANIMALS AND PLANTS. Record the children's thinking in the table so everyone can see.

Going further

Divide the students into pairs or threes. Explain THINK, PAIR, SHARE: students to consider a question closely individually and THINK about it, they then PAIR and share their thoughts with someone else, and finally SHARE their ideas with the rest of the group. Ask the small groups to consider what things are the same in plants and animals and what things are different—provide lots of time for students to think and to discuss their different ideas in a small group before you ask them to report back to the rest of the class. Some prompts to use include: Think about the movement of animals and the movement of plants. Consider the ways we use plants in our lives. Consider the ways that plants grow. Think about what plants need in order to live.

3.2 Germination

Learning outcomes

Students should be able to:

Student's Book and Workbook

- describe the process of germination

Workbook

- identify different seeds and draw the stages in the life cycle of a plant

Resources

You will need:

- Student's Book page 22
- Workbook pages 9, 10, and 11

Student's Book steps

1. Explain that, in the same way as animals are grouped by scientists, plants are also put into different groups.
2. Elicit the two main ways that scientists group animals: by their skeleton and by their temperature.
3. Elicit the name for animals like humans, with internal skeletons.
4. Elicit the name for animals like ants, with external skeletons.
5. Ask the children to name some warm-blooded animals.
6. Ask the children to name some cold-blooded animals.
7. Explain that germination is the life cycle of a plant and has four stages.
8. Using Student's Book pages 22 and 23, explain each of these four stages clearly.
9. Extend students' knowledge by explaining that some plants do not produce flowers. These plants produce spores instead of seeds.
10. Revise the parts of a seed using Student's Book page 24.

Activities

- Help the children to write in their own words for Learning is fun! A—the two main groups of plants, and to describe their features.
- Help the children to fill in the missing words for Learning is fun! B.

Workbook steps

1. For the exercise 'My own plant', encourage the children to have fun creating their very own made up plant. They may complete the description and drawing of their plant at home and bring it in the following lesson to share with the class.
2. Guide the students to attempt pages 10 and 11 in the Workbook.

Answers to Student's Book 3

A. 1. The life cycle of a plant begins when a seed is produced by an adult plant and starts growing in the ground. With the right amount of water and nutrients, the seed starts to grow roots and shoots. Next, the plant breaks through the earth and grows leaves. When a plant is fully grown, it produces flowers where the seeds are produced. The seeds are scattered by wind or some other means and start growing in the ground. Then the life cycle begins for new plants.

2. minerals and vitamins

3. Plants need food/nutrients, water, and sunlight.

4. The leaves shade him from the Sun.

5. The fruit contains flesh and seeds.

B. 1. nutrients 2. shoots 3. sunlight 4. scattered 5. spores

Answers to Workbook

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Drawings will vary.

The name of my plant is (answers will vary).

It grows in earth / soil.

It needs water, nutrients, and sunlight to grow.

It lives in earth / soil / water.

It produces flowers / seeds from which new plants will grow.

I like it because (answers will vary).

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Drawings will vary depending on students' observations.

(Page 11)

seed → roots and shoots → leaves → fully grown plant

Answers to Worksheet 4

A. 1. shade 2. sunlight 3. four 4. roots and shoots 5. flowers

B. The roots spread into the ground so the plant can't easily be moved. The shoots break through the surface of the soil.

UNIT 4 SENSES

Background

The importance of the five senses will be reinforced in this unit. Students will have basic knowledge of these senses. The parts corresponding to these senses will be discussed. Cartoons of Super Scientist in this unit will help to make the lesson lively. Build on students' thinking skills using prompts under activity time and discussion points in the Student's Book. The 'Senses Station' activity will also strengthen concepts in this area.

Expected learning outcomes for the unit

Students should be able to:

- list the five senses
- explain how each sense helps them to do certain activities

4.1 Why senses are important

Learning outcomes

Students should be able to:

Student's Book

- name the five senses and their function
- name the part of the human body that corresponds to each sense

Workbook

- identify the correct senses required in different situations

Resources

You will need:

- Student's Book page 26
- Workbook page 12

Student's Book steps

1. Welcome the children into the classroom and ask them to sit in a semicircle with you in the centre.
2. Explain that they will be learning about the five senses. Elicit that they are: sight, sound, smell, taste, and touch.

3. Explain that in order to help us live we have five senses: we can see, we can hear, we can feel, we can smell, and we can taste.
4. Draw an outline of a human body on the board with pointers to the different sense organs (eyes, ears, hands, nose, and mouth).
5. Brainstorm how we use each of the senses; asking questions such as:

   Why is the sense of sight important to us?

   What do we need sight for?

   What other senses can help us if we can't see?

   Why do some people wear glasses?

   Why is the sense of taste important to us?

   Who has tasted something that was bad—what was it like?

   Why do you think we like to eat things that smell good?
6. Provide positive feedback.
7. Read aloud from the Student's Book as the students follow in their own books.
8. Put the children in groups of four or five and ask them to discuss the 'Discussion point' questions.
9. After some time signal to the children that it is time to listen and ask the different groups to report back on their discussion.
10. Record the different points raised in a table on the board with the headings: Sight, Smell, Touch, Hearing, Taste.

Activities

- In pairs or threes ask the children to use their sense of hearing to work out how far someone is away from them. Allow enough time for each of the children to try the exercise a few times.
- Read aloud the activity in 'Learning is fun' and check that the children understand what they need to do. They can complete the activity at home and bring it to the next class to be checked.

Going further

Illustrate the answers and display them around the room.

Workbook steps

Allow time for the children to match the correct sense with the corresponding picture. Ask individual children to explain their decisions.

Answers to Student's Book 4

1. The sense of sight enables you to see where you are going, and the sense of hearing protects you by enabling you to hear things that are coming towards you.
2. Answers will vary.

Answers to Workbook

(Page 12)

The boy in the kitchen will be saved by the senses of touch, sight, and smell.

The sense of sight will save the girl from the car on the road.

The boy with the plate of food will be saved by the senses of smell and sight.

The children will be saved from the fire by the sense of smell.

The sense of hearing will save the boy on the bicycle from the car behind him.

The sense of hearing will save the blind man.

UNIT 5 FOOD AND DIET

Background

Students will have existing knowledge about food being the main source of energy for the growth and strength of human beings. Reiterate the importance of healthy eating and how foods can be arranged in groups. Introduce the food pyramid using lively visual materials. Discuss the values of sharing food, eating together, and not wasting food. Students should be able to identify food groups and their position in the food pyramid.

Expected learning outcomes for the unit

Students should be able to:

- explain that a healthy diet keeps us healthy
- identify foods that should be eaten every day, foods that should be eaten sometimes and foods that should be eaten rarely

5.1 Food pyramid

Learning outcomes

Students should be able to:

Student's Book

- explain that food provides fuel to our bodies to grow and stay healthy
- explain the information in a food pyramid

Workbook

- place food items correctly in the food pyramid

Resources

You will need:

- Student's Book page 28
- Workbook pages 13 and 14
- some healthy snacks to share—such as vegetable sticks
- poster paper and coloured markers

Student's Book steps

1. Welcome the children to the classroom and explain that they are going to learn about food and diet.

2. Explain that eating healthy food means that they will have a much better chance of growing up strong and healthy.
3. Explain that humans need food to live, and without food we would not survive. Explain that, like animals and plants, we need food and water to live.
4. Explain that food provides the energy that allows us to live and that what we eat is our diet. If we have a good diet, then we live better. Explain that eating food is like putting fuel in a car; if the fuel is clean the car will go well but if it is dirty, the car will break down. In the same way, if humans do not eat good food they will become weak and ill.
5. Look at the picture of the food pyramid with the children and ask individual children to identify the different foods that they can see.
6. Emphasize that in order for our bodies to be the best they can possibly be, our diet needs to look like the food pyramid, mostly whole grains and leafy greens and least of 'sometimes food' like chocolate, cake, and chips
7. Share some healthy food snacks with the children—be mindful of any allergies or intolerances.

Activities

Help the children to make a list of the foods that they should have most of in their meals, three foods that they should have in some of their meals, and three foods that they should only eat sometimes.

Going further

Make a poster showing the foods that should be eaten most often and foods that only should be eaten sometimes. Display the posters around the room.

Workbook steps

1. For the 'Food pyramid', ask the children to draw a line from the food to the part of the pyramid where it belongs. Remind the children that foods we should eat every day are at the bottom of the pyramid and foods that we should eat rarely are at the top of the pyramid.
2. For 'Let's go shopping', put the children in groups of two or three and ask them to try and get 50 points by choosing the right sort of foods for the shopping basket.

Answers to Student's Book 5

A. a. milkshake—gives you energy and strong teeth and bones
   b. apple—keeps you healthy and prevents diseases
   c. chicken curry—chicken makes your muscles strong
   d. roti—gives you energy

B. most—any three of the foods from the bottom of the pyramid
   some—any three of the foods from the middle of the pyramid
   not very often—any three of the foods from the top of the pyramid

Answers to Workbook

(Page 13)

top—ice cream cone and biscuits

middle—cheese, fish

bottom—apple, nuts, rice, and pasta

(Page 14)

Apple, cucumber, bread, bag of rice / wheat, and bananas should be placed in the trolley. Each item has 10 points which will enable you to score 50 points. Combinations can vary. Students can add fish and chicken also.

Answers to Worksheet 5

Students will cut out and paste the pictures in the pyramid as stated below.

top—sweets, cone, chocolate, and dessert

middle—milk, chicken, fish, meat, and cheese

bottom—fruits, vegetables, grains, and bread

UNIT 6 ENVIRONMENT

Background

This unit highlights how each environment is unique in its own way. It also reinforces how we as human beings share it with other living and non-living things and should therefore keep it healthy for everyone. A starter activity can be conducted using students' feedback to create a definition of an environment. Students will have prior knowledge about land-use and keeping their rooms tidy. Extend their knowledge by eliciting ideas about caring for the environment. Ideas can be generated and posted on the bulletin board. Explain and discuss the terms, 'reduce', 'reuse', 'recycle', and 'repair' using suitable examples. This unit will contribute to an important value of keeping the surroundings clean.

Expected learning outcomes for the unit

Students should be able to:

- define an environment
- explain the importance of a healthy environment

6.1 Sharing the environment

Learning outcomes

Students should be able to:

Student's Book

- explain that we share the environment with living and non-living things
- explain that we need to care for the environment

Workbook

- demonstrate care for their immediate environment

Resources

You will need:

- Student's Book page 31
- Workbook page 15

Student's Book steps

1. Welcome the children to the classroom and explain that they will be learning about the environment.

2. Elicit from the children the meaning of the term environment; encourage individual children to try to explain the word and give positive feedback.
3. Explain that the environment is everything around them, from their homes, to their school, their city, to Pakistan and to the whole world.
4. Show the children a globe (or use Google Earth) and focus on their town, their city, Pakistan, the region and the world. Explain that their immediate environment is their home, then their school, their city, their region, their country, and the world. Write the word 'You' in the centre of the board and then draw a circle around 'You' and write the name of the school, draw another circle and write the name of their city, draw another circle and write the name of their region, draw another circle and write 'Pakistan', and then draw another circle and write 'Earth'.
5. Read aloud from the Student's Book as the children follow in their own books. Pause after each statement and look at the pictures with the children, asking individual children to describe what they can see.
6. Emphasize that we share the environment with other animals and plants and non-living things.

Activities

- Draw and label their home environment. Colour the living things such as the people, plants, and any animals with one colour and the non-living things in another colour. The children can complete this task at home.
- Ask the children to think about some animals and plants that they share their environment with. Encourage them to write them down and draw a picture of them.

Workbook steps

For the activity 'Describing your environment' explain that they need to finish the sentences. They can write as much as they want about their environment. If they are stuck, help them to use the words in the box to describe their environment.

Answers to Student's Book 6.1

Differences—buildings, beach, animal, different children, and no greenery

6.2 Caring for the environment

Learning outcomes

Students should be able to:

Student's Book

- explain the importance of caring for the environment
- list some things that can be done to care for the environment

Workbook

- demonstrate understanding of recycling

Resources

You will need:

- Student's Book page 32
- Workbook page 16

Student's Book steps

1. Put the children in small groups and ask them to share the drawings they did of their home environment with each other. They should take turns explaining their home environment to each other and pointing out the different things that they share this environment with.
2. Explain that it is important to care for our environment. Elicit that we clean up our bedrooms so we can find things easily and we wash ourselves so we can stay healthy; in a similar way we need to care for all of our environments to make sure that they are healthy.
3. Read aloud from the Student's Book as the children follow in their own books. Pause after each statement looking carefully at the pictures and inviting any comments or reactions from the children.

Activities

- Discuss the answers to 'Learning is fun!' with the children and help them to record their answers.
- Read aloud the crossword puzzle clues and help the children to complete it.

  Extension: Make up crosswords using words to do with the environment and ask the children to complete each others puzzles.

Going further

Take the children outside to look at the environment of the school yard. Brainstorm some of the things that share this environment with the children. Ask the children what can be done to make the environment cleaner and healthier. Pick up litter from the yard. Make sure everyone washes their hands with soap afterwards.

Workbook steps

Put the children in groups of two or three and encourage them to discuss some things that they could write in their letter to an alien. Check to see that each group is able to brainstorm some suggestions to include in their letter. Allow time for the children to write their letters.

Answers to Student's Book 6.2

A. 1. An environment is the area around us. Environments are different and change from time to time.

2. It should be clean to keep it healthy, because it is shared by many other living and non-living things.

3. Plants, animals, water, air, and non-living things share the environment with us.

4. Answers will vary.

5. Answers will vary.

B.

Across	**Down**
4. plants	1. litter
5. reuse	2. plastic
	3. air

Answers to Workbook

(Page 15)

Answers and drawings will vary.

(Page 16)

Answers will vary. Students should write how items can be reused and recycled.

UNIT 7 WATER, WEATHER, AND WIND

Background

The purpose of this unit is to introduce the concept of the water cycle, different types of weather, and the impact of wind. Help students to recall the uses of water and guide them to think about the sources of water. Organize their responses in a circle and introduce the water cycle. Use appealing visual materials to strengthen this concept. Use students' observations and ideas to talk about different types of weather, and brainstorm different ways in which students can have fun in sunny, cold, or rainy weather. Talk about what wind is and help them visualize its effects. The topic of water conservation should also be discussed.

Expected learning outcomes for the unit

Students should be able to:

- describe the water cycle
- describe different types of weather
- identify some effects of wind

7.1 Where does water come from?

Learning outcomes

Students should be able to:

Student's Book and Workbook

- describe the water cycle

Resources

You will need:

- Student's Book page 34
- Workbook page 17
- a book on a water-related topic—a boat trip, a rainy day, etc.
- cups and water
- masking tape

Student's Book steps

1. Welcome the children to the classroom and explain that they are going to learn about water.
2. Discuss where water comes from, asking questions such as:

   Where do you get your drinking water from?

   Who has a water reservoir or has seen one?

   Water reservoirs collect water from the sky—where does this water come from?
3. Elicit that water is all around us and it comes from oceans, rivers, and the sky. Explain that the Sun heats up the water in the rivers and oceans and the heated water rises into the air, like steam from a kettle, and when it cools it falls to the ground as rain and mist. Drawing on the board as you explain would be helpful.
4. Read aloud from the Student's Book as the children follow in their own books. Pause after each statement or question and encourage the children to comment. Provide positive feedback.
5. Read aloud from a book on a relevant, water-related topic. Encourage the children to predict what might happen by looking at the pictures.

Activities

Place the children in small groups and give them a cup, some water, and some lengths of tape. Ask them to pour the water into the cup and mark the level of the water. Leave the cup in the Sun and in the following lesson check to see if some of the water has joined the water cycle and evaporated into the air.

Going further

Organize the children in small groups and assist them to make up a short play to show the water cycle. They will need to show how the Sun heats the water in rivers, lakes, and oceans and how the heated water rises into the air and falls to the ground again when it cools, so the cycle continues. Allow time for the children to plan their performance. They may use classroom items as props. Ask the children to sit in a circle as each group performs their play in the centre.

Workbook steps

In class, help the children to complete the gaps in the sentences about the water cycle.

7.2 What is weather?

Learning outcomes

Students should be able to:

Student's Book

- explain weather reports in their own words
- explain that different places around the world have different weather

Workbook

- identify activities for different types of weather

Resources

You will need:

- Student's Book page 36
- Workbook page 18
- a local weather report
- a weather report for a country with different weather

Student's Book steps

1. Put the children back into their small groups from the previous lesson. Ask them to check the level of the water in their cups and to report back to the group what they have discovered.
2. Explain that some water has risen up into the air as part of the water cycle.
3. Ask the children to sit in a semicircle with you at the centre. Explain that they will still be learning about water, but now as part of the weather.
4. Read aloud the weather report for the local area. Elicit that the weather report tells us what the weather will be like today and in the near future.
5. Explain that the weather is different in different places around the world.
6. Show the children a globe (or use Google Earth) and point out a place which has very different weather from that of Pakistan.
7. Read out the weather report for a place with different weather from that of Pakistan. Ask the children to imagine what it might be like living there. Ask them to share these ideas with a partner and after some time ask individuals to share their thoughts with the whole class. Ask questions such as:

   How do you think it would feel to live in a place with this type of weather?

   What types of clothes are you wearing today for our weather?

   What different clothes would you wear if you were in another country with different weather?

Extension: Help the children to make up weather reports for around the world and present the weather to each other as if they were on television. Encourage them to use props and to have fun pretending to be the weather person.

8. Read aloud from the Student's Book as the children follow in their own books. Pause after statement looking carefully at the pictures and asking individual children to describe what the children are doing and what they are wearing in the different pictures. Elicit that they can wear and do these things because of the weather.

Activities

Help the children to make a list of things that they like to do when it is wet and when it is hot. Ask the children to draw some of these activities next to their list.

Going further

Guide the students to construct a weekly timetable called 'My weather forecast.' They can record their own forecast (temperature) and the actual weather.

Workbook steps

For the exercise on weather, the children can complete their lists and illustrations at home and bring them to the next class.

Answers to Student's Book 7.2

Lists will vary.

7.3 Wind

Learning outcomes

Students should be able to:

Student's Book

- explain how wind can move things

Workbook

- explain the effects of wind

Resources

You will need:

- Student's Book page 38
- Workbook page 19
- balloons

- colourful paper to make paper fans
- scotch tape

Student's Book steps

1. Welcome the children into the classroom and give them each a balloon, some cardboard, and a lollipop stick.
2. Explain that they are going to use wind to make the balloon travel around the classroom.
3. Demonstrate how to fold the paper in a concertina fashion to make a fan and secure the bottom with scotch tape. Encourage the children to experiment with making different types of paper fans by folding the paper in different width folds.
4. Help the children to blow up the balloons and tie the necks.
5. Allow time for the children to use their fans to make 'wind' to see how they can move their balloons around the classroom. The children will have great fun doing this activity so encourage them to be creative and to play with their fans and balloons.

   Extension: Make an obstacle course for the balloons and see if the children can fan their balloons around the room without touching the ground.
6. Read aloud from the Student's Book as they follow in their own books. Pause after each statement and study the pictures carefully with the children.

Activities

- If it is a windy day, go outside and observe the wind moving things around.
- Read aloud the clues for the crossword and help the students to complete it.

Workbook steps

For the exercise, 'What wind can do' help the children brainstorm some of the many things that wind can do. They can complete their lists and illustrations at home.

Answers to Student's Book 7.3

A.

Across	Down
2. water	1. dry
4. hot	2. weather
5. seeds	3. wind

B. a. It can spread seeds for plants to grow.
b. Strong wind can cause extreme weather and buildings can shake or fall down.
c. Air could be hot, cold, wet, dry, still, or moving.
d. The water cycle shows us how the water in lakes, rivers, and oceans is heated by the Sun and rises in the air. When it cools, it falls to the ground again.

Answers to Workbook

(Page 17)

1. heated, Sun
2. rising
3. cooling, clouds
4. rain
5. ocean

(Page 18)

Answers will vary.

(Page 19)

- spread seeds so plants can grow
- blow dirty air away from where people live
- if very strong, cause damage
- dry clothes
- produce energy

Answers and drawings will vary.

UNIT 8 MATERIALS

Background

Students will be familiar with the different textures of materials, and materials and tools used for building. Help them to recall this information and extend their knowledge by introducing materials which are waterproof, not waterproof, can float, or sink. Use examples of materials and hands-on activities to strengthen these concepts. Move on to explain how different materials are used to make or build different things. Reinforce the idea that materials should not be wasted and can be recycled or reused to make new items.

Expected learning outcomes for the unit

Students should be able to:

- explain that different materials have different properties
- identify some common materials

8.1 Right material for the right job

Learning outcomes

Students should be able to:

Student's Book

- explain that different materials have different properties—some are light, some are strong, some float and some sink
- explain how different materials can be used

Workbook

- suggest suitable materials needed for an object

Resources

You will need:

- Student's Book page 40
- Workbook page 20
- a container of different materials such as tissue paper, foil, plastic, cardboard, and so on
- a range of objects that are made of different materials, such as wood, metal, a cork, a feather, a rubber band (ensure some will float and some will sink)
- a sink or large watertight container to test whether the object will sink or float

Student's Book steps

1. Welcome the children to the classroom and ask them to sit in a semicircle with you in the centre.
2. Explain that they will be learning about materials—things that are used to make something else.
3. Put the box of different materials in the centre of the circle and encourage the children to feel each one and talk to each other about the different materials. Allow the children to play with the materials and observe their play guiding them back to the materials if they become distracted. Allow enough time for all the children to feel the different materials. Help them to use suitable words to describe each material.
4. Read aloud from the Student's Book as the children follow in their own books. Pause after each statement and encourage the children to respond to the comments and questions. Provide positive feedback.

Activities

- Help the children to make a list of objects that are made up of more than one material. Start with objects in the classroom and help the children identify the different materials used. The children can find more objects at home and should add them to their list.
- Ask the students to identify two things from plastic, two things made from clay, two things made from paper and two things made from cloth.

Going further

Put the children in small groups and give them some different materials and a container filled with water. Ask them to predict which objects will sink and which will float. Draw a table on the board with the name of the objects listed in a column and then 'Sink' and 'Float' written at the top of the next two columns. Ask the children to put a tick in the appropriate column for each object. Ask the children to place the objects one-by-one into the water to test whether they float or not. Allow enough time for all of the children in the small groups to test the materials. After some time, ask the children to pack up and then ask them to reflect on whether their predictions were correct or not.

Workbook steps

Read aloud the exercise on 'Choosing materials' in the Workbook. Allow time for the children to complete the activity in class. As the children are attempting it, walk around the classroom and provide any necessary help.

Answers to Student's Book 8.1

a. Natural materials come from plants, animals, rocks, and minerals.

b. These contain natural materials and have been changed by humans.

c. i. shoes ii. ruler

i. pots ii. umbrella

8.2 Using materials

Learning outcomes

Students should be able to:

Student's Book

- state how different materials are used

Workbook

- differentiate between natural and man-made materials

Resources

You will need:

- Student's Book page 42
- Workbook page 21
- resources listed below each other in previous units

Student's Book steps

1. Begin the lesson by recalling the properties of materials such as those that are waterproof, not waterproof, and those that sink or float. Ensure students understand the difference between natural and man-made materials.
2. Draw four columns on the board headed, 'wood', 'rubber', 'stones and bricks', and 'minerals from the Earth'.
3. Read the text on page 42 of the Student's Book and look at the different pictures with the students.
4. Show the students the materials you have prepared and elicit more items which can be made using these materials.
5. Help the students to come up with as many ideas as possible by giving clues, and write a list on the board.

Activities

Help the students to attempt the questions from 'Learning is fun'.

Workbook steps

Ask the students to identify natural and man-made materials.

Answers to Student's Book 8.2

A. plastic—bottles and storage boxes
clay—pots and tiles
paper—books and napkins
cloth—dresses and scarves
Answers will vary.

B. Answers will vary.

Answers to Workbook

(Page 20)

1. paper
2. cement, bricks, and stone
3. plastic/metal
4. wood/metal
5. plastic/metal/glass
6. metal, plastic, and glass
7. snow
8. metal, plastic, and glass
9. water
10. cloth

(Page 21)

man-made materials—plastic car, plastic bottle, and plastic comb

natural materials—cotton shirt, leather bag, gold necklace, paper sheets, lead pencils, clay pot, and rubber duck

Answers to Worksheet 6

Waterproof	Not waterproof
glass	paper bag
saucepan	t-shirt
shower curtain	sponge

Float	Sink
balloon filled with air	a person without a life jacket
empty can	stones
boat	plastic cup filled with coins

UNIT 9 FORCES

Background

This unit reinforces the concept of forces. Revise the terms push, pull, and lift and explain that these forces cause movement. Activities in this guide, the Student's Book, and the Workbook will be useful in doing this and generating interest in the topic at the same time. Build on this knowledge to explain how these forces can cause objects to change shape or direction. At this stage, students should be able to give examples of push and pull activities easily. Lists of these can be compiled and displayed on the bulletin board.

Expected learning outcomes for the unit

Students should be able to:

- explain that forces are used to move things
- identify some common forces

9.1 What are forces?

Learning outcomes

Students should be able to:

Student's Book

- explain what forces are

Workbook

- identify some of the ways forces are used

Resources

You will need:

- Student's Book page 43
- Workbook pages 22 and 23
- different sports equipment such as cricket bats, different types of balls, yo-yos, shuttlecocks, and so on

Student's Book steps

1. Explain that they are going to be learning about forces and the best way to learn about forces is to play with different things and see how they move. Take the students outside and encourage them to play with the different sports equipment. Ask them to notice the way different balls bounce, what happens when they hit a ball with a bat, and what happens when they throw the same ball.

2. After some time, return to the classroom and ask the children to sit in a semicircle with you in the centre. Explain that what they were just doing was applying force to different things. Lead a discussion on what the children did outside asking questions such as:

   How did the different balls change direction— was it their shape, did they hit a bump? What made the balls go farther? Were the balls thrown or hit with a bat?

   What made a ball go up in the air? What made it travel along the ground?

   How far did the cricket ball go? Did it go farther when it was hit with a bat or when it was thrown?

   How does a football bounce? What about a cricket ball? Why do you think they bounce differently?

3. Ask the children to look at the textbook cover carefully, and describe what they see. Do they see a pattern in all the different actions that are being performed? Applaud if some children say 'forces'. Ask them to say what type of force is being used in each action.

   The cover should be used to generate interest in the topic and to make children realize how closely related it is to everyday life. (Answers on page 42)

4. After the discussion, read aloud from the Student's Book as the children follow in their own books. Remember to pause after each statement or question and encourage the children to interact. Provide positive feedback for asking or attempting to answer questions.

Activities

- Ask the children to draw an invention that uses force to move the food from the fridge at home. They can share their ideas in the next class.
- Read aloud the descriptions of force in the table and help the children to tick either 'Push' or 'Pull' as the correct force.

Workbook steps

Remind the children of some of the different forces: pull, push, put, lift. Ask the children to act out each scenario in 'How will you do it?' and list the different forces at work.

Answers to Student's Book 9.1

A. 1. pull 2. push 3. push 4. pull
   5. pull 6. push 7. push 8. pull

B. 1. Forces cause movement. They can change the direction and shape of something.

   2. The force of water can be used to produce electricity and wind can help to push sailing boats across seas and oceans.

Answers to Workbook

(Page 22)

1. pull and push 2. push 3. pull

(Page 23)

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

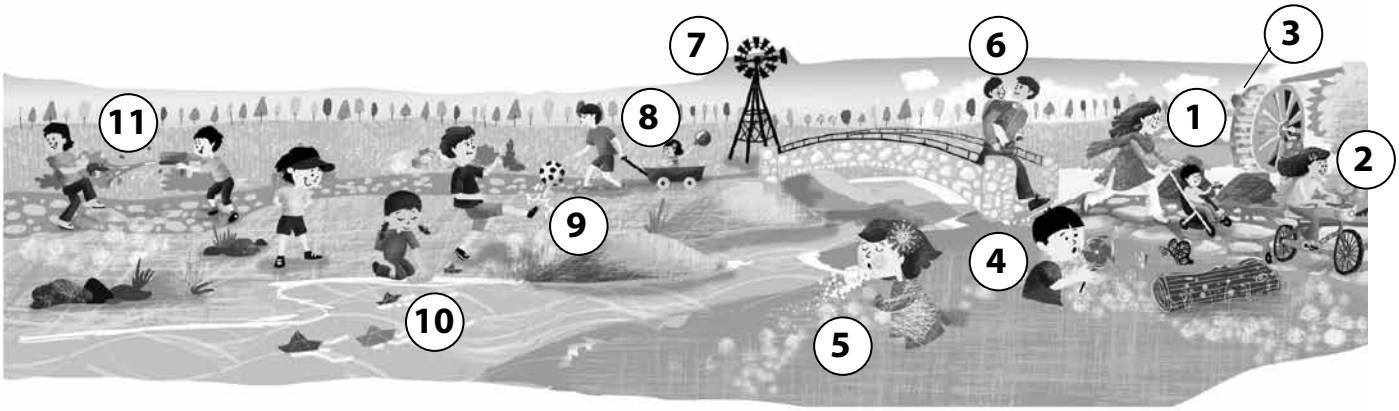
B.

Across	Down
2. work	1. direction
3. wind	3. water
4. force	

Answers to Worksheet 7

Answers will vary.

Types of forces illustrated on the cover



1. push
2. push (pushing the pedal)
3. The force of falling water
4. Force of the wind
5. Force of the wind
6. lift and pull
7. Force of the wind
8. pull
9. push
10. Force created by flowing water
11. push

UNIT 10 HEAT AND LIGHT

Background

This unit aims to introduce the properties of heat and light to the students. Their background knowledge will be based on the Sun being the natural source of heat and light, man-made heat and light, and how they are used in different ways every day. Use suitable pictures and objects to explain the meaning of transparent, translucent, and opaque. Similarly, introduce the word conduction and explain how some objects are good while others are poor conductors of heat. Attempting the activity in the Student's Book will further strengthen both these concepts. Energy-saving ideas should continue to be discussed.

Expected learning outcomes for the unit

Students should be able to:

- explain the importance of heat and light
- describe the properties of heat and light

10.1 Properties of light

Learning outcomes

Students should be able to:

Student's Book

- define the words translucent, transparent, and opaque

Workbook

- provide examples of opaque, transparent, and translucent objects

Resources

You will need:

- Student's Book page 46
- Workbook page 24
- torches or a light box
- different materials, such as tissue paper, cardboard, tracing paper, cloth, foil, and so on

Student's Book steps

1. Welcome the children to the classroom and explain that they are going to perform an experiment with light.

2. Divide the children into small groups and give each group a torch or light source and different materials. Allow them to experiment with the light and the different materials without telling them what to do. Ask each group to share what they have discovered in their activity and praise them for sharing what they have been doing.
3. Next, explain that light can pass through some objects but not through others. Explain that when light can pass through an object such as a window, the object is transparent. Write the word 'transparent' on the board and encourage the children to practise saying it.
4. Next, explain that objects that allow some light to pass through are said to be translucent. Write the word 'translucent' on the board and encourage the children to practise saying it.
5. Then explain that objects that do not allow any light to pass through are said to be opaque. Write the word 'opaque' on the board and encourage the children to practise saying it.
6. Ask the children to play with their light source and try to identify whether the materials they have been given are transparent, translucent, or opaque. Walk around to the different groups providing any necessary assistance.
7. After some time, ask each group to share what they have discovered.
8. Read aloud from the Student's Book as the children follow in their own books. Remember to read slowly and pause after each statement to allow the children to react or ask any questions that they may have.

Activities

Help the children complete the table by ticking to show whether the material is transparent, translucent, or opaque.

Workbook steps

Put the children in groups of two or three and ask them to brainstorm the different uses of transparent materials, translucent materials, and opaque materials. Ask the groups to share their lists with the rest of the class. The children can complete the illustrations and list in their Workbook at home.

Answers to Student's Book 10.1

tissue paper—translucent

chart paper—opaque

cloth—opaque

tracing paper—translucent

foil—opaque

a. Heat and light enable us to see, provide us with energy, keep the Earth warm, and help plants produce their own food.

b. i. Transparent objects are those through which light can pass.

ii. Opaque objects do not allow any light to pass through.

iii. Translucent objects allow some light to pass through.

c. The glass is transparent so the driver can be aware of traffic and any potential hazards.

10.2 Properties of heat

Learning outcomes

Students should be able to:

Student's Book

- explain that how different materials react to heat differently

Workbook

- differentiate between good and bad conductors of heat

Resources

You will need:

- Student's Book page 48
- Workbook page 25
- cups made out of different materials such as glass, plastic, and Styrofoam
- access to hot water

Student's Book steps

1. Welcome the children into the classroom and ask them to sit in a semicircle with you at the centre.
2. Ask individual children to explain what 'opaque', 'translucent', and 'transparent' mean and provide positive feedback even if the answers are incorrect.
3. Open the Student's Book and read aloud the correct definitions of opaque, translucent, and transparent, as the children follow in their own books.
4. Explain that they will be learning some new words to describe heat.
5. Read aloud from the Student's Book about the properties of heat as the children follow in their own books. Remember to pause after each statement and look at the images with the children.

Activities

- Carefully pour hot water into the different cups and allow time for the children to touch the outside of each cup and rate them from hottest to coolest.
- Ask the children to complete the answers to 'Learning is fun!' at home. Remind them that all the answers are in the Student's Book.

Workbook steps

Put the children in groups of two or three and ask them to read through the exercise 'Good and bad conductors' and complete it together. Check that each group knows what they are doing and provide assistance if required. Remind the children that the answers are in the Student's Book.

Answers to Student's Book 10.2

1. opaque
2. translucent
3. transparent
4. conduction

Answers to Workbook

(Page 24)

opaque glass—glass used in ambulances and offices for privacy

transparent glass—clear drinking water glass and car windscreen

translucent glass—frosted glass used in windows, doors, or table tops

Answers will vary.

(Page 25)

1. a. Good conductors allow heat to pass through them.
   b. Metal and copper are good conductors of heat.
   c. Cooking food and flow of electricity are examples of how the conductors can be used.
2. a. Bad conductors do not allow heat to pass through them.
   b. Cloth, wood, and plastic are bad conductors of heat.
   c. The above materials can be used for blankets, warm clothes, and handles of utensils and kettles, since it is difficult for heat to pass through them.

Answers to Worksheet 8

A. 1. conduction
   2. good
   3. burn, wood, and plastic

B. brick—opaque
   piece of wood—opaque
   car windscreen—transparent
   cardboard—opaque
   leather—opaque
   shower curtain—translucent/transparent/opaque
   ice cream container—translucent/opaque

Answers to Worksheet 9

Drawings will vary.

UNIT 11 ELECTRICITY

Background

The purpose of this unit is to introduce the topic of electricity to students at a basic level. Students at this level should be able to give examples of the uses of electricity. These may be brainstormed and listed on the board. Explain that electricity is also a type of energy and is made from natural resources such as coal, gas, oil, wind, and water. Energy-saving ideas can also be discussed in this unit.

Expected learning outcomes for the unit

Students should be able to:

- identify things that need mains electricity or batteries to work
- explain the basic concept of a circuit
- describe the importance of electricity in our lives

11.1 Mains and batteries

Learning outcomes

Students should be able to:

Student's Book

- identify things that need mains electricity or batteries to work
- explain how to stay safe with electricity

Workbook

- restate how to stay safe with electricity

Resources

You will need:

- Student's Book page 50
- Workbook page 26
- battery-operated toy or torch

Student's Book steps

1. Welcome the students to the classroom and ask them to sit down.

2. Explain that they will be learning about electricity.
3. Recall their previous knowledge of electricity and remind them that electricity is a form of energy which is usually made from other types of energy.
4. Encourage students to participate and think about where electricity comes from and how it reaches their homes.
5. After receiving students' responses, introduce the term 'mains electricity'.
6. Explain how this is the electricity that comes from power stations through wires. Use some examples to explain this.
7. Continue reading from Student's Book page 51 and discuss how many things use batteries to provide power. A toy and a torch with batteries can be shown to students as examples.
8. Using information on Student's Book page 51, discuss measures to stay safe with electricity.
9. Revise what was learnt in the lesson by helping them to answer questions under, 'In your notebook'

Activities

Help the students to compile a list of things in their homes which use mains electricity or batteries to work.

Workbook steps

Ask the children to complete the exercise at home. Review the answers in the next class.

Answers to Student's Book 11.1

Lists will vary.

1. Electricity from a power station is known as mains electricity.
2. It reaches our homes through wires from a power station.
3. Batteries use a small amount of electricity.

11.2 Circuits

Learning outcomes

Students should be able to:

Student's Book

- describe an electrical circuit

Workbook

- label an electrical circuit

Resources

You will need:

- Student's Book page 52
- Workbook page 27
- wire, light bulb with holder, and battery

Student's Book steps

1. As always, welcome the students to the classroom and ask them to sit in their seats.
2. Recall the concepts of mains electricity and batteries from the previous lesson.
3. Introduce the term 'circuit'. Explain that this is the path along which electricity travels.
4. Using the text and diagrams on page 52 of the Student's Book, elaborate on the things that are needed for a circuit and how they are set up together to work.
5. Connect the wire, light bulb, and the battery to display the circuit. Please do this yourself and do not allow student intervention for safety purposes.

Activities

Discuss the questions under 'In your notebook' and guide the students to write their answers in their notebooks.

Workbook steps

Ask the children to complete the exercise at home. Review the answers in the next class.

Answers to Student's Book 11.2

1. battery, wire, a light bulb, and a switch
2. Drawings similar to those on page 52 of Student's Book.

11.3 What electricity enables us to do

Learning outcomes

Students should be able to:

Student's Book

- explain the difference between natural and artificial light
- list some different things that electricity enables us to do

Resources

You will need:

- Student's Book page 53
- coverings on windows

Student's Book steps

1. Prepare the room so that when the students enter it is darkened. Explain that they are going to experience a world without electricity.
2. Ask the students to sit down and place some books on their tables.
3. Ask them to try to read the books—it will be difficult for them to see because there will be limited light.
4. Turn on the light and ask the children to read the books again—they can see!
5. Explain that this is electricity at work. Explain that electricity gives us artificial light that enables us to do things when it is dark.
6. Remove the coverings on the windows and turn off the light. Explain that sunlight is natural light.
7. Elicit that without artificial light when it is dark we can't see. Electricity means that we can do lots of different things when it would otherwise be too dark to see.
8. Ask the students to recall what happened when they tried to read without any light.
9. Elicit other things that would be difficult to do without any light. Ask them to think about all the times they have used electricity from the moment they got out of bed. Write their ideas on the board.
10. Read aloud from the Student's Book as the children follow in their own books. Remember to pause after each statement and look closely at the pictures. Encourage the children to share any thoughts or questions that they have.

Activities

- Read aloud the list of different machines in the table in 'Learning is fun!' and help the children to put ticks in the correct boxes.
- Help the students to complete the word search.

Going further

Compile a table where students observe different places such as their kitchen at home, a park, a mall, or a supermarket to list items that use electricity. These can be further divided into those that produce light and those that produce heat.

Answers to Student's Book 11.3

1. Super Scientist can make the two machines work by plugging the wires into the socket.
2. runs on electricity—fridge, toaster, and fan
   does not need electricity—screwdriver and scissors
3.

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

• wire • machines • store • careful • mains

Answers to Workbook

(Page 26)

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

(Page 27)

A. Students will label the switch, bulb, wire, and battery correctly in the diagram.

B. 1. energy
   2. wires
   3. mains
   4. battery
   5. wet

Answers to Worksheet 10

Answers will vary.

UNIT 12 SOUND

Background

Students explore the properties of sound through this unit. Begin the unit with an interesting activity involving different types of sounds. Ask them to imagine themselves in different surroundings and to describe the kinds of sounds they would hear there. Discuss pleasant and unpleasant sounds with examples. Explain that sound travels from one place to another through sound waves, just like waves caused when a pebble is dropped in still water. Explain this with the help of illustrations. The activities provided will establish a better understanding of these concepts.

Expected learning outcomes for the unit

Students should be able to:

- identify the properties of sound

How do we hear sounds?

Learning outcomes

Students should be able to:

Student's Book

- explain that sound is caused by vibrations
- recognize basic sound wave images
- begin to classify different types of sounds

Workbook

- demonstrate understanding of sound

Resources

You will need:

- Student's Book page 56
- Workbook pages 28 and 29
- bowls and jars to make drums
- cling film and rubber bands
- a musical instrument such as a tambourine
- metal coat hangers, metal spoons, string

Student's Book steps

1. Welcome the children into the classroom by making sound with a musical instrument.
2. Explain that they will be learning about sound.
3. Put the children into small groups and give them some bowls and jars, cling film, and rubber bands. Show them how to cover the top with cling film, pull it tightly, and secure it with a rubber band. Encourage them to experiment and try to make different sounds. See if they can play a tune. They can use pencils as drumsticks and play the drums or use their fingers to play the *tabla*.

   Extension: Provide other materials to try to make different sounds, such as empty tins, rice in a jar, stones in a bottle, and so on.
4. After some time, ask the children to sit in a semicircle and follow as you read the section on sound in the Student's Book.
5. Remember to pause after each statement to look at the pictures and encourage the children to interact.
6. Emphasize that sounds are vibrations travelling through the air.

Activities

Help the children to draw a sound wave of a very low sound, a high sound, and a medium sound. Refer to the picture in the Student's Book to see how to illustrate the sound waves—the closer together the sound waves, the higher the pitch of the sound.

Going further

Organize the children into small groups and show them how to tie a length of string to each corner of the metal hanger. Show them how to loop one end of the sting around one finger and the other around the other index finger. Demonstrate banging the hanger against a table with your fingers in your ears. Explain that the sound waves from the vibrating hanger travel along the string into your ear. Allow the children to try the experiment. See what happens if they replace the metal hanger with a metal spoon.

Workbook steps

Ask the children to complete the exercise at home. Review their answers in the next lesson.

Answers to Student's Book

1. Low sound waves should have a large gap between each wave.
2. High sound waves should have a smaller gap between each wave.
3. The gap for medium sound waves should be larger than high sound waves and smaller than low sound waves.
4. a. heard b. travel c. larger

Answers to Workbook

(Page 28)

A. 1. vibrate
2. brain
3. ears
4. waves
5. large
6. smaller

B. Answers and drawings will vary.

(Page 29)

Across	Down
4. brain	1. vibrations
5. water	2. high
6. low	3. ears
7. waves	

UNIT 13 THE SOLAR SYSTEM

Background

Help students learn the names of the planets and provide information about each using the Student's Book. Use the acronym in the book to help the students remember the order in which the planets revolve around the Sun. Encourage students to make up other acronyms to remember the order. It will also be useful to revise how the Earth spins on its axis, causing day and night.

Expected learning outcomes for the unit

Students should be able to:

- identify the planets and their order
- explain that the planets orbit around the Sun

13.1 The planets

Learning outcomes

Students should be able to:

Student's Book

- explain what makes up our solar system
- name the planets
- explain that all the planets are travelling around the Sun

Workbook

- state the order of planets in the solar system

Resources

You will need:

- Student's Book page 58
- Workbook page 30
- a relevant book about space or a rocket trip
- a globe and a torch

Student's Book steps

1. Welcome the children into the classroom and ask them to sit in a semicircle with you in the centre. Explain that they are going to be learning about the solar system.
2. Ask individual children if they can remember the names of the eight planets that are in our solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. Provide positive feedback even if the answers are incorrect.
3. Elicit that all of the planets orbit the Sun—that means that they travel around the Sun. Elicit that the Sun is a star and that all the stars we can see in the sky are suns but they are just a long way away.
4. Read a book about space or a rocket trip and encourage the children to predict what is going to happen by looking at the pictures.
5. Read aloud from the Student's Book as the children follow in their own books. Remember to pause after each statement and look closely at the images with the children.

Activities

- Ask the children to think up a phrase to help them remember the order of the planets. Share the different phrases among the students.
- Ask the children to try to answer the quiz without looking for the answers in their Student's Book. After they have attempted the quiz ask them to check their answers by looking back through the Student's Book.

Going further

Lead a discussion about night and day. Use a globe of Earth and the torch to show that when light is shining on one half of Earth, it creates daylight and the other half of Earth is in darkness. Explain that the Earth turns around in its orbit as it in turn orbits the Sun—creating days and seasons. Explain that when the Sun shines on Pakistan it is day and when the Earth turns around it is night. Show the children how this looks by shining the torch on the globe and gently turning the globe around. You may need a child to hold the torch.

Workbook steps

Ask the children to label the planets at home. Remind them that the answers are in the Student's Book. Review the children's work in the next lesson.

Answers to Student's Book 13

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

Answers to Workbook

(Page 30)

Students will draw the planets on their orbits starting from the Sun in the order stated below.

Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune

Answers to Worksheet 11

M	E	R	C	U	R	Y	X	J	X
X	X	U	E	X	X	A	X	U	N
O	P	A	X	V	X	O	A	P	E
M	A	R	S	E	X	E	I	I	P
O	X	O	X	N	X	A	X	T	T
L	M	A	R	U	X	R	A	E	U
A	A	X	L	S	A	T	U	R	N
U	R	A	N	U	S	H	X	A	E

Name: _____ Date: _____

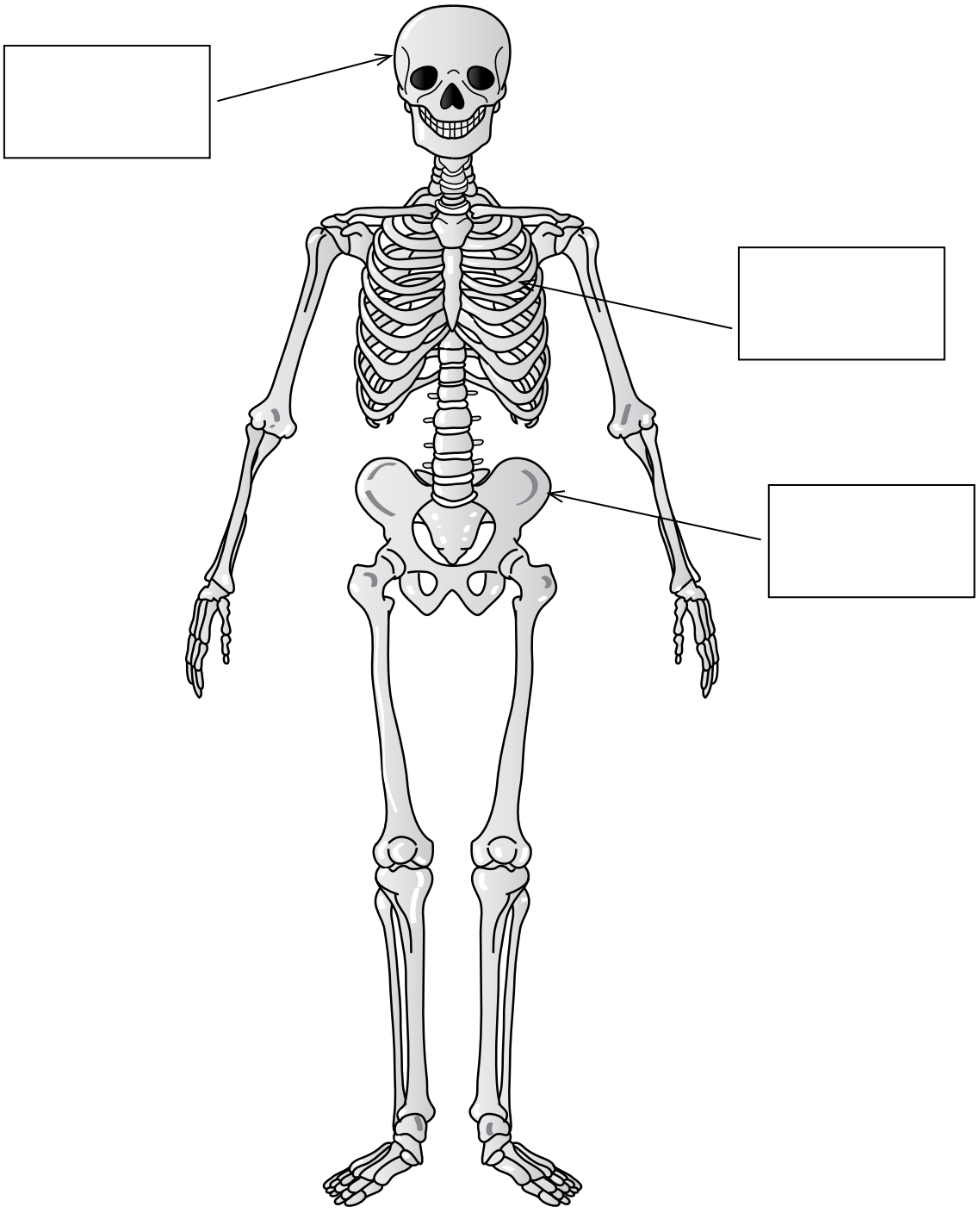
Circle the correct answer

1. Your heart is a muscle that pumps blood through your body.
   A. true B. false
2. Bones protect parts of your body such as: (pick 3 answers)
   A. skin B. heart C. lungs D. brain E. hair
3. How do you keep your bones and muscles healthy? (pick 2 answers)
   A. by eating junk food B. by exercising
   C. oxygen D. by eating healthy foods
4. What do lungs do?
   A. take in air and move oxygen through your body
   B. digest your food C. help you to hear D. move the bones
5. What moves your bones?
   A. your heart B. your lungs C. your muscles D. your blood
6. The brain helps you to
   A. pump blood around your body B. take a deep breath
   C. speak, think, and move D. stand upright
7. All the bones in your body fit together to make up
   A. the muscles B. the arm C. the skeleton D. the human body
8. The cerebrum is the biggest part of your
   A. heart B. lungs C. brain D. kidney
9. Carbon dioxide is removed from our body when we
   A. breathe in B. jump C. drink water D. breathe out
10. The place where two bones meet is called a
    A. fixture B. joint C. muscle D. skull

Name: _____ Date: _____

The human skeleton

Label the skull, the rib cage, and the hip bone in the diagram below.



Name: _____ Date: _____

Reptiles and amphibians

Reptiles
skin covered with scales
cold-blooded
hatch from eggs

Amphibians
live on land and in water
cold-blooded
no scales on skin

Draw 3 reptiles and 3 amphibians.

turtle	frog
crocodile	salamander
snake	newt

Name: _____ Date: _____

Plants

A. Fill in the blanks using words from the text box below

flowers	roots	four	shade	shoots	sunlight

1. Trees give _____ from the sun.
2. Plants need food, water, and _____.
3. There are _____ main stages in the life cycle of a plant.
4. The seed grows _____ and _____.
5. The _____ of a plant produce seeds.

B. What is the difference between the roots and shoots of a plant?

_____

_____

_____

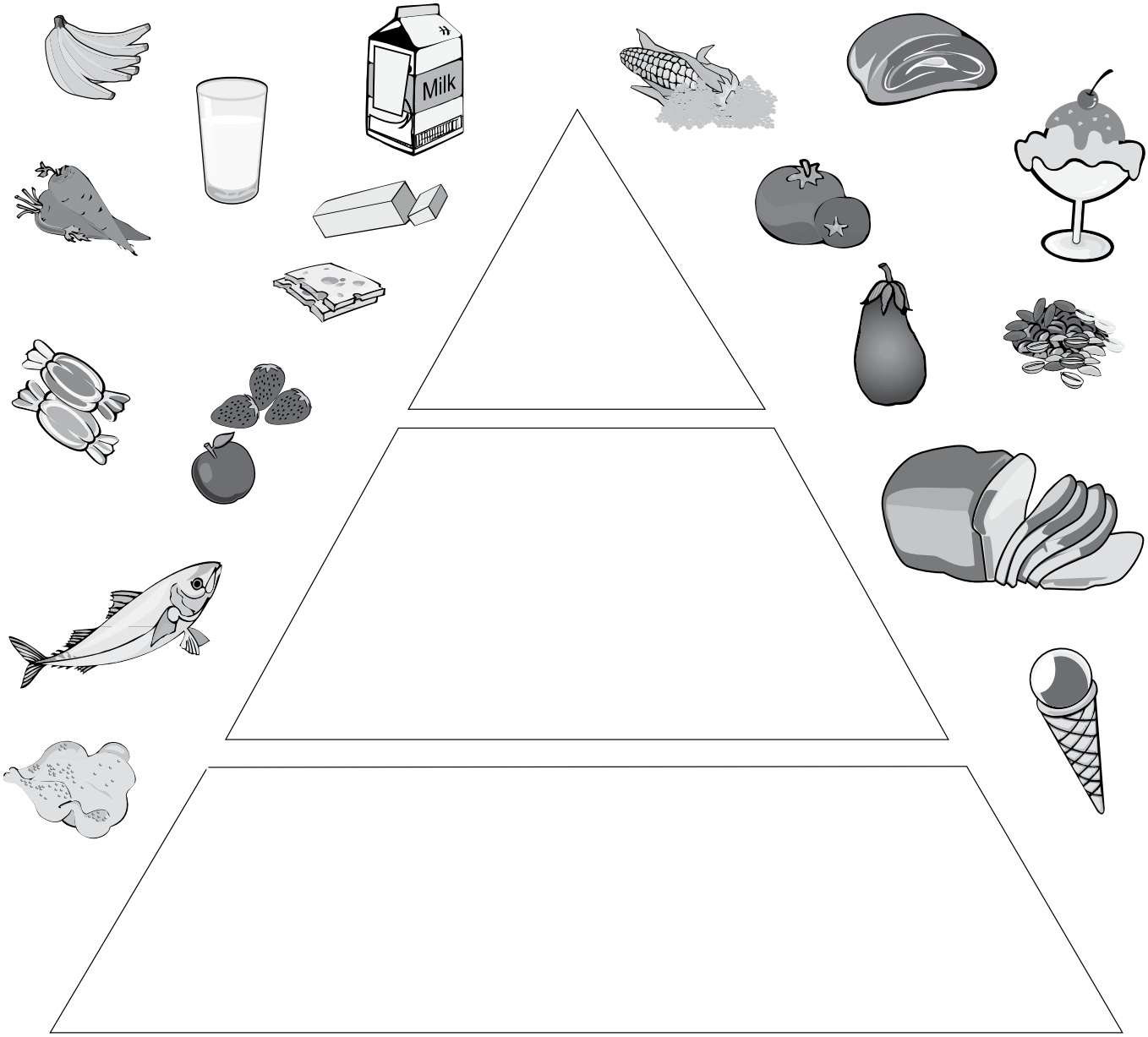
_____

_____

Name: _____ Date: _____

Food pyramid

Make your own food pyramid. Look at the different foods shown below. Cut them out and glue them in their correct places on the food pyramid.



Name: _____ Date: _____

Materials

Write the names of the objects below in the correct columns.

paper bag	glass	saucepan	t- shirt	sponge	curtain	shower curtain

Waterproof	Not waterproof

a person without a life jacket		balloon filled with air	empty can
stones	boat	plastic cup filled with coins	

Floats	Sinks

Name: _____ Date: _____

Push or pull?

Think of some actions where you push or pull an object. Then write them in the correct columns.

	Push	Pull
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		

Name: _____ Date: _____

Heat and light

A. Fill in the blanks.

1. When heat travels from one object to another it is known as _____.
2. Metal is a _____ conductor of heat because heat travels quickly through metal.
3. Things that _____ easily and let heat escape into the air are bad conductors of heat. Examples are _____ and _____.

B. Decide whether each object listed in the table below is transparent, opaque, or translucent. Then place a tick mark in the correct column.

Material	Transparent	Opaque	Translucent
brick			
piece of wood			
car windscreen			
cardboard			
leather			
shower curtain			
ice cream container			
cooking pot			

Name: _____ Date: _____

Light

Draw 2 pictures in the boxes of things that we can do when we have natural light, and 2 pictures of things we can do when we have artificial light.

Natural light

Artificial light

Name: _____ Date: _____

Uses of electricity

List ten ways in which electricity can be used.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Name: _____ Date: _____

The planets

Find and circle the names of the planets of our solar system in this word search.

M	E	R	C	U	R	Y	X	J	X
X	X	U	E	X	X	A	X	U	N
0	P	A	X	V	X	0	A	P	E
M	A	R	S	E	X	E	I	I	P
O	X	O	X	N	X	A	X	T	T
L	M	A	R	U	X	R	A	E	U
A	A	X	L	S	A	T	U	R	N
U	R	A	N	U	S	H	X	A	E

Saturn Earth Jupiter Mercury

Venus Mars Uranus Neptune