OUR WORLD OF SCIENCE

PAKISTAN EDITION

Book 5

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fidem
education network

first edition 2014
first impression 2014

ISBN 978-969-9705-44-1

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Published by
fidem education network
D-69/1, Block-9, Scheme 5, Clifton, Karachi-75600, Pakistan
Printed at
Yaqeen Art Press (Private) Limited
Plot 150, Sector 23, Korangi Industrial Area, Karachi-74900, Karachi, Pakistan.

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Introduction

This Teachers' Guide has been developed to accompany Our World of Science textbook series. The Guide has particularly been designed with an aim to help you put your valuable class time and resources to the best use.

The detailed lessons plans in this Guide may be used as they are, or followed loosely depending upon your teaching strategies, resources, time allotted to Science at your institution and very importantly, the needs of your students. Remember, these are not the only ways to transmit knowledge; you can come up with your own plans to tailor the activities given in the lessons and divide your time accordingly.

STRUCTURE OF THE TEACHERS' GUIDE

This Guide has been divided broadly into two main sections: Lesson Plans and Worksheets.

Lesson Plans consist of the following key features:

- **Objectives:** Every chapter lists the learning objectives of the lesson which you may refer to before, during, and as you conclude the teaching of the chapter to ensure that you have covered everything.

- **Vocabulary Bank:** The vocabulary bank includes the relevant vocabulary which the students will require to be familiar with. You should encourage them to use it during class discussions. Make sure that you prepare the class softboard with the words displayed prominently. Drill these words daily. You can prepare flashcards or use other techniques like a thematic word wall on the softboard.

- **Lesson:** The detailed procedure of the main teaching of the lessons has been structured in a way to include activities and their variations, multiple teaching strategies, extra information, hands-on activities and crafts to clarify concepts and give ideas a concrete shape. Each lesson is divided into Warm up, Main Lesson and Recap sections. Be judicious in your choice of activities and you can mix and match different sections. The plans may also be used as they are. You may also improvise and contextualize ideas, incorporating them into your own teaching design.

- **Links:** Weblinks to relevant topics have been given to enhance the teaching process for you and to ensure complete understanding of chapters taught.

- **Evaluation:** Evaluation exercises have been included at the end of every lesson to help you assess and ensure how far key objectives for particular teaching session have been met.

- Safety

  Specific safety measures have been included with activities in the Guide; however, exercise all necessary caution when conducting hands-on activities.

  Some general ethical and safety precautions:

  - In discussions involving a comparison of physical and cultural characteristics, be careful not to pass judgmental remarks or to let the students pass critical comments. Students come from different backgrounds and have varying intellectual and physical abilities. Similarly, cultural differences like dietary preferences may also vary. Exercise every caution not to offend their sensibilities. Be sure to emphasize that we are all different in our physical attributes, likes/dislikes, etc.

  - Students may have various allergies from plants, animals, and edible items like pollen, dust, cats, and (pea)nuts. Try to find out any such instances from parents or the school nurse well in advance of any demonstration or field exercise.

  - Make sure before tasting anything the students have clean hands.

  - Ensure that students are under proper supervision when taking them four for a visit to the park or to the playground for observation.

  - The students must never look at the Sun directly, or sunlight reflected in a mirror, microscope, or through a hand lens etc. Warn them of permanent damage including blindness.

  - Be careful when handling apparatus: electrical appliances, mercury thermometers, microscopes, glass beakers, test tubes etc.

  - Seeds may be poisonous. Make sure that children do not put them in their mouth.

  - Candles should be supported firmly in their proper holders.

Remember to go through the plans well in advance to make the necessary preparations, especially for topics like plants, the solar system and weather which require ample time to record results intermittently.

Answers to exercises in the textbook have been provided for each chapter.

Worksheets for every lesson are provided at the end of the Guide. Tear out and photocopy the worksheets to use as a reinforcement exercise, homework or for assessment.

TEACHING STRATEGIES

The philosophy behind our books is to break away from the traditional pedagogical practice of lecturing and focusing on a learner-centred approach. Always demonstrate, discuss and then engage the students in reading the text. Do not initiate any lesson by directly reading from the textbook. We particularly emphasize on collaborative learning in the classroom and encourage you to use various cooperative and interactive teaching strategies.

We have taken meticulous care to include a variety of such strategies in our lesson plans. They include:

Pair/Group Work: Students work in pairs to think about work assigned to them and then discuss amongst themselves before sharing with the class. Two approaches for this are:

Think-Pair-Share: Assign the students a particular task or give them a topic/question to think about. In pairs, the pupils will discuss the question or task, and then share their ideas with each other. Finally, the pupils will discuss their answers with the class.

Jigsaw Technique: This cooperative learning approach where pupils teach there group members what they have learnt. It works like this:

a. Form 'home' groups where each member is assigned a different portion of a chapter to read. Also assign each student with a number, for example from 1–4. Each number denotes the portion assigned to them.

b. All students assigned a particular task in their home groups will then form a group with other pupils assigned the same task. For example, all number 1s from their respective home group will come together, as will all number 2s, 3s, and 4s. They will study and discuss the material and become 'experts' in it.

c. Now all the pupils will return to their respective home groups. They will teach each other what they have learnt about the material assigned to them.

d. Your job is to facilitate this process and evaluate what they have learnt by asking them to make a presentation before the class, or by taking a quiz.

Gallery Walk: An excellent way to start/conduct/revise the lesson. Divide the class into at least 3–4 groups. Each group will be assigned a topic, which they will discuss and write the salient points of on a paper/chart and paste it on the wall. Every chart will be pasted in the room far apart, preferably on all four corners of the room, like an art gallery. Each group will now be stationed in front of another group's poster.

The students in the group will read and discuss the points on the poster and write their observations on sticky notes which they will stick onto the poster. When the teacher claps or rings a bell, each group will rotate and move to the next poster and do the same. All groups will rotate in this manner until each group has had a chance to look at every group's poster. All the groups will then end when they have reached their own group's poster.

Loop cards: This is a popular educational game to keep students actively engaged. Prepare cards with a question on one side and answer on the other. The answer should be to a different question and not the one on the card. The number of cards you prepare should match the number of students in the class.

Distribute the cards, giving one card to each pupil. Begin by one student reading aloud the question on his/her card. The rest of their students will flip their cards to see who has the answer. The child bearing the correct answer will call out the answer and then it will be his her turn to read out the question on his/her card.

If the child with the correct answer written on his/her card does not know that it is the answer to the question, whoever answers correctly will be the next to read out the question on his/her card. The students can be divided into teams as well.

Loop cards can serve as an excellent revision/evaluation strategy. It keeps the students thoroughly attentive because the card they hold may come up in the loop. The idea is to have all the children participate by asking and answering questions in a way that you come back in a loop to the 'Start' person.

KWL: This is a comprehension strategy to evaluate what the students have learned using a chart. You can make a three column table on the board or a flip chart labelled K, W and L. Before reading, first find out what the children already know about a topic (K). List those points on the flip chart. Then ask what they want to know about the topic (W). List these as well. After the reading and discussion, ask what they have learned about the topic (L). Once you have completed the chart, analyse it to see

what learning has taken place. KWL gives the students a purpose for learning the topic and keeps them engaged.

Here is what the KWL chart may look like:

K What I/we know	W What I/we want to know	L What I/we learned
Write the what the students already know in this column	Write what the students want to know in this column	After the completion of the lesson write whatever the students have learned in this column

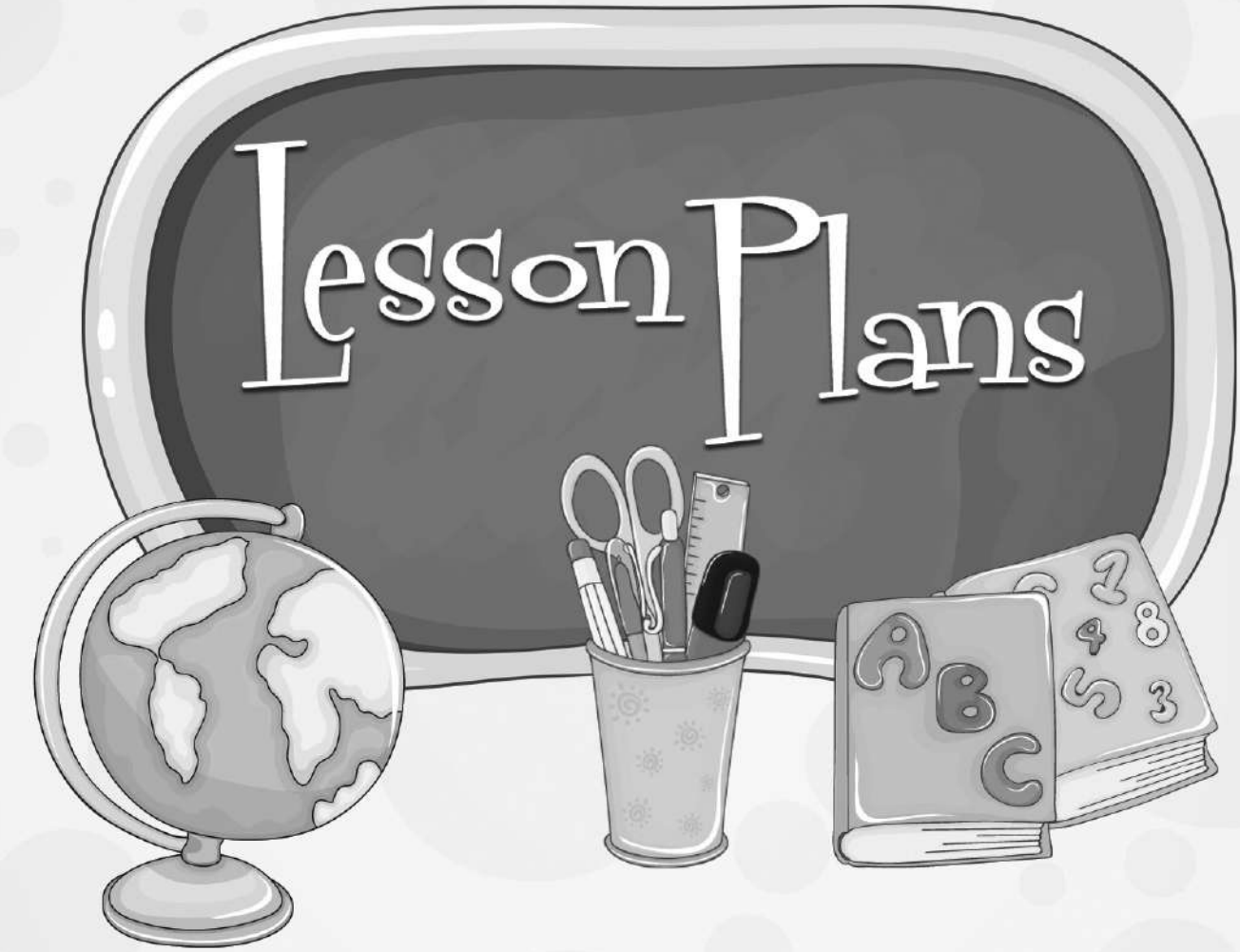
Circle Time: This is an excellent strategy to initiate discussions or use as part of your main lesson. Arrange the class in a fish bowl set-up or if there is enough room, ask them to sit in a large circle. This allows face to face interaction and helps in exchange of ideas, revision, and removal of misconceptions. This may be used in conjunction with any of the strategies above, for example the gallery walk. Each group can read out the comments left by other groups on their posters, leading to an interactive discussion.

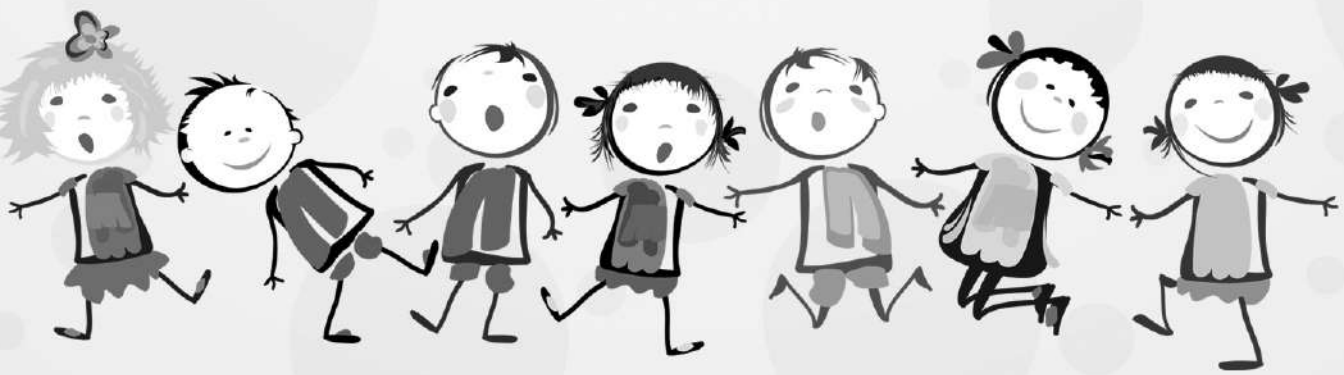
Audio Visual Aids: Links to relevant websites have been provided in the lesson plans for different topics. Concepts are understood best only when they are seen or done practically. The children must experience phenomena in order to fully understand concepts like forces, electricity, materials, living things, etc.

Although every care has been taken to ensure that the lesson plans in this Guide will help facilitate learning through inquiry and practical activities, they are not necessarily to be followed rigidly. If you have trouble arranging the required resources for a lesson, feel free to improvise. Make the most of what you have readily available.

Science started with observation, and this is one of the first skills to be inculcated in children to foster the spirit of scientific enquiry, followed by collecting information, inference, experimentation, recording and analysing results to form a conclusion. A good teacher always tries to provide a variety of learning experiences to the students. Make every effort to connect phenomena to the experiences of the everyday lives of your learners. Take them to the playground or a nearby park, the music room, computer room, or any other place to engage them in a hands-on learning experience, encouraging them to observe and ponder over their findings.

Lesson Plans





Unit 1

Chapter 1

Study of science

Objectives	By the end of the chapter, students should be able to: • state the meaning of science • describe the nature of science in their own words • observe and identify different everyday phenomena of science • predict and communicate the consequences of such phenomena • explain the way scientists study and discover • develop a curiosity to unveil different scientific situations • describe the three main areas of science • explain the way science has changed our lives over a period of time
Vocabulary Bank	science, nature of science, oceanography, satellites, physics, chemistry, biology

LESSON 1: 40 mins

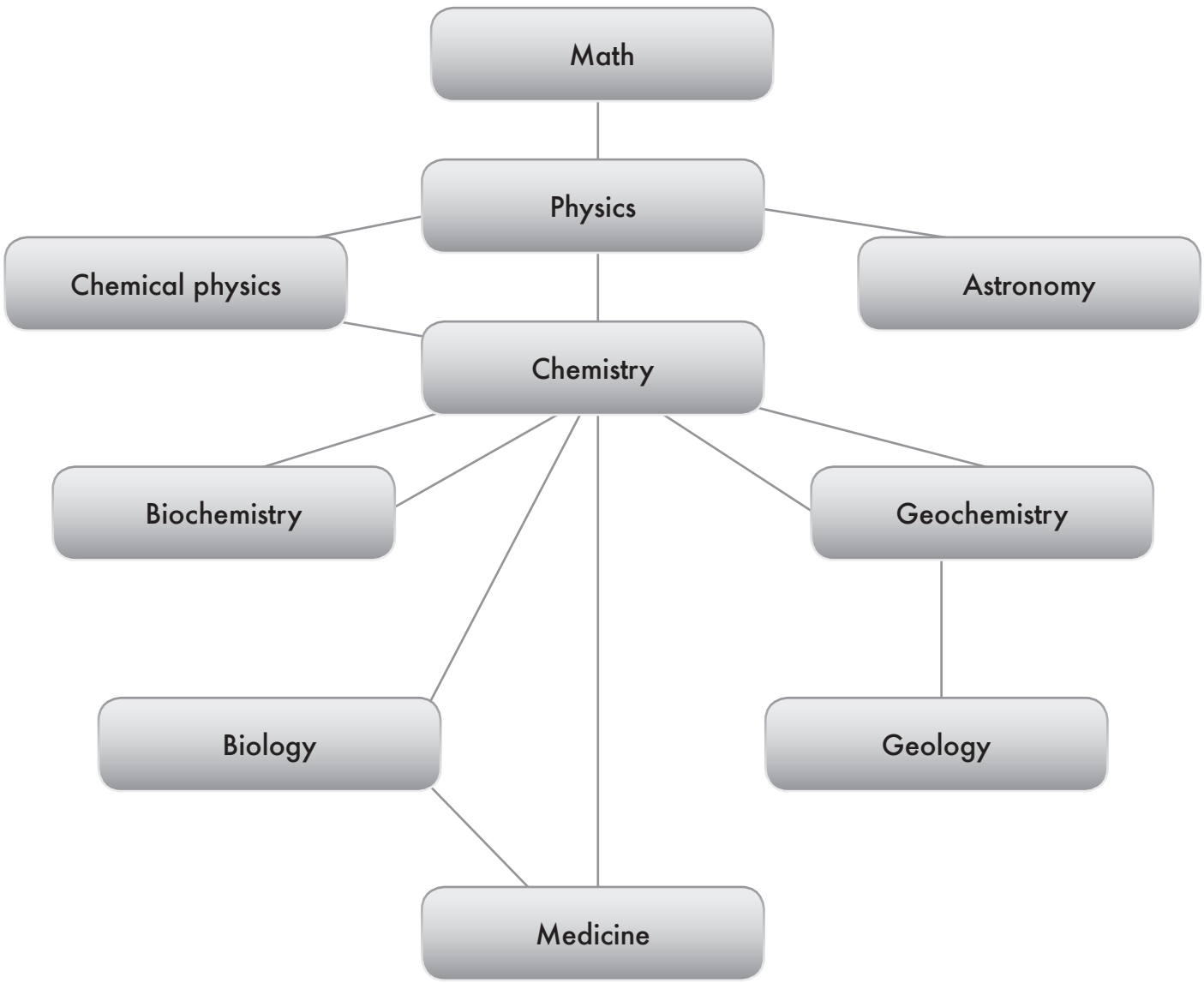
10 mins	**Warm up:** Take the opportunity of first lesson of the new class and ask them to tell their partners what do they like about science and quote one lesson that they enjoyed most in their previous class. Now, ask each of them to describe what their partners have told them. For e.g. *This is my friend Imaaz, and he enjoyed the chapter on food in the previous class.* Tell them what they learn and explore with help of science.
20 mins	**Development:** Proceed with the lesson with the group activity below. Divide the class into four groups and assign them a topic each: Earthquake, flood, solar eclipse and thunderstorm. Four pictures depicting the situation can also be used. Ask the students to discuss in their group what they see in such situation (Observation) and what are the possible reasons of such natural disasters

	(Inference). Ask any one member from each group to present in front of the whole class. Simultaneously, divide the board into four parts and jot down their discussions on the board. As the students have come with up with their explanations of the phenomena, rephrase and elaborate that the role of science is to unfold such natural phenomena by observing, explaining and predicting as we observe dark clouds and predict rainfall. Emphasize on the dynamic nature of science by giving examples of technological advancements. Give them examples of how the table size PC has squeezed down to a palm size notebook. Tell them after the inventions of different fertilizers to increase crops production, the people in the developed countries like UK and USA pay more for the food that is grown using natural fertilizer, called organic food. Ask them further the number of planets in the solar system. Tell them that Pluto is no more considered as planet, but a dwarf planet. This explains the tentative nature of science.
10 mins	**Recap:** Ask the students to do silent reading of page 8, 9 and 10 of the textbook, followed by oral questioning based on how science works.

LESSON 2: 40 mins

5 mins	**Warm up:** Initiate the lesson through questioning about the previous lesson. Pay special attention to their understanding about science and its nature. Emphasize on "curiosity to explore further is science" (page 9) by giving them concrete examples of different machineries and medicines such penicillin (used as antibiotic) and polio vaccine.
25 mins	**Main Lesson:** *Think-Pair-Share:* Ask the student to think about the how science has made our lives easier. Discuss with your partner and decide upon one invention/discovery of science that is most useful and give reason for it. Give them some examples of medicines, machines, petro-chemicals and airships to broaden their thinking and help them discuss beyond computer and mobile phones. Divide the whiteboard into three parts. Without mentioning them keep each side

	for physical science, earth science and life science. As the students come up with their suggestions, put them accordingly. For example, if it is radio or TV, it comes under physical science. If it is treatment of TB, it aligns with life science and if it is related to discovery of planets, it fits in earth sciences. After they have given their responses. Tell them, that science is a vast field and it is sub divided into three major fields (figure 1, page 10). Elaborate further, focusing on biology, chemistry and physics.
10 mins	**Warm up:** Paste or convert the following diagram on a chart paper and summarize how science branches out into various fields which are linked and depend on each other.



	Evaluation: Free writing: Ask the students to write a paragraph on 'Science'. No brainstorming is required, tell them to write what comes to their mind when they think of 'Science'. Free writing will give them an opportunity to express their conceptions as well as misconceptions about the nature of science and provides the teacher with the feedback of the lessons.
	Extension: Teachers may give students some situations in which they act like a detective (scientist work as detectives, when they observe, find clues, do experiments and conclude a problem). The specific order of scientific skills i.e. observation, collecting information, inference, experimentation and conclusion (mentioned above) could be used to solve any such situations. In case of ample space in the classroom, a scene can be created in which the students' belongings are 'lost'. Using a magnifying glass, students will look for clues such as footprints, hair and fingerprints to 'catch' the culprit. http://www.glasgowsciencecentre.org/online/gsi-glasgow-science-investigation.html http://www.fbi.gov/fun-games/kids/kids-investigate http://www.sciencekids.co.nz/gamesactivities/detectivescience.html

Answers

Exercise 1

a. To explore further, unfold nature and explain natural phenomena.

b. Different answers

c. Because it keeps changing by exploring more and more with time.

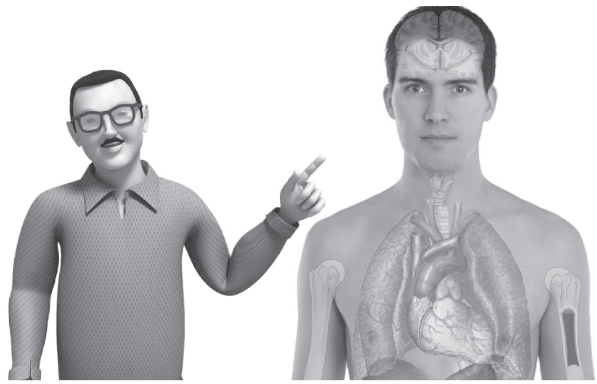
Exercise 2

a. false b. true c. false d. true e. true

Unit 1

Chapter 2

Healthy body



Objectives	By the end of the chapter, students should be able to: • recognize that our body is similar to a machine that works perfectly to fulfil its needs • elaborate the role of important parts (organs) of this machine (body) • state the size and location of the heart • describe the efficiency of the heart in terms of the amount of blood it supplies • state the function of blood vessels • discuss that regular exercise make us healthy • state the shape of our lungs • explain the function of lungs • record the number of breathing in a minute • identify and record pulse with help of guided practice • differentiate between the breathing rates in different situations • compute the pulse rate and breathing rate in the table given on page 18
Vocabulary Bank	pulse rate, alveoli, circulation, contraction, pumping, carbon dioxide, breathing rate, capacity, efficiency, sprinting, jogging, fitness
Resources	Models of heart and lungs or real heart and lungs of a goat. Request stop watches from the science lab, at least half the number of the total children to work in pairs or remind the children to wear their wrist watches on the day of the lesson.
Factual Bank	This could be put up on the softboard, along with a simple diagram of heart and blood circulatory system (page 15)

Our Heart

- Our heart pumps 6000–7500 litres of blood every day.
- It beats about 100, 000 times a day.
- The blood travels a total of 19, 000 Km in a day.
- An average adult's heart beats about 72 times a minute.

LESSON 1: 40 mins

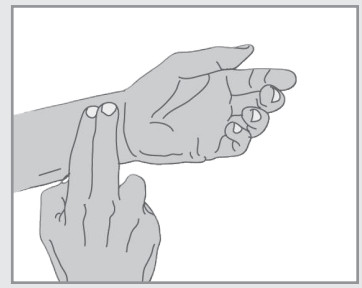
5 mins	**Warm up:** Initiate the lesson through a gesture of thankfulness to Allah for His uncountable blessings. Hold a discussion on counting blessings and focusing on health as the greatest of all blessings. Draw an outline of a human body and point out the different parts and organs. Ask the students about their specific roles.
25 mins	**Main Lesson:** Prepare a short script on the heart. *"I am the most hardworking chap of a big and complex machine. I am about the size of your fist and situated slightly on the left side of the chest. My job is to supply all what is needed to the each and every part of the body. I receive great support from numerous tiny pipes called 'blood vessels'...".* Similarly prepare another script on the lungs:

	"I look like two balloons hooked together with help of pipe. My duty is to provide clean air carrying oxygen to the body and getting rid of the harmful gases. I am situated in the chest cavity and guarded by bony structure called ribs." Select two children from the class and hand them a script to perform role playing the class. Involve the children by asking them questions related to the function of each organ. Explain them further by using models of heart and lungs. Heart and Lungs of a goat can also be brought to the class to make the children more curious and motivated about learning science.
10 min	**Recap:** Divide the board into two columns and label them heart and lungs. Ask the students specific questions related to what has been explained and jot it down on the board. An interesting PowerPoint presentation on the heart can be downloaded from the following link and used in class: http://education.scholastic.co.uk/resources/15476

LESSON 2: 40 mins

5 mins	**Warm up:** Initiate the lesson by taking oral responses from the previous lesson on heart and lungs. Ask some questions from the fact sheet provided in the first lesson.
25 mins	**Main Lesson:** *Pulse Rate and Breathing Activity:* Ask the students to do the silent reading of page 17 and 18 before proceeding for the activity. Make sure that they understand what they have read by explaining it in your own words. This activity should be done in the play ground where the students can move freely. Take help from the lab assistant or a co-teacher to assist children in doing this activity in pairs. Show the students how to take their pulse rate, before taking them out.

Demonstration of taking pulse



1. Show them your right hand and indicate that you would be using your first two fingers to feel the pulse.
2. Straighten your left hand in front and place right hand's finger on the wrist.
3. Slide the fingers to locate the pulse.
4. Press down a bit more to feel the throbbing movement.
5. Count the number of throbbing movements in one minute.

Show the students how we breathe by consciously inhaling and exhaling. Tell them the number of times we breathe in a minute shows our breathing rate.

Use the table on page 18 to record their observations individually.

10 mins

Recap:

As the students have recorded their pulse rate and breathing rate, bring them back to the classroom. Discuss their pulse rate and breathing rate in resting position and then after each activity. Ask them when their pulse increased the most.

Conclude the discussion by telling them as we run and jog, we require more energy. To provide our body with greater amount of energy, our hearts and lungs work harder. This is the reason our pulse and breathing rates increase during such activities.

Evaluation:

The students can complete the following exercise:

Q.1. Elaborate the following statements:

a. Our body is an extraordinary machine.

b. Our heart and lungs are the metres in our body.

c. An athlete has a lower pulse rate than people who do not exercise regularly.

d. Our pulse rate and breathing rate changes according to our activities.

e. Our heart is similar to a pumping machine.

Q.2. State five habits to help keep our heart and lungs healthy.

Parent-Pupil Partnership

Encourage the students to discuss what they have learnt in the class with their parents and do the worksheet **Healthy body** with them. Motivate the children to go for a walk with their mothers in the evening and maintain a diary for the number of times in a week.

Answers

Exercise 1

a. Contracting

b. Move

c. Blood vessels

d. Oxygen

e. Carbon dioxide

Exercise 2

a. It pumps blood to all parts of the body.

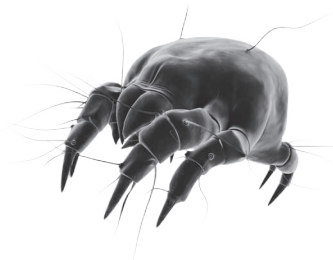
b. It is affected by food deficiency and not exercising

c. Lungs are like bunch of balloons that absorb oxygen and remove carbon dioxide from the body.

Unit 2

Chapter 3

Microbes



Objectives	By the end of the chapter, students should be able to: • define microorganisms • identify microorganisms with help of the microscope • name the main groups of microorganisms • describe bacteria in terms of their shape, occurrence, reproduction and function • describe fungi in terms of their shape, occurrence, reproduction and function • describe virus in terms of their shape, occurrence, reproduction and function • state the meaning of germs • define infection and its cause • describe that infections can be prevented • discuss the advantages of microbes
Vocabulary Bank	microorganism, bacteria, fungi, virus, germs, infection, germs, immunity (defense system)
Resources	• Photocopy of the specific content from the textbook • Chart papers and thick permanent markers • Microscopes, slides of bacteria and virus, some plastic sealed rotten fruits, pieces of bread kept for two days in a hot place

LESSON 1: 80 (40 + 40) mins

10 mins	**Warm Up:** Video: Show them a video of the advertisement of antibacterial soaps. Discuss what they have seen. Ask them if they wash their hands after playing. Usually, children in cities do wash hands after using the toilet and before meals, but not after outdoor play. Ask them why they should be washing their hands even if they do not see any dirt on them.

OR

If the video facility is not available, some hand puppets can be prepared with the help of pictures of 'enemies' like Dirto and Germoon, found on the websites of antibacterial brands of soap:

http://dettolwarriors.com/dettolwarriors.php

https://www.safeguard.com.pk/commandersafeguard/characters.php

http://www.safeguard.com.pk/commandersafeguard/downloads.php

60 mins

Main Lesson:

As the children have now anticipated that they would be learning about germs, tell them that today you have planned an activity for them, in which you would work like a team and conduct the specific roles assigned to them. Emphasize that each of them has to perform the duty and help each other. The time for completing the activity is 15 minutes.

Cooperative Learning Group activity:

Divide the children into groups of five each. Allocate the following roles to each child in the group:

1. Facilitator: The one who will read the content and explain to the whole group.
2. Resource Person: The person who will arrange for the resources like a dictionary (to find out the meaning of any difficult word), chart paper and marker.
3. Reporter: The one who will jot down the explanation given by the facilitator in bullets on the chart paper.
4. Time Manager: The person who will ensure that the task is completed in 15 minutes.
5. Presenter: The person who will present the information to the whole class.

Content Allocation:

Get photocopy of the following pages and hand them over to the facilitator.

Group 1: Microbes (page 20 and 21)

Group 2: Bacteria (page 22)

Group 3: Fungi (page 23)

Group 4: Viruses (page 24)

If there are more than 20 children in the class, then the same content can be given to two groups as well. However, the number of children in each group should not exceed five.

	Teacher's Role: As the children are working in groups, make sure each one of them is performing their assigned roles. As they would be giving presentations on their specific content, ensure that they are loud enough and the rest of the children are following. Encourage the children to ask questions from the presenter. Now consolidate the discussion with the following activity. Make three stations in the class or the science lab. Each station should have two microscopes with three slides of: bacteria, virus and a third one for a piece of bread with rotten fruits. Put proper tags of bacteria, virus and fungi on it. Ask the students to observe each one by one and note down their observations.
10 mins	**Recap:** Now recap the whole lesson in the form of a discussion. Starting from microbes to bacteria, fungi and viruses, relate the discussion to their observations of the slides and food which will strengthen their understanding. Ask the students to read pages 20–24.
	Evaluation: An oral quiz could be taken by making the same groups as the teams. The worksheet **Microbes** could be used for the purpose of evaluation.

LESSON 2: 40 mins

5 mins	**Warm up:** Begin the discussion by talking about illnesses. Elicit response by asking them the names of some other diseases and their causes. Every time the weather changes, children get ill. They get fever, influenza and cough. Take these incidents as points for discussion in the class. Ask them the reason behind illnesses being caused due to the change of weather. Help them recall and discuss what they have learnt about bacteria and viruses in the previous lesson. Tell them that with the change of weather, some microorganisms get activated (multiply) and cause diseases.
25 mins	**Main Lesson:** Use the enlarged images given on page 25 or some other images of human infections without the caption. Show them each image and ask them what they have observed.

	Now show them the captions and explain that the pimples on our skin are caused by bacteria, rashes are caused by viruses and nails get infected by fungi. Tuberculosis (TB) is a life threatening disease caused by bacteria and polio is caused by a virus. Ask them if all these microbes are so much harmful, why Allah has made them? Tell them there is no such thing in the world which is created by Allah without a cause. Similarly microbes are also very useful. Explain them the preparation of yogurt (bacteria obtained from sour yogurt) and bread (yeast) need microbes. Our stomach has some useful bacteria that help us digest food.
10 mins	**Recap:** Write the heading Microbes on the board. Draw two columns under it, labelling one 'Useful' the other 'Harmful'. Ask questions about how microbes can be useful and harmful and then and jot down their responses on the board. Summarize the main points in the end.
	Evaluation and Activities: Exercise 1 and 2 on page 29 can be used for the purpose of evaluation as class test. An interesting crossword puzzle (on page 29 of the pdf file) can be printed from this weblink: http://www.e-bug.eu/lang_eng/primary_pack/downloads/UK%20Junior%20Pack%20Complete.pdf The children can also play this game to reinforce their understanding about microbes through the following weblink: http://www.sciencekids.co.nz/gamesactivities/microorganisms.html

Answers

Exercise 1

a. Microbes

b. Useful

c. Bacteria

d. Virus

e. Moving

f. Virus

g. Mildew

Exercise 2

a. Microorganisms are extremely tiny living things that can only be seen by microscope.

b. Infection is the invasion and multiplication of germs in our bodies.

c. Infections can be prevented by following good hygienic procedures, such as washing your hands before eating food, after going to the toilet and even after coming from the playground as well.

d. Yes, they are useful for making bread and yogurt.

Unit 2

Chapter 4

Insects and birds

Objectives	By the end of the chapter, students should be able to: • differentiate between vertebrates and invertebrates • describe the characteristics of insects • explain how insects are significant to plants and humans • identify and describe the characteristics of birds • discuss the roles of insects and birds in the environment
Vocabulary Bank	vertebrates, invertebrates, mollusc, larva, pupa/cocoon, cold-blooded, warm blooded, species, adapting, ants, termites, beetles, antenna, thorax, abdomen, exoskeleton, beak, feathers, tail, extinct
Factual Bank	This could be printed in large font and be pasted on the softboard.

Insects	Birds
95% of the animals are categorized as insects, that means there are only 5% animals in the world that are not insects!	There are 10,000 species of birds.
There are 32 groups of insects.	Chicken is the most commonly found bird.
There are 5,000 species (sub groups) of dragonfly.	Ostrich is the largest bird with maximum 9 ft. height.
There are 20,000 species of grasshopper.	The Bee Humming bird is the smallest bird whose size is just 2 inches.

5 mins	**Warm up:** Begin by asking them to name some animals. The students will start by naming cat, dog, buffalo etc. Elicit previous knowledge by asking them what vertebrates and invertebrates are. Ask them if they think that most animals are mammals. Why? What are the characteristics of mammals? You will Probably get a mixed response.
35 mins	**Main Lesson:** Now, ask them to do the following activity. Working in pairs, ask the children to take a single leaf of notebook size paper and write as many names of animals as they can on one side. Instruct them to be specific, like instead of writing 'bird', write 'pigeon' or 'sparrow' and instead of writing 'insect', write 'cockroach, spider, ant' etc. Give them a good ten minutes to think about animals, help them out if they are unable to translate into English. Give them hints about some common birds and insects. Do visit the following links to enhance your vocabulary before proceeding to the class. http://www.urdu-english.com/lessons/beginner/animals http://www.urdu-english.com/lessons/beginner/insects http://www.urdu-english.com/lessons/beginner/birds Now ask them to count all mammals, birds and insects separately. You will surprisingly notice that the number of insects and number of birds exceed the number of mammals. Here, you will announce the opening of the lesson on insects and birds and share the factual bank with the class. As they have done the life cycle of the butterfly earlier in lower classes, ask them about larva and pupa. Show them the figure on page 31 and reinforce it through discussion. The diagram on page 32 should be drawn on the board, followed by an explanation about the various parts if an insect. Ask them if they ever thought of the world without insects. *What would we be missing without insects?* First of all honey and then fruits, because pollination highly depends on insects. *What else do you think insects are useful for?*

5 mins	**Recap:** The crossword puzzle on page 22 can be printed from this weblink: http://www.muhlenberg.edu/cultural/graver/k-12outreach/insectsdontbugus.pdf

LESSON 2: 40 mins

10 mins	**Warm up:** Begin the new day with a brief discussion on insects, then take the children into open space, where they can see the sky and birds. Ask them to observe the difference between birds and other animals. *Bird's have a backbone, they fly, have large wings, they are of different sizes, they have two legs.*
25 mins	**Main Lesson:** As the children come back, discuss their observations. If they do not come to a conclusion themselves (i.e. they fly together), ask them why are you asked all the time to make a line, walk in a line and come back to the class in line. Obviously, to make you disciplined and united. Similarly, birds also live together and are termed as "team players". Ask them about the features of birds. What are their specific characteristics? *Birds have a beak, wings to fly, feathers, two legs, and a backbone*...Simultaneously draw a figure of a bird and label it. Tell them how birds keep themselves warm by trapping air in their feathers. You can bring a a bird like pigeon or Australian parrots to the class and show them their characteristics, especially the food they are dependent on. Ask them if they have pet birds, and what do they do and do not eat. *Birds have an important role in the environment. Can you think why?* *Birds like chicken, turkey, duck give us meat and eggs.* *They make good pets, like parrots, pigeons, finches, etc.* *Some birds eat harmful insects.* *Birds of prey eat mice, rats and other animals that destroy a farmer's crops.* Read pages 33 and 34. Let's Find Out for Ourselves may be given for homework.
5 mins	**Recap:** The following exercise may be used to evaluate students. Working in pairs, write down the differences between birds and insects.

INSECTS	BIRDS
No backbone	
Six legs	
Exoskeleton	
Cold blooded	
Three body parts	
Wings	

Further Activities:

The following weblink could also be used to cut and paste pictures of invertebrates for the softboard in the classroom:

http://cdn.orkin.com/downloads/invertebrate-photographs-template.pdf

The following weblink is helpful in preparing flash card of the names of insects and birds.

http://thebingomaker.com/bingo-cards/animals-bingo-cards/insects-and-bugs-bingo-cards/Insects-and-Bugs-bingo-cards.pdf

Evaluation:

The Worksheet **Insects and Birds** can be given to evaluate students.

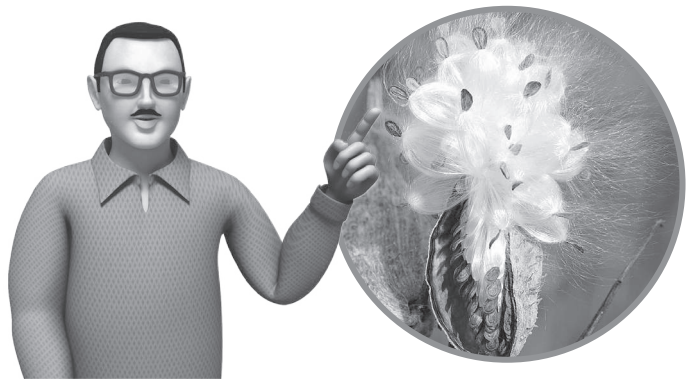
Answers

Insects	Groups/Orders	There are 32 groups of insects. There are 5,000 species (sub group) of dragonflies and 20,000 species of grasshoppers.
	Structure	They have six jointed legs, two antenna, head, thorax and abdomen.
Birds	Species	There are 10,000 species of birds. Chicken is the most commonly found bird. Ostrich is the largest bird with maximum 9 ft. height. Bee Humming bird is the smallest bird whose size is just 2 inches.
	Features	They have a beak, feathers and a tail.

Unit 2

Chapter 5

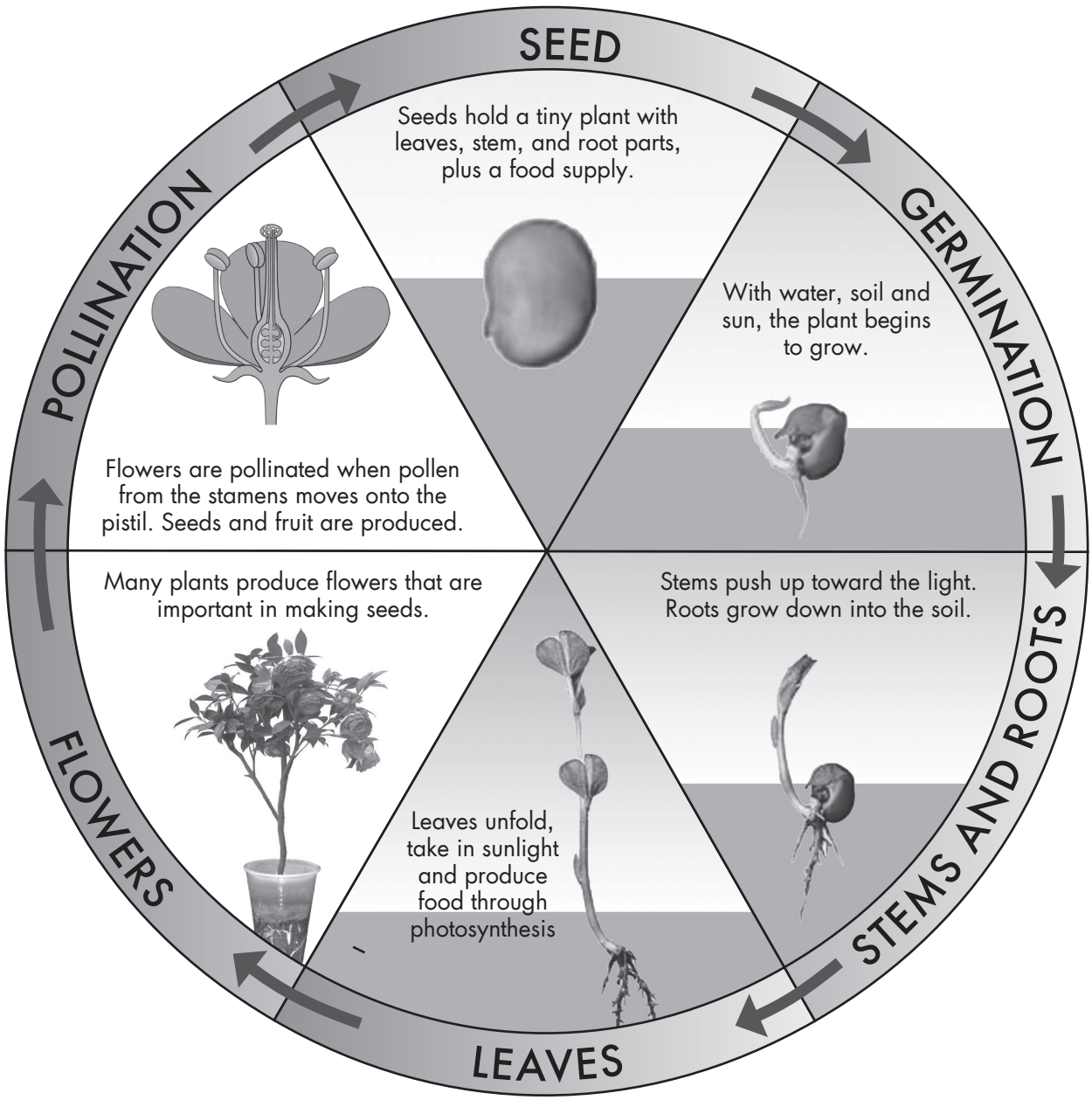
Life cycle of plants



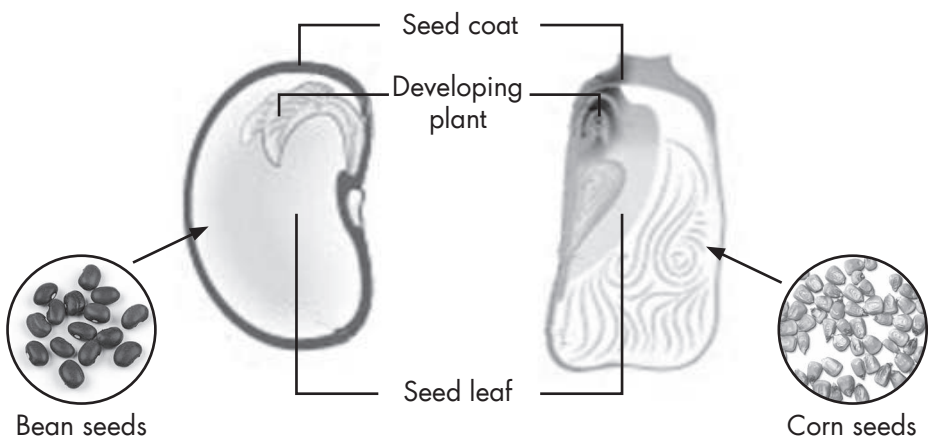
Objectives	By the end of the chapter, students should be able to: • state the meaning of 'life cycle' • explain the life cycle of a pumpkin plant • name and identify some common seeds • describe the structure of a seed • label a diagram of a seed showing embryo, cotyledons, endosperm and seed coat • identify monocotyledon and dicotyledon seeds • describe the germination of a seed • state various modes of dispersal of seeds • identify and label different parts of a flower • observe and discuss pollination • define fertilization in plants • describe the pollination in plants
Vocabulary Bank	sprout, embryo, endosperm, seed coat, monocotyledon, dicotyledon, germination, dispersal of seed, pollination, fertilization
Preparation and Resources	Bring two of your own childhood pictures. Collect seeds of corn, coriander, grape, beet, poppy, sunflower, kidney beans and pumpkin seeds. Put them in small plastic bags and staple on a chart paper with labels. Some pumpkin seeds soaked three days earlier and a pumpkin as well. Enlarge the 'Life Cycle of Plant' diagram (page 39) and structure of a dicot seed (page 40) and paste it on chart paper to display. For the second lesson, the children should be taken to the computer lab. Make sure no more than three children are working on one computer in order to learn the content well.

Ideas for the Softboard:

Enlarge the image below and put it on a flip chart for the children to observe.



5 mins	**Warm up:** Set off the lesson by sharing some of your own childhood pictures and sharing some old memories. Tell them that at the age of two years, you could walk and run but could not talk properly. By four years, you started going to school. When you finished schooling, you were big enough to do all your personal work independently. And, now with age you can walk briskly but not run well. Ask them if they feel some changes in their lives as well. Then ask them about other living things. Now, show them the jar of kidney beans, and the sprouts coming out of the bean, indicating some changes.
30 mins	**Main Lesson:** Ask them to do silent reading of page 38 and 39 of the textbook. In the meantime, set up the seven seeds mentioned in resources on seven different places in the class. Ask them to make a queue and carefully observe each type of seed while noting down their name in their notebooks. As they all get back to their seats after observation, ask them to describe each type of seed. Encourage them to discuss them in terms of colour, shape, and texture of the seeds shown. Now ask them the names of the seeds and make sure after the discussion they are able to name them correctly. Now focus on the pumpkin seeds and ask if they are alive or not? Then show them the sprouts of pumpkin seeds and then the pumpkin itself. Tell them the process of sprouting of seeds or growth of seeds is called germination. (They have done in their lower grades.) Pass them the sprouting seeds and explain the structure of a seed with help of the diagram on page 40. The following diagram can also be enlarged and shown to them to help them differentiate between monocotyledons and dicotyledons.



	Visit the following websites for help on sprouting seeds: http://www.sproutpeople.com/seed/print/pumpkin.html http://www.vegetariantimes.com/blog/how-to-soak-and-sprout-nuts-seeds-grains-and-beans/
5 mins	**Recap:** Use the enlarged figure of the plant life cycle to summarize the lesson. Discuss what they have observed. They learn best while observing and doing. Ask them the following questions orally: 1. *What are seeds?* 2. *How do they turn into plants?* 3. *Name some seeds with their shape and colour.* 4. *Describe the different parts of a seed.* 5. *Differentiate between monocotyledons and dicotyledons.*
	Reinforcement: Ask them to do Exercise 2 of Page 45 at home. Encourage them to soak seeds at home and note down their observations.

LESSON 2: 40 mins

10 mins	**Warm up:** As they have learnt about seeds, show them the sprouts and ask them what if they had not soaked the seeds themselves, what would have happened to them? Ask them what do they do with the seeds after eating fruits. Discuss that some seeds are carried away through wind and water. Some seeds are eaten by animals and are excreted. The waste products get dumped in landfills and the seeds get buried. When the bees move from one plant to another, they also carry seeds.
30 mins	**Main Lesson:** Ask them to do silent reading of page 40–42 before they proceed to the computer lab. Show them an interesting animation related to dispersal of seeds from the following weblink: http://www2.bgfl.org/bgfl2/custom/resources_ftp/client_ftp/ks2/science/plants_pt2/dispersal.htm

	Ask them to do the labelling activity from the weblink: http://www2.bgfl.org/bgfl2/custom/resources_ftp/client_ftp/ks2/science/plants_pt2/parts.htm Now show them an interesting video on pollination: http://vimeo.com/6965266
5 mins	**Recap:** As they have seen the video and done an activity on the dispersal of seeds, pollination and parts of a flower, ask them questions and ensure that they have grasped the concepts well.
	Evaluation: The worksheet **Life Cycle of Plants** may be given to evaluate the students.

Answers

Exercise 1

a. Stem b. Root c. Ovules d. Petals e. Fruit

f. Leaves g. Endosperm

Exercise 2

Answers will vary depending upon the flower used.

Exercise 3

a. Monocots have one leaf like structure, whereas dicots have two.

b. Endosperm provides food to the seed, so the seed would die without food.

c. It protects the seed from drying out.

d. Fruits are important for the purpose of dispersal of seeds.

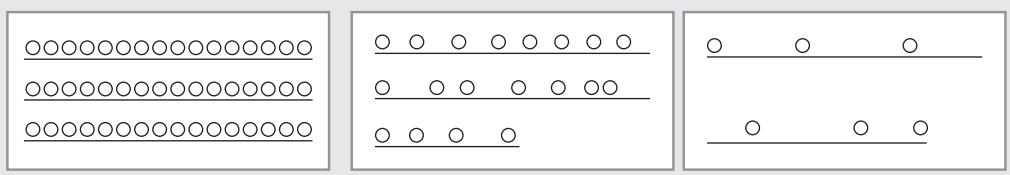
Unit 3

Chapter 6

Gases around us

Objectives	By the end of the chapter, the students should be able to: • identify the differences between solids and gases • observe how gases are different from solids and liquids • describe the properties of gases • state the composition of air • prove that air has mass (weight) • appreciate the presence of air in the environment • recognize the uses of air in our daily lives
Vocabulary Bank	matter, solids, liquids, gases, volume, molecules
Resources	Some ice cubes in a glass, water in a glass with three different shaped containers, three balloons of different shapes and a room spray; at least four balloons of the same size and two long sticks, a piece of sponge

Softboard Ideas



Solid Liquid Gas

Solids	Liquids	Gases
Maintain their shape	Take shape of the container	Move freely and escape
Fixed volume	Fixed volume	Can be compressed
Don't flow	All liquid flow	All gases flow

5 mins	**Warm up:** Write the word 'matter' on the board. Ask the students what comes to their mind. Write their answers on the board. Ask them about the main states of matter. Point to the desk. *This is a solid . The water in your bottles is a liquid. Now breathe in deeply and let it out. The air we breathe is a gas.*
30 mins	**Main Lesson:** Bring the resources mentioned above to the class. While setting the experiment, ask them to make a large circle in the class and observe the objects on the desk. Show them the cubes of ice and transfer them to different shaped jars. Ask them if they see any change in the shape of the cubes. Do it several times, so they observe well. Next, pour the water into different shaped containers and ask them how the water fits in all of them. In the end, go to one corner of the class and spray the air freshener. Ask them if they smelled anything. Leave the ice cube in a small tray. Ask them questions regarding their observation. Give them some clues. *What difference did you observe between the ice-cubes and water. Why were they able to smell the fragrance of the air freshener from a distance?* Ask them to discuss with their partners about the different nature of the three substances. Help them develop critical thinking by asking questions randomly regarding their observations With help of the diagrams of solid, liquid and gas molecules you have prepared for the softboard, explain to them how the molecules are packed together in the case of solids. Show them the duster, that it has a fixed shape and size. *But what has happened to those ice cubes? The cubes must have melted by now.* Show them the melted cubes. Tell them solids change to liquid and the process is called melting. Talk about liquids, various drink bottles, they are all different shapes and size. *What happens when water is kept in the freezer?* It becomes solid again and the process is called freezing. As the gas molecules are free to move, so they scatter quickly, as in case of the air freshener. Ask them for examples of gases. Tell them that the empty space around us is all filled with air. Although we can't see air, we can feel it. Read page 46 and 47.
5 mins	**Recap:** Matter may be solid, liquid, or gas. A solid may melt and change its form into liquid. A liquid may be frozen to form a solid. Air is a gas. It has weight and volume. Gases are mostly invisible. Gas molecules fill up the available space. Gases flow very easily from one place to another and may be compressed easily. Ask the students to work in pairs and prepare a list of solids, liquids and gases. Each pair will then share their responses and describe its characteristics.

5 mins

Warm up:

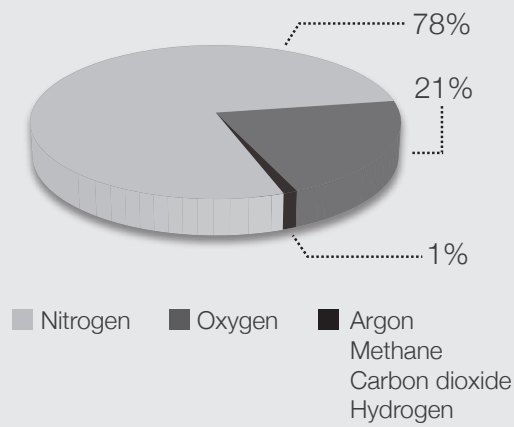
Initiate the lesson by asking the students to quickly jot down the name of some gases around them in their homes and outside. Prompt them by asking relevant questions. *Can you think of any gases in your home or outside?* Sui gas for the stove, geyser, heater, CNG (Compressed Natural Gas) in vehicles, coolants in the refrigerator or air conditioner, petrol, LPG (Liquefied Petroleum Gas), air in the tyres of the vehicle and ventilator in the kitchen (meant for sucking hot air) etc. are all examples which may be brought up.

30 mins

Main Lesson:

As they talk about air, ask them, *"What exactly is air?"*

Explain that air is a mixture of different gases. Ask them to name some gases. Oxygen would be a natural answer. Ask them if they have heard of any other gas. Show them the diagram of composition of air and describe it and disclose that although oxygen is extremely useful but it is only 21%. Explain that the other gases perform important functions in to maintain ideal conditions of the Earth's atmosphere.



Practical Activity

Discussing the qualities of air, ask if air is light or heavy. *Do you think air has weight?*

Seek help from a child and blow two balloons. Stick each to the end of the hanger and tie the hanger to the centre. Make sure that the two balloons are balancing each other. Now prick one of the balloons and show them how the inflated one became lighter and moved upwards. This experiment proves that air has mass (weight).

As the children love balloons, take this opportunity to discuss how air is a blessing. Switch off the fan and as they start feeling hot, switch it again. Tell them how it soothes us, the air helps us lowering the temperature. Give them the example of vacuum cleaners used to clean carpets. Then pour some water and wipe it off with a sponge, showing that the air trapped in the sponge helps to absorb water.

Read pages 48–50. Discuss Real Life Bites on page 55 together.

5 mins	**Recap:** Draw the molecular diagrams of solids, liquids and gases on the board. Ask the children to elaborate it by giving concrete examples. Briefly review the properties of air and its uses.
	Evaluation: Ask the children to do Ex 1 and 2 on pages 51–53. Give them specific time (exactly 10 minutes) for doing this activity, so that their assessment is reliable. The worksheet **Gases Around Us** is an extension to the chapter, therefore it could be given as a library assignment.

Answers

Exercise 1

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

Exercise 2

a. Gas b. Liquid c. Solid d. Liquid and gas e. Gas
f.Solid g.Liquid h.Solid i. Gas

Exercise 3 (I)

It will become smaller because the gas particles will become closer and occupy less space.

The amount of water will decrease because of evaporation

It will be difficult to squeeze it, since it is sealed and air cannot pass through.

It will be difficult to squeeze it, but it is possible. The pressure of air in the empty syringe will make the cap sealing the syringe pop out.

Exercise 3 (II)

True, because the balloon is moving downwards.

True, because it gets energy from heat and move faster to promote evaporation.

True, mountain is solid and water is liquid.

False, because it is showing condensation.

True, because liquids flow and take the shape of their container.

Unit 3

Chapter 7

Changing state

Objectives	By the end of the chapter, students should be able to: • observe and discuss the changes in states of matter in everyday life • identify the condensation and evaporation process of water in daily life • state the properties of water • describe the water cycle in terms of evaporation, condensation and precipitation • communicate their observations and understanding in the form of a poster • discuss and present the various stages of the water cycle
Vocabulary Bank	water cycle, condensation, precipitation, evaporation, transpiration, water cycle, hail

LESSON 1: 40 mins

5 mins	**Warm up:** Think about any event that has taken place recently in school involving water. It could be a water spill, watering of plants or a floor wash. Ask where the water goes. *You must have seen water disappearing, like when we hang our clothes after washing. What happens to the water in clothes?*
25 mins	**Main Lesson:** Set up the apparatus prior to the lesson. Proceed with the following demonstration. Take a beaker and put some ice cubes in it. With the help of a stand, place a thermometer in it. Note down the temperature. Now with the help of a tripod stand, place a spirit lamp under the beaker. As soon as the ice starts melting, note down the temperature and note down when all of it melts. Mark the level of water with help of a permanent marker. Now, keep heating the beaker and observe the rise in temperature as some steam starts coming out of it. After five minutes, observe the level of water again.

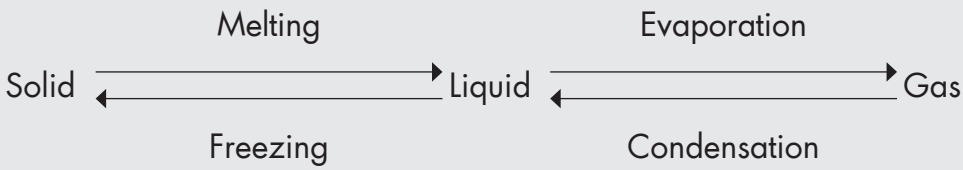
Ask them what happened to the water. Why did the level decrease? Give them time to discuss and think. Now explain that water exists in three states.

Ice cube ➡ solid (water freezes at 0° C)

Water ➡ steam (water boils at 100° C)

To recall and connect what has been discussed in the previous lesson, draw this diagram on the board and explain the conversion of states.

Now ask them where we should write gas. Complete the diagram appropriately.



Introduce the term 'evaporation' as they have observed water evaporating from the beaker.

Tell them when clothes dry easily, it is usually summer, when the temperature is higher.

Now show them a pressurized perfume/deodorant bottle, ask them to press the nozzle by pointing it in the air. As soon as it is pressed some gaseous substance spreads. Ask them why it seems to be liquid in the bottle. *Because of the high pressure (machine fitted cap) it is compressed to look like a liquid; as soon as it gets an outlet by being released into the air, it changes into a gas again.*

Safety

Take utmost care when performing the demonstration. Keep the thermometer, glass apparatus, hot lamp and water away from children.

Be careful with pressurized cans. Spray under your supervision and make sure that it is not sprayed towards anybody's eyes or face.

Lesson 2: 80 mins (40 + 40)

5 mins	**Warm up:** Begin the new day with a recap of the previous lesson, focusing on the conversion of three states.
30 mins	**Main Lesson:** This will be a jigsaw group activity. Advance Preparation: Prepare five flash cards with help of the following information from the book. **1. Water cycle** Cycle means going on and on. The water cycle is actually based on the fact that water exists in three different states, i.e. solid, liquid and gas. With the change of temperature, it changes its state too. In this way it keeps on moving round and round like a cycle. Drying of spilled water, formation of clouds and rainfall are all different stages of the water cycle. **2. Evaporation** Evaporation is the process by which water changes into vapour (gaseous form). It takes place all the time but it increases in the day because of higher temperature. Water in all the water bodies (lakes, streams, rivers and oceans) keeps on changing into vapours. **3. Condensation and cloud formation** As the water rises high up in the air, it comes across cold air. The air higher up in the atmosphere has lower temperature. Because of the lower temperature, the water vapours change into water droplets. These water droplets collect high up in the air in form of droplets, which is called condensation. **4. Precipitation (Rainfall/snowfall)** The clouds are made up of water droplets and they get bigger and bigger. As they become heavier they cannot hold themselves high up in the air and fall down. This falling of heavy droplets is actually called raining. If the temperature is very low, i.e. below 0°C, then this can result in snowfall as well. Therefore, this falling of droplets in the form of rainfall and snow known as precipitation. **5. Collection** The water that falls in the form of rainfall seeps into the ground. As the water goes deep and deep, it finds its way to different streams, lakes, rivers and ultimately the sea. This collection of water in lakes, streams, rivers and sea is called collection.

	Divide the children into five groups. The number of children in one group would depend on their total number. Get A4 size sheets in five different colours. The total number of sheets required would depend on the total number of children. Suppose, if there are 30 children in class, you would require six sheets of each colour. Number each coloured sheet from 1–6. Each group should be given 6 sheets of the same colour. Give each group a flash card and 6 coloured sheets of paper. Ask them to read the information together. Each individual member of the group will prepare a poster (A4 size) to express the concept in the form of a drawing. Give them 15 minutes for this activity. When the sheets are all numbered, ask all number 1s to come together, all 2s together and so on. In this way new groups will be formed and each group will have children carrying different coloured posters as well as the theme. Now ask them to silently read page 59 and 60 from the textbook and then arrange the sheets in order from 1 to 5 with help of discussion in their groups. Ask the children to present the posters to the whole class by putting them on the softboard or whiteboard. Provide them with thumb pins or sticky gum. As they show their work, help them explain by rephrasing their sentences and adding to their explanation. The first group might face some problems in explaining but as they proceed ahead, they will improve.
5 mins	**Recap:** With the help of a diagram on a flip chart with the water cycle pasted on it, discuss the water cycle with them. Ask them random questions to ensure their understanding.
	Evaluation: Exercise 1 and 2 can be given for evaluation purpose or the worksheet **Changing State** can also be given.

Answers

Exercise 1

1. c 2. b 3. c 4. b

Exercise 2 (I)

a) Evaporation is the process in which a liquid changes into gas and condensation is the process when gas change into liquid.

b) Some liquids evaporate faster because of their low boiling point.

c) By increasing temperature and helping water to evaporate.

d) They keep the temperature low during summers.

e) It rains or snows.

Exercise 2 (II)

a) Evaporation

b) Condensation

c) Condensation

d) Evaporation

Unit 4

Chapter 8

Pollution

Objectives	By the end of the chapter, students should be able to: • identify the different kinds of waste produced by human activities • define pollution and classify kind of pollution • describe the causes of air pollutio • explain the cause of acid rain • define water pollution with its causes • discuss the hazards of water, land and noise pollution
Vocabulary Bank	waste, pollution, pollutants, hazardous, fumes, smog, land pollution, air pollution, noise, water pollution, contamination, deterioration, depletion, chemicals, resources, marine (life), biodegradable, non-biodegradable wastes

LESSON 1: 40 mins

5 mins	**Warm up:** The following webpage opens up with the song "The Earth is My Home", listen with the children and discuss the message in this song. http://www.kidsforsavingearth.org/ The song may be downloaded directly from the following link as well to play in a school/assembly presentation: http://www.kidsforsavingearth.org/rocktheworld.html Ask them the name of the greatest enemy of Earth. Help them focus on one word, i.e. **pollution.**
30 mins	**Main Lesson:** Use the following KWL technique to conduct the lesson.

What do you know? (K)	What do you want to know? (W)	What have you learnt? (L)
	What is pollution? What are the different types of pollution? What is air pollution? What are the hazards of air pollution? What is acid rain?	

Make three columns on a flip chart as above. You might need two to three flip charts. Put all information neatly and in legible handwriting to refer back to. You might come across a different set of questions for the second column, but try to focus on these questions.

Now ask them what they know about pollution. Give them a free hand to tell whatever they know about it. Ask them to name things related to pollution. *Can you give some examples of pollution in your surroundings?*

Then enquire what can be done about it. In this way, you would have an idea about their understanding. Now ask them what else you want to know about pollution. They might not come up with answer. *Do you know how many types of pollution there are?* Similarly ask them what are the disadvantages of pollution. Put the one they can't answer in the middle columns. Ask them as many questions as you can related to the topic e.g. ask them if they know what acids are or ask them if they have heard of acid rain.

Now initiate a discussion on the city's condition. Ask them what they like about their city and what they don't like. Most of them would be talking about the condition of cleanliness. Tell them all waste is not pollution, but the one which upsets the natural environment is considered 'pollution'.

Read page 64–65 in class, explaining any vague or difficult terms.

Identify the types of pollution by discussing our city's condition again, especially focusing on air. Talk about vehicles emitting gases containing harmful substances. Recall that some of the vehicles discharge harmful gases, that go high up the atmosphere and get mixed with water, thus forming acid rain. *Acid rain occurs very often near industries because industries emit some harmful gases. Acid rain contains sulphuric and nitric acid that make the soil infertile. As this water goes into river or lakes, and then it destroys marine life as well.*

In this discussion you should only be focusing on pages 64–65.

5 mins	**Recap:** Now refer back to the questions on the flip chart related to pollution, types of pollution and air pollution. Ask questions and jot the answers in the third column.
	Home Assignment: Ask the children to read page 66 and 67 at home.

LESSON 2: 40 mins

5 mins

Warm up:
Kick start the day with a quick recap of the flip chart and focusing on water and land pollution. Apart from air pollution, what other types of pollution are there? Prompt them to think of air and water.

What do you know? (K)	What do you want to know? W)	What have you learnt? (L)
	What is water pollution? What are the hazards of water pollution? What is land pollution? What are the hazards of land pollution?	

20 mins

Main Lesson:
Discuss the sources of water of pollution. *How is our sea is getting polluted?* They might respond that rubbish is being thrown by the citizens. Ask them about chemicals and their possible sources. *Where do you think oil and chemicals are found in the sea?* Tell them how industries get rid of their waste, which are chemicals, by dumping them into rivers and streams.

Share the incident about the oil spill of 2003, when a lot of fish and other marine (water) animals died at the Karachi beach at Sea View. Elaborate how water pollution can be harmful to marine life. You may show them images from the internet of 2003 *Tasman Spirit* oil spill.

Talk about different diseases caused by water pollution, e.g. dengue fever, which is caused by mosquitoes fed on standing water. *Where do you think solid waste (garbage etc.) is taken away?* Tell them it is dumped outside the city and because of non-biodegradable wastes (like plastic bags and some harmful chemicals), it

	causes land pollution. When dumped, it pollutes the soil and is causes problems for the animals living in the vicinity. Refer to the pictures on page 66 or 67 throughout the lesson.
5 mins	**Recap:** Now refer back to the questions on the flip chart related to water and land pollution. Ask the questions from the students and jot them in the third column.
	Home Assignment: Ask the children to read page 68 at home.  2003 Tasman Spirit oil spill

LESSON 3: 40 mins

5 mins	**Warm up:** Record some irritating sounds in a MP4 or your cell phone, like some drilling sound, hammering or a loud horn sound. Play the audio several times. *How does it feel?* Discuss how noise pollution is a growing problem of cities.
15 mins	**Main Lesson:**

What do you know? (K)	What do you want to know? W)	What have you learnt? (L)
	What is noise pollution? What are the hazards of noise pollution?	

Talk about the problems related to noise, discuss how constant, irritating sounds hinder interaction among people. It makes people irritated and

	especially during driving, people lose their temper. Focus on hospitals, where people are in distress. Talk about the effects of noise pollution on our health. Deafness is caused by noise pollution. Now refer back to the flip chart and review the questions on noise pollution. Discuss the answers and jot them down on the flip chart. Reinforce all content by summarising the chapter with help of KWL flip charts. Place the flip charts in a position where all children can see them well.
20 mins	**Recap:** Do Let's Find out for Ourselves together as a class. Exercise 2 may be given as a group assignment.
	Evaluation: Ask the children to do Ex 1 from page 70.
	Other Acitivities: Visit the following to hear the interesting story of Kanpur India: http://resources.primarysource.org/content.php?pid=337082&sid=2757052
	Project Ideas: Divide the students into four groups. Assign each group a type of pollution (air pollution, land pollution, water pollution, noise pollution). Ask them to develop an awareness program, by preparing posters and presentation about the sources and hazards of that kind of pollution. Also, focus on how to take care of our environment. They can walk through the school with their posters, hold group discussions during break or present their project in the morning assembly.

Answers

Exercise 1

a) Polluted air slows down the growth of plants and they become very weak.

b) Pollution is also caused by over-using technology, like computers, television etc. Even we are not working on the computer, we leave it on.

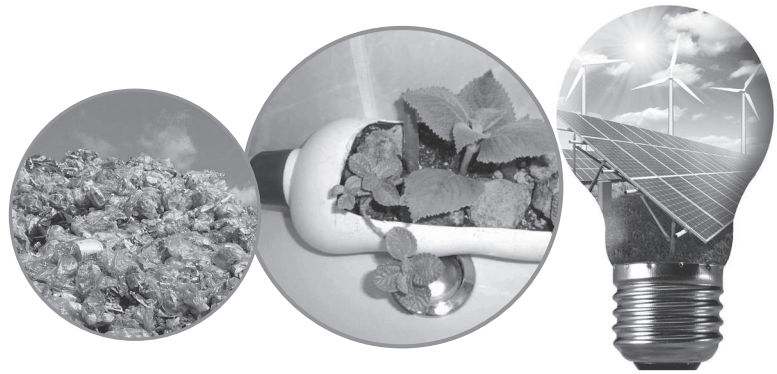
c) Air pollution causes respiratory problems and allergies when humans inhale the polluted air. It is harmful for plants and causes them to become weak and die. Pollution in the air causes the temperature to rise as well.

d) If a land is barren, no new crops can be cultivated.

Unit 4

Chapter 9

Fighting pollution

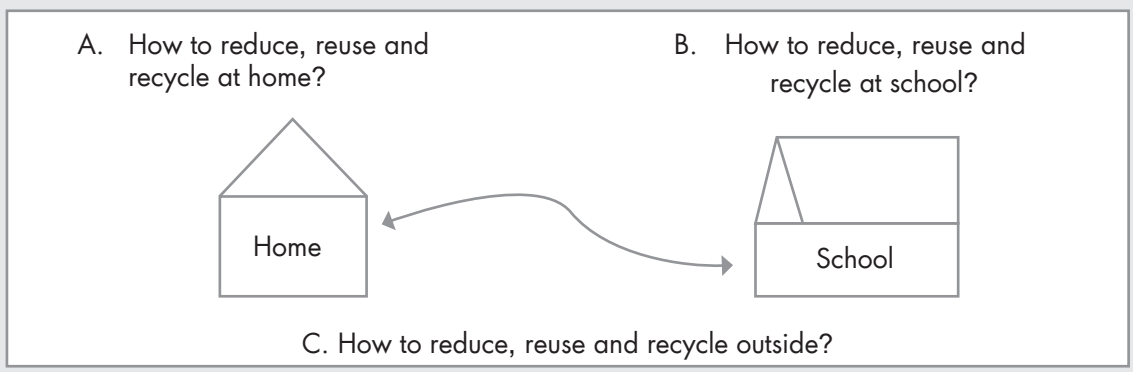


Objectives	By the end of the chapter, students should be able to: • identify the sources of waste • discuss the reason of increase in amount of waste produced • identify some natural waste and their sources • define biodegradable waste with examples • explain that biodegradable waste is safe for the environment • define non-biodegradable waste with examples • explain the reason why non-biodegradable waste is a risk to environment • discuss the ways to make our planet a heaven • inculcate the habit of recycling and reusing • describe the ways to reduce the waste of resources • encourage others to conserve resources and energy
Vocabulary Bank	energy, industrialization, resources, natural wastes, chemical wastes, biodegradable, non-biodegradable, decay, rot, plastic, reduce, recycle, reuse, compost, fossil fuels
Resources	fruit peel, rotten vegetables, old shoes, newspapers, and used tissue papers, empty cartons of juices, wrappers, straws, plastic bottles, empty perfume bottle, Styrofoam (thermopore) cups and plastic shopping bags

LESSON 1: 40 mins

5 mins	**Warm up:** Let the children anticipate the topic by creating a mess in their classroom. Bring some fruit peels, rotten vegetables, old shoes, newspapers, and used tissue papers, empty cartons of juices, wrappers, straws, plastic bottles, empty perfume bottle, Styrofoam cups and plastic shopping bags. As they will enter in the class, they would be surprised to see the filthy classroom. Help them clear the mess and simultaneously ask them questions about where this mess has come. Put two big

	cartons and help them place all degradable items in one carton and non-biodegradable ones into the other one, without mentioning there two terms. *Place natural waste items in Box 1. Put other items in Box 2. Now see, isn't paper made from a natural source? Place all paper items in Box 1.*
25 mins	**Main Lesson:** As they have cleared up the mess discuss the reason of increasing waste. Talk about your childhood, when mineral water bottles were not readily available. People used to prefer homemade food in a lunchbox rather than buying readymade food in a plastic bag. Now tell them the waste is a natural by-product of all human activities. However, it could harm our planet if it does not break down naturally. From the waste collected in two cartons, show them the peel of fruit. Ask them what happens to fruits, when they are kept for long. The fruits get rotten, turn soft and sticky. If the peels of fruits and vegetables are buried underground, they serve as excellent fertilizer for plants. If anything goes back to nature it is called **biodegradable.** Then, show them plastic bags and plastic bottles. *Will they would go back to nature? No, they cannot be break down naturally. Therefore, these things are non-biodegradable and harmful for the environment.* Now write down 'home', 'school', 'hospital' and 'restaurant' on the board. Divide the class into four groups. Allocate a topic to each of the group and ask them to list down all waste produce at each of the place. As they jot them down, tell them to divide the items listed into biodegradable and non-biodegradable. Give them 7–8 minutes for discussion. As they are doing this activity, help them identify as many waste materials as possible. In the end, give two minutes each to the group to share their list. Put their lists on the softboard for referring back in the next lesson.
5 mins	**Recap:** Review that waste products are biodegradable or non-biodegradable. Waste products like dead animals and plants which can rot or decay naturally and return to the Earth are biodegradable products. Those which do not decay or disappear are called non-biodegradable waste. Bio-degradable waste is 'good waste' as it benefits the soil with rich nutrients. Non-biodegradable waste is a major source of pollution and harms the environment.

5 mins	**Warm up:** Begin the lesson with help of recap of the previous lesson. Refer to the lists they prepared ask them if it is possible to do something about the waste? *How can we get rid of it in the best possible way? How can we use it to our advantage; can it be useful for us? Is there a way we can make it useful again?*
25 mins	**Main Lesson:** Focus on one list at a time and ask them what can be done. In case of school list, point out wrappers of sweets, crisps and biscuits. Tell them, it is not only plastic but a lot of energy is involved in preparing these things and they end up in creating more garbage. Industries produce gases that cause air pollution; some industries also cause water pollution. What can be done for used papers? They can be used again by recycling. Give them 10 minutes for silent reading of 74, 75 and 76. Ask them if we can contribute to save our planet from pollution. Draw a journey diagram on the board.  Take three flip charts and put one next to each A, B, C. Brainstorm for ideas and write them on the flip charts.
10 mins	**Recap:** As they have discussed all possible ways to make this planet a heaven. Revise all of their ideas and add some of your examples to them. Ask the students to take out their notebooks. *By observing the ideas on the board, write your mission statements to save our Earth.* Help them by giving your example, I, [Name of Teacher] *would be printing my notes on recycled papers, and would not use electrical machines unnecessarily. I will make sure that I switch off the lights, when not needed. I will carry my own water bottle, instead of*

	buying mineral water. I will share my car with other people to save fuel, which is a great resource. Motivate them to talk about their real life and focus on ways to reduce, reuse and recycle. Worksheet **Fighting Pollution** can be given for homework.
25 mins	**Evaluation:** This chapter focuses on creating awareness about the issues related to increasing pollution. Therefore, it is preferable to evaluate it on the basis of skills and attitude only. Encourage the students to make log of all the activities which they did intentionally for saving our planet. What did they reduce? What did they reuse? What did they recycle. Reward them in the end in the form of certificates for 'Mr' or 'Miss' Green. This is an excellent motivational activity. OR Activities from Exercise 4 page 79 can be assigned to different groups in class.

Answers

Exercise 1

a) Recycle

b) Going green

c) Reduce

d) Prevent

e) Reuse

Exercise 2 (I)

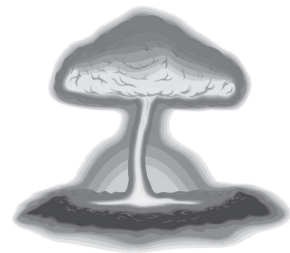
a) By reusing, recycling and repairing old material instead of throwing and replacing can truly decrease pollution. (examples may vary)

b) Cornstarch is added to make it bio-degradable. It will be eaten away by tiny insects and microorganisms ultimately degrade.

Unit 5

Chapter 10

Energy and its forms



Objectives	By the end of the chapter, students should be able to: • define energy • understand the significance of energy • state two major types of energy • name some common forms of energy • define kinetic, sound, heat, nuclear, light, chemical, electrical, gravitational and elastic potential energy with examples • recall the law of conservation of energy • describe the conversion of energy with examples • inculcate the habit of conservation of energy
Vocabulary Bank	energy, work, kinetic energy, potential energy, nuclear energy, mechanical energy, gravitational energy, chemical energy, harnessing energy (to make use of a resource for a purpose)
Resources	radio, electric iron, a torch, candle, rubber band

LESSON 1: 40 mins

5 mins	**Warm up:** Initiate the lesson with help of a discussion on energy and work. Ask them questions like: *How do you feel when you wake up?* *What is the one thing your mothers force you most to do in the morning?* *What if you do not eat anything and come to school?* *After, getting back home, how do you feel?* *When you have a drink or juice, do you feel a change?*

	Through their answers and discussion, deduce that for doing each and every task in life, we need to have energy. *We obtain energy from food. Different machines get their energy from fuel, like cars and buses run on petrol or CNG. Similarly all electrical appliances present in our home need electricity. Even the hand pump to pull underground water needs energy from our hands! We get our energy from food. This is known as chemical potential energy.* In other words, we can say that no work can be done without energy and the capacity to do work is called energy.
25 mins	**Main Lesson:** Elaborate the discussion by telling them that there are different kinds of energy. The two broad types are kinetic and potential energy. Give examples of movement and staying at a height to differentiate among them. Tell them potential is further divided into chemical potential, gravitational potential and elastic potential energy. Write the names of different forms of energy on the board. Ask them to observe the following demonstration carefully and then answer the questions. 1. Switch on the radio for a while and switch it off, show them it operates with the help of a battery cell. 2. Switch on the iron, press (iron) a square piece of cloth and switch it off. 3. Switch the torch on and off; show them the battery cell. 4. Light the candle and leave it. 5. Stretch the rubber band, put a piece of paper in between and let it go. In case of the **radio**, ask them what does the battery cell provide? Show them the battery cell and show them how it connects to give energy. *What kind of energy do we obtain from the cell? The energy obtained from the cell is chemical energy which converts into sound energy when it comes out from the radio.* *In case of the electric iron, electrical energy converts into heat energy.* *In the candle, chemical potential energy (wax) converts into light and heat energy.* *In case of the torch, chemical potential energy (battery cell) converts into light energy.* *In case of the rubber band, chemical potential energy gets stored in it as it stretches up. It then changes into kinetic energy when we let it go.*

10 mins	**Recap:** Make two teams, A and B in the class. Write A and B on the board for points. Ask a child from team A to name any household appliance. Then, ask a child from team B to explain how energy conversion takes place when it starts working. Give them an example of a bulb, when we switch on the bulb, electrical gets converted into light energy.

LESSON 2: 40 mins

5 mins	**Warm up:** Write the following on the board: **Life without electricity** *What would life be like without electricity?* Kick start the day by asking the students to work in pairs, thinking for a minute about life without electricity and then discussing with their partner. Take their responses and write them on the board. Tell them we are now very dependent on electricity and facing an electrical crisis as well.
25 mins	**Main Lesson:** Ask them to read page 83 silently. Initiate the discussion through a talk about the load shedding hours and ask them what we should do to prevent it. *Why do you think load shedding happens? What are ways we can produce more energy or save the resources we have?* List down their ideas on board. Ask them about which form of energy is present in bulk but we are not using it. Explain solar, wind and hydropower as useful means of harnessing energy. Tell them they are renewable resources, meaning that they can be used again and again. The petrol, CNG and Sui gas that we are using these days would finish after sometime but water, wind and the Sun would always be there. So we should be thinking of using renewable resources only. Read pages 80–83 silently.
10 mins	**Recap:** Summarize the main points. There is an interesting video followed by an interactive game to recap the concept of harnessing energy. http://www.wonderville.ca/asset/save-the-world

	Evaluation Exercise 1 and 2 can be done orally for the purpose of evaluation.
	Ideas for the softboard and other activities: For interesting softboard ideas, visit the following link. http://www.kids.esdb.bg/newenergy.html For other interesting activities, visit the following links. http://solarwa.org/sites/default/files/basicsTeachers.pdf

Answers

Exercise 1

a) true

b) true

c) false

d) true

e) true

Exercise 2

a) Energy is the capacity to do work.

b) We only eat those substances that can provide us with energy. Therefore for all functions energy is required.

c) To change its form and conservation of energy.

Unit 5

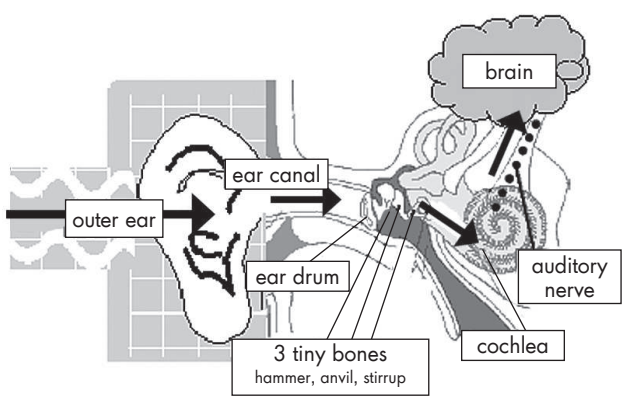
Chapter 11

Sounds

Objectives	By the end of the chapter, students should be able to: • recognize sound as a form of energy • experience and differentiate among various sounds • describe how sound is produced • define hearing • describe the role of ear in facilitating hearing • state the features of sound • define intensity of sound with examples • define pitch of sound with examples • discuss the advantages of sound
Vocabulary Bank	outer ear, middle ear, inner ear, vibrations, volume, pitch, waves, frequency, pleasant, unpleasant, auditory nerves

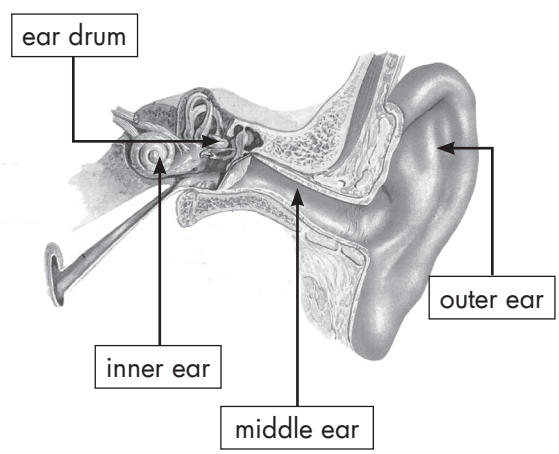
Ideas for the softboard:

How sound travels



Source: http://www.nfd.org.nz/70/How-Sound-Travels

Parts of the Ear



10 mins	**Warm up:** Use the following interesting activity for identification of sounds from the link below: http://www.scholastic.com/magicschoolbus/games/sound/index.htm If the internet resources are not available, you can use some kind of curtain to hide the things. Use multiples things like bell, spoon and saucer, blowing whistle, key chain and sand paper to produce a variety of sounds. As you make the sounds, ask them to list them with numbers. Ask them the name of the objects which produced the sounds as you finish.
5 mins	**Main Lesson:** As they identify the names of the things that produced the sounds, ask them what they noticed. *What is sound? How can you differentiate among different sounds?* Now tell them just as we cannot see heat but can feel it, similarly, sound cannot be seen but felt with our ears, the sense organ for hearing. *Sound is produced by the vibration of particles in air.* *It travels like rings of waves ripple through water in a pond or river.* *Our ear has a shape of a cone (outer ear), that collects the sound and sends it to the brain.* *When somebody is talking in a glass room, why can't we hear what they are saying?* *It happens because sound needs some medium to travel and as air cannot pass through glass, we can't hear anything. Similarly, sound does not travel in vacuum, because vacuum means no air at all.* Now explain the structure of the human ear. With help of the two figures mentioned above, explain that the ear can be divided into three parts: *The outer ear is the cone-shaped skin.* *The middle ear comprises of the canal leading to the inner ear.* *The inner ear consists of bony structures connecting to the brain with help of nerves.* *The sound is collected by the outer ear, strikes on the ear drum which is stretched skin. The vibration of the ear drum causes the tiny bones to move, that is carried forward to the brain with help of auditory nerves.* You can ask them to feel the vibration of sound by asking them to put their rulers at the edge of the edge of their desks and pressing them down and letting go.

5 mins	**Recap:** Recap the lesson by asking questions: *What is sound?* *How does sound travel?* *Why we can't hear anything in space?* *What is outer ear?* *What is middle ear?* *What is inner ear?* *How does sound reach our brain?*

LESSON 2: 40 mins

5 mins	**Warm up:** Begin the lesson by reviewing the previous lesson. Ask them to name some sounds which they like and do not like. Jot them down in two columns on the board
20 mins	**Main Lesson:** As they talk about different sounds, tell them sounds differ in nature on the basis of volume and pitch. Volume is actually the power and strength of sound and pitch tells us about how fast the sound waves are vibrating. For an excellent explanation with difference among the two concepts, follow this link: http://studyjams.scholastic.com/studyjams/jams/science/energy-light-sound/sound.htm Now steer the discussion towards the usefulness of sound. Elaborate further by telling them that some sounds are extremely useful for communication and gives certain messages. Ask them to name some examples. *Azaan for calling people to pray.* *Warning alarms in case of emergency like fire alarms, ambulance alarms, mobile phones, intercoms, etc.* *Earthquakes can be detected through sound waves.* Read pages 88–90 and do Exercise 1.

10 mins	**Recap:** The same link mentioned above provides multiple choice questions for getting a quick feedback of the lesson in 'Test Yourself' http://studyjams.scholastic.com/studyjams/jams/science/energy-light-sound/sound.htm
	Evaluation: The following weblink can be used for evaluation. It may be used for demonstration of pitch so the students clearly distinguish between volume and pitch of sound. http://www.bbc.co.uk/schools/scienceclips/ages/9_10/changing_sounds_fs.shtml The worksheet **Sounds** may also be given.

Answers

Exercise 1

a) Sound is a form of energy and needs a medium to travel.

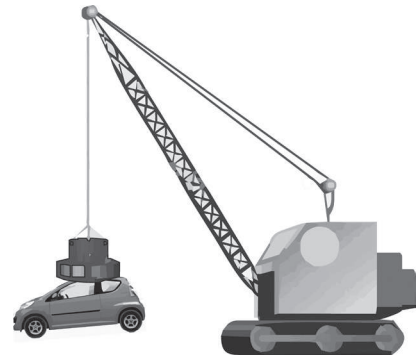
b) Yes, sound travels better through gases because air gives no resistance to air.

c) Sound has volume, which tells us if the sound is soft or not. Pitch tells how high or low a sound is. (Give any two examples)

Unit 5

Chapter 12

Magnets and electro-magnetism



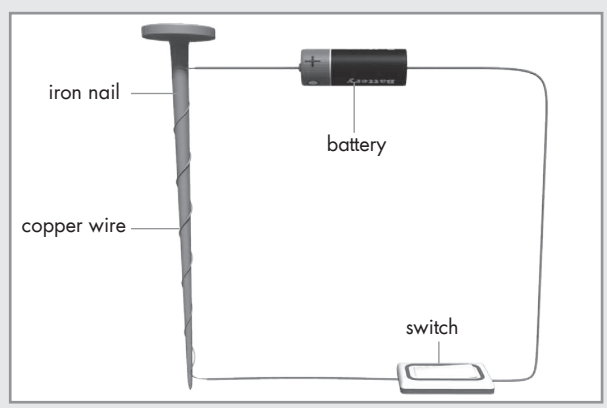
Objectives	By the end of the chapter, students should be able to: • study a magnet and discuss it features • describe different kind of magnets in terms of shape and strength • identify the two poles of magnets • name some commonly used devices harnessing magnetic energy • explain the working of an electromagnet with help of a diagram • state some uses of electromagnets • draw a diagram to show the working of an electric bell • discuss how the electromagnet helps Maglev trains to work
Vocabulary Bank	magnet, iron, cobolt, nickel, magnetic field, attract, repel, poles, like poles, unlike poles, coil, electromagnet, magnetism
Resources	A stick with a small magnet tightened to its tip, bar magnet, shoe magnet. Two battery cells of different strength (1.5 and 3 volts), a nail, four feet long insulated copper wire, paper clips and a 2 inch long nail.

LESSON 1: 40 mins

10 mins	**Warm up:** Let the children anticipate the topic themselves. Walk with the stick with a magnet attached to its tip. As you try to adjust some material on the softboard, intentionally drops a few thumb pins and instead of picking them up with your hands, use your stick to locate them. The children themselves would be eager to know how it happened. You can announce that we will be learning about magnets now. Demonstrate if a magnet can attract a chair or plastic or glass cup. Show them magnets come in different shapes and sizes.

25 mins	**Main Lesson:** Ask the children to do silent reading of page 92–93. As they have read the chapter, ask them to close the book. Initiate a discussion on magnets and their properties. As they explore further, ask them about uses of magnets. They must have seen door magnets that prevent doors from closing. It is also used in many electrical appliances like refrigerators, washing machines and telephones. Now you should demonstrate electricity and magnetism without using the nail. Take the copper wire and scratch it from the middle. Connect the two ends with a battery cell. As you complete the circuit, bring some paper clips near the nail. *You will observe that as the circuit is completed, one or two paper clips will be attracted to the copper wire. The current flowing through the electrical wire turned it into a magnet and attracted the paper clips to it.*
5 mins	**Recap:** Summarize the content by discussing that magnets are made up iron, cobalt and nickel. They have a unique property of attracting metallic objects. They are found in various shapes, sizes and strengths. The two ends of magnets are called two poles, i.e. North and South poles. When electricity passes through an electric wire, an invisible magnetic field is produced, thus changing it into a magnet.

LESSON 2: 40 mins

5 mins	**Warm up:** Review the experiment to refresh their memories about electromagnets.
15 mins	**Main Lesson:** Tell the students that you would be conducting four sets of experiments and they need to observe carefully and fill the worksheet provided. 1. Take the 1.5 V cell and connect it with the circuit as shown. Limit the turns of the wire around the nail to two. Bring some paper clips close the nail and observe how many clips it can attract. 2. Repeat the experiment by adding two more turns around the nail. 

3. Take the 3 V cell and connect it with the circuit as below. Limit the turns of the wire around the nail to two. Bring some paper clips close the nail and observe how many clips it can attract.

4. Repeat the experiment by adding two more turns around the nail.

As the children have written their observation, give them time to think over and write the inference, i.e. explanation based on their observation. Ask them to share with the class. Conclude in the end that due to the greater strength of the battery cell, more current would be passing through, thus making a stronger magnet.

Similarly adding more turns also makes the magnet stronger.

Magnets have various useful applications in our everyday life.

As they get a good understanding of electromagnets, tell them how electromagnets are commonly used as in case of an electric bell. Discuss the figure given on page 95. Show them the Maglev train on the same page and tell them the fastest train in the world works with help of magnets only. The principal of attracting opposite poles and repelling like poles is utilized here to make the train friction free.

Evaluation:
The online quiz present on the link below could be used for the purpose of evaluation.

http://quizlet.com/1905749/test

Exercises 1 and 2 on page 98 and 99 can also be used for the purpose of evaluation.

Answers

Exercise 1

a) true b) false c) true d) false e) false

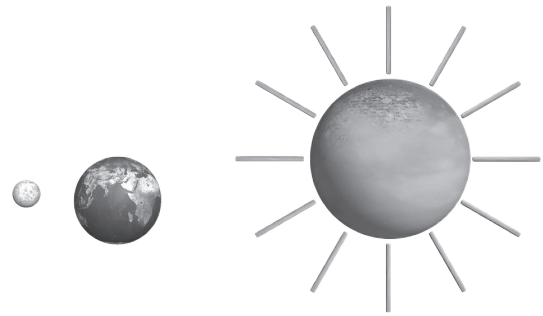
Exercise 2

1. b 2. c 3. b 4. b 5. a

Unit 6

Chapter 13

The Moon and Mars



Objectives	By the end of the chapter, students should be able to: • observe and identify the heavy bodies surrounding our atmosphere • describe the surface of the Moon • discuss the size and distance of the Moon in comparison with the Earth • state the distance between Earth and Moon • state the distance between Sun and Earth with help of a diagram • explain the orbiting of the Moon around the Earth in terms of the lunar calendar • understand that the Moon reflects light from the Sun • recognize that the face of the Moon illuminated by the Sun which is visible to us is known as a phase of the Moon • describe the surface of Mars • analyse the interest of scientists in Mars • give a reason why Mars is called a red planet • compare the similarities between Earth and Mars
Vocabulary Bank	axis, planets, orbit, revolution, phases of Moon dusty, rocky, surface, atmosphere, polar caps, hemisphere (northern and southern), solar system, sphere, highlands, illuminated, valleys, canyon
Factual Bank	Enlarge the following facts and put them on flip charts on the softboard. **Moon** • It is a massive ball, made up of solid rock. • A very small amount of water or ice is present. • It is about four times smaller than Earth in diameter. • The Moon is 385,000 km away, whereas the Sun is 149.6 million km away from Earth. • The Moon goes round the Earth by spinning around its axis. • It takes an average of 28 days to complete a cycle.

	Mars • It is a rocky and dusty planet. • It is our first neighbour and the fourth planet in the solar system. • It is a cold planet with no signs of life; temperature ranges from -120°C in winter nights to 25°C in summer. • It has two moons called Phobos and Demos. • It is called as 'red planet' because it is covered with red particles of iron oxide. • Its thin atmosphere made up of carbon dioxide. **Similarities between Mars and Earth** • Mars has mountains, valleys and some signs of water like Earth. • The largest mountain of the solar system is Olympus Mons which is 78,000 ft high. • Valles Marineris is the largest canyon (deep valley with steep sides) and stretches to 4, 000 km across the planet. • It has polar regions like Earth and has frozen water in the ice caps that supports the fact that it had life once. • It rotates around the sun in 320 days.

LESSON 1: 40 mins

10 mins	**Warm up:** Take three balls of different sizes: A (big), B (medium) and C (small) into the class. Keep Ball A in centre of the table and move Ball B around it in an anticlockwise motion. Then leave the Ball B at a distance next to Ball A. Take Ball C and rotate it around Ball B in an anti-clockwise motion. Ask the students what this signifies.
25 mins	**Main Lesson:** They would be telling you about the solar system. Ask them why we cannot see the moon during daylight. Recall the difference between the Sun and Moon. Ask them to do silent reading of page 100–102. Now discuss with them the structure of the Moon and its orbiting around the Earth with help of the flip chart mentioned above.

	Let's Find out for Ourselves on page 105 may be done in groups or as a demonstration before the class. They should complete 105 and 106 as they predict and observe.
10 min	**Recap:** An excellent video to recap the lesson can be accessed from the following link: http://www.visuallearningsys.com/digital-science/preview

LESSON 2: 40 mins

5 mins	**Warm up:** Set off the lesson by taking a quick review of the previous lesson. Tell them moons are associated with many other planets. *Can you name the planet with two moons?* *The name of that planet is Mars.*
25 mins	**Main Lesson:** Talk about the unique features of Earth, like it has two poles and ice glaciers on it. Talk about mountains and valleys. Most importantly, it is water and oxygen that support life. Explain to them the structure of Mars and its similarity to Earth with help of the flip charts mentioned earlier. Ask them to read pages103–104 silently and underline all the important facts.
10 min	**Evaluation:** Exercise 3 on page 107 can be given for the purpose of the evaluation or the worksheet **The Moon and Mars**.

Answers

Exercise 1

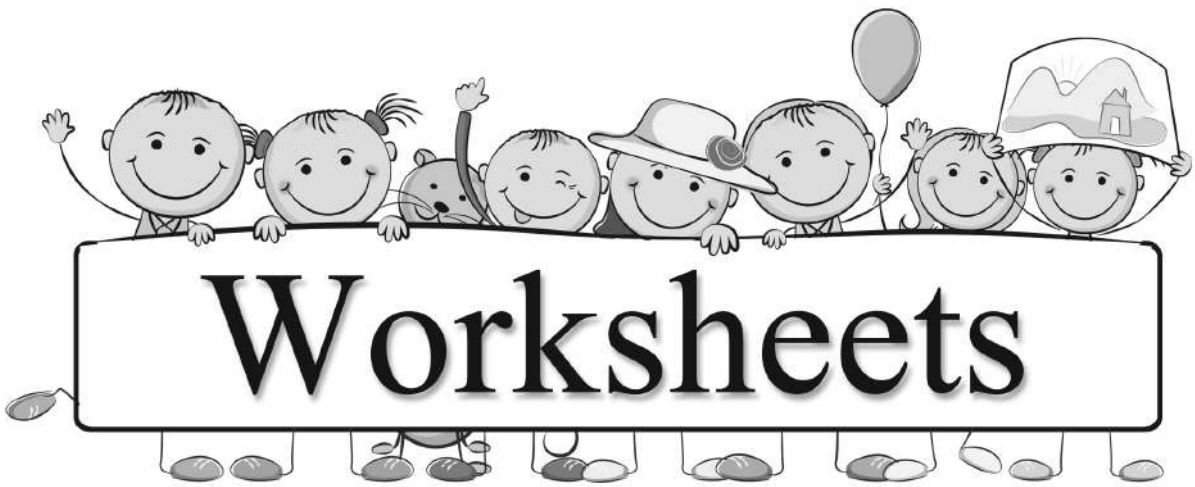
a) During the day, the Sun's light is so bright that we cannot see the Moon. In the absence of sunlight, the Moon is reflecting some light from the Sun, so it is visible.

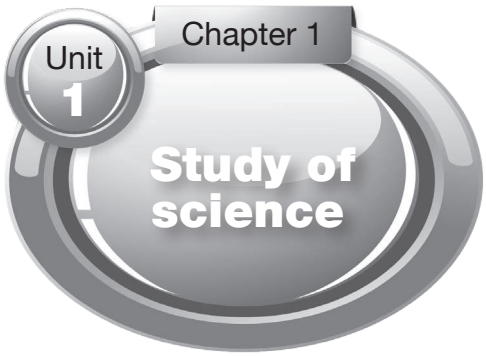
b) It has mountains, valleys, water, polar caps, and plains like Earth.

c) The phases indicate that the Moon is orbiting the Earth and at different positions, its shape changes.

Exercise 2

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


Worksheets



Name: _____

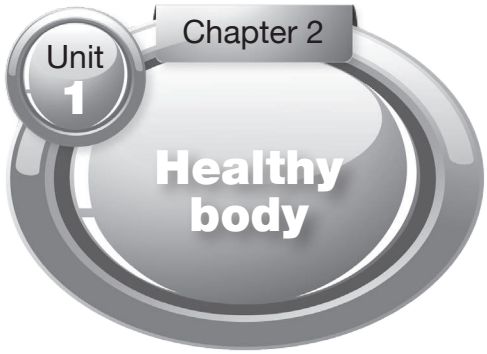
Class: _____

Date: _____

Scientists act like detectives There are some common procedures that all scientists follow in order to find a solution to a problem:

Collecting information, observation, inference, conclusion, experimentation.

Arrange the steps above in their correct order in the flowchart below.



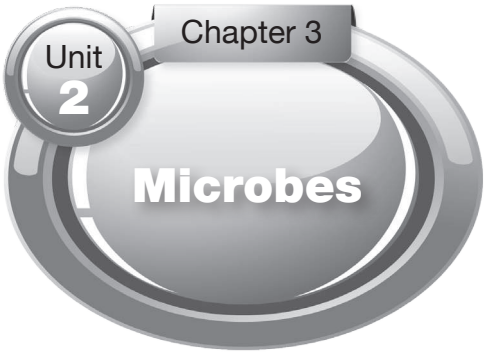
Name: _____

Class: _____

Date: _____

Complete this worksheet with the help of your parents.

Action	Pulse rate after 1 minute	
	Mother	Father
Standing still		
Walking slowly		
Walking briskly		
Jogging		
	Pulse rate after 2 minutes	
	Mother	Father
Standing still		
Walking slowly		
Walking briskly		
Jogging		



Name: _____

Class: _____

Date: _____

fungi	virus	bacteria	microbes	food poisoning
three	mildew	spore	infections	

Fill in the blanks with help of the word bank provided above. Each word can be used more than once.

1. _____ are the tiniest living things in the world.

2. _____ are the worst of the microbes.

3. Eating decayed food can cause _____.

4. _____ is a grey, mould-like growth caused by fungi.

5. Microorganisms can be classified into _____ main groups.

6. _____ exists in rods, spheres and spiral shapes.

7. _____ can be found as powdery, hairy or mouldy growths.

8. Viruses are the worst of all microbes because of _____.

9. _____ are the largest among the main groups of microorganisms.

10. Fungi do not move but they produce a seed like material called _____.

Unit 2

Chapter 4

Insects and birds

Name: _____

Class: _____

Date: _____

Sameer has jumbled down the features of birds and insects.
Can you help of him fix this problem?

cold blooded	10,000 different species	beak
warm blooded	thorax	exoskeleton
dragonfly	bipedal	antennae
feathers	Antarctica	team player
ostrich	honey	32 groups
	wax	

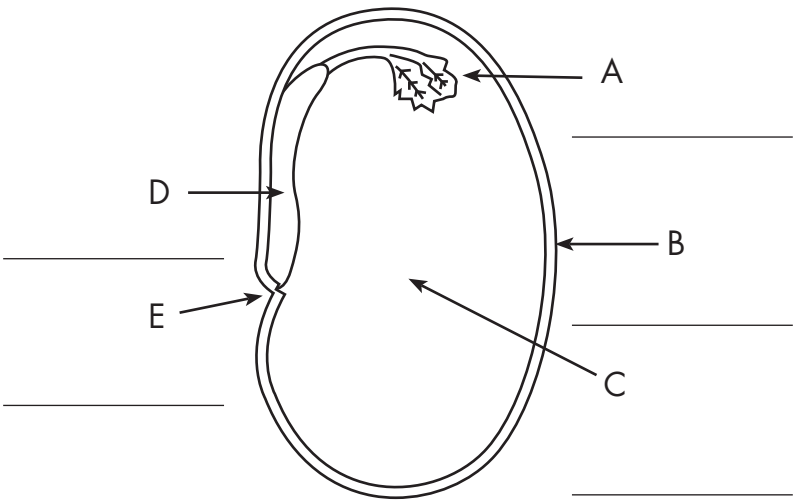
Insects	Birds

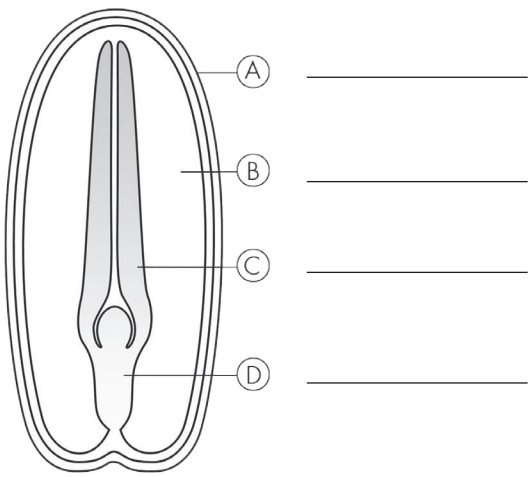
Name: _____

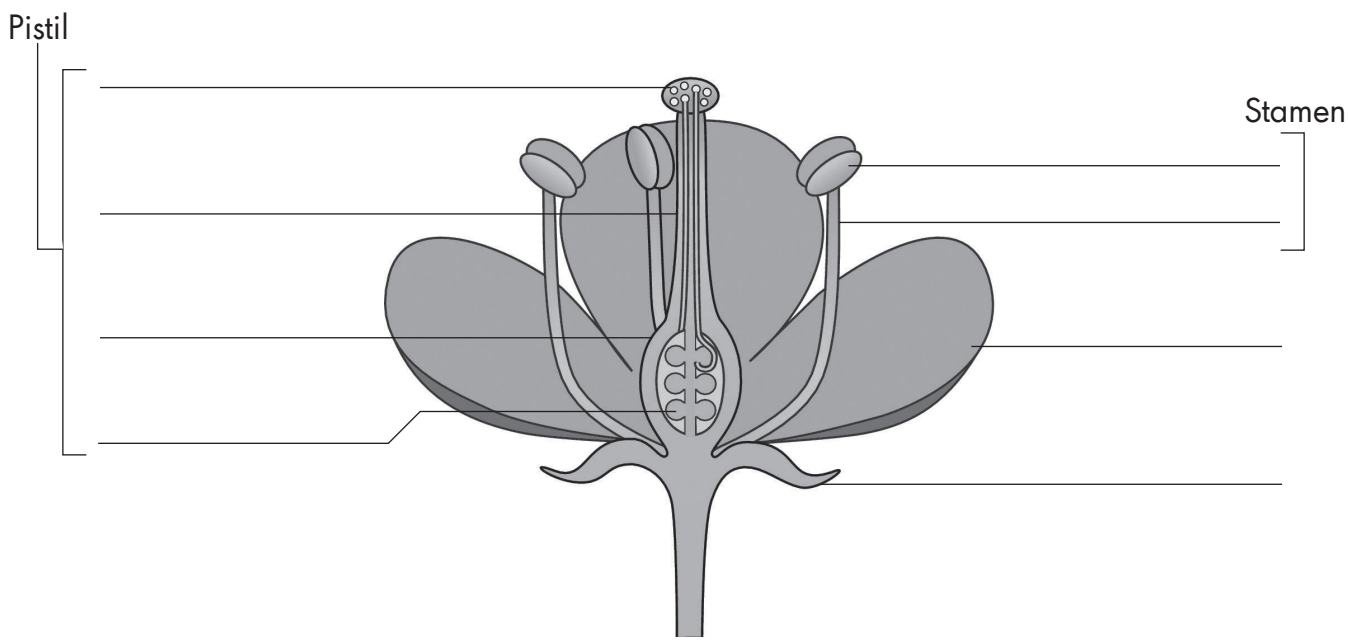
Class: _____

Date: _____

Label the following diagrams.





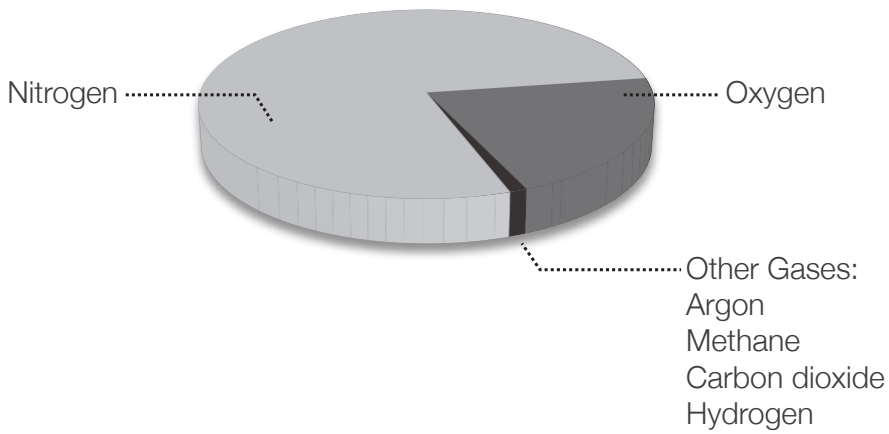


Name: _____

Class: _____

Date: _____

Mention the percentage of each gas in the following diagram:



State the colour, odour and uses of the following gases:

No.	Gas	Colour	Odour	Use
1	Oxygen			
2	Nitrogen			
3	Carbon dioxide			
4	Methane			
5	Argon			

Name: _____

Class: _____

Date: _____

A. **Give one word for the following processes:**

1. A chain process in which water is recycled. _____
2. The freezing point of water. _____
3. Water changing into vapours. _____
4. Vapours changing into water droplets. _____
5. Clouds changing into rain. _____

B. **Give a reason for the following statements.**

1. Washed clothes take longer time to dry during the winter season.

_____

2. An aeroplane forms a white trail in the sky.

_____

3. A saucer is used to drink tea in a hurry.

_____

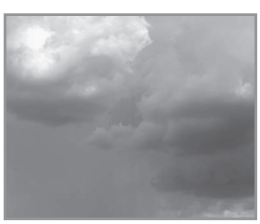
4. When perfume is applied, you skin feels cool.

_____

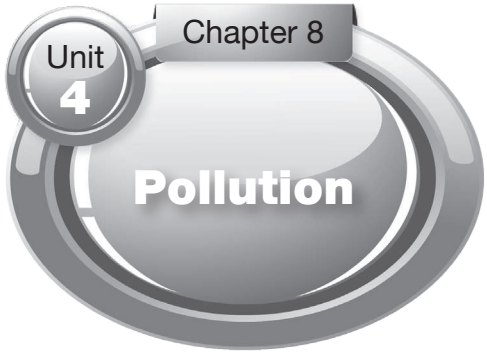
5. Water vapours turn into clouds as they go higher in the atmosphere.

_____

C. **Observe the following pictures and name the process from the following list:**
condensation, precipitation, collection, evaporation , transpiration


_____ _____ _____ _____ _____



Name: _____

Class: _____

Date: _____

You should complete this plan with help of your parent(s) or elder siblings.

A. Identify any ONE kind of pollution that you want to focus on. _____

B. Select any ONE site where one can observe this kind of pollution

_____

C. Name any THREE hazards associated with this kind of pollution:

_____

_____

_____

D. Search some practical ways to combat this issue and mention them below.

_____

E. Involve the community in this cause (name at least two people)

_____

_____

F. Discuss with your parent(s)/siblings and agree on any ONE change in your lifestyle to help save our mother planet, Earth.

_____

_____

_____

Unit 4

Chapter 9

Fighting pollution

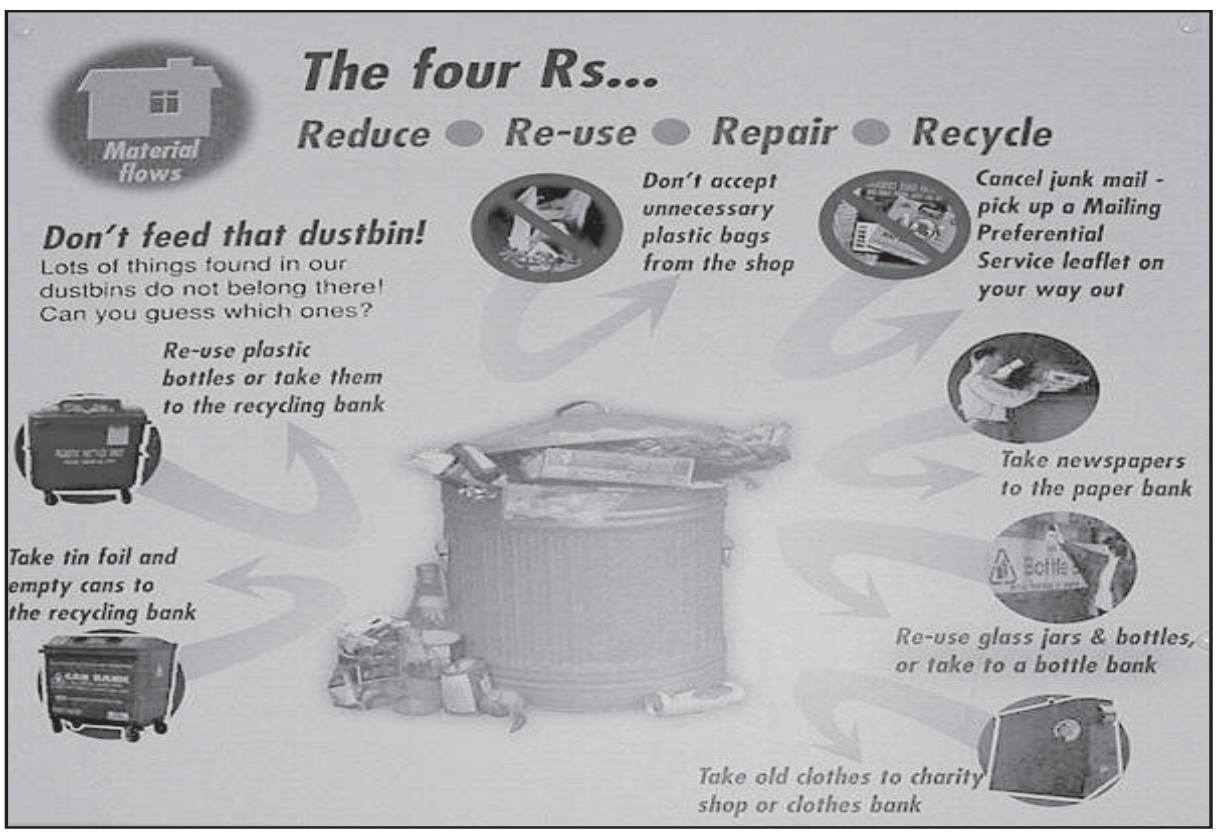
Name: _____

Class: _____

Date: _____

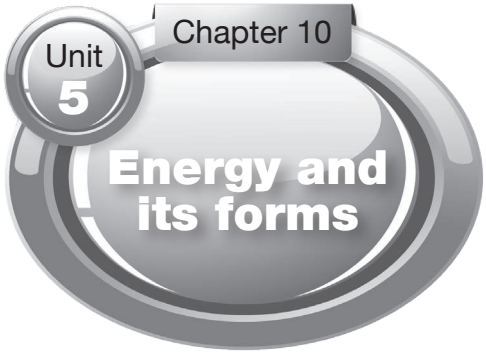
Take a look of the picture below and see how we can use the four Rs.

On your way to school, what rubbish can you notice? Also observe any street bin or the bin at home and note down all the stuff that has been thrown away. Think about the four Rs. Under each, list down the things that can be reduced, reused, repaired or recycled.



Source: http://www.swindonclimate.org.uk/Recycle

Reduce	Re-use	Repair	Recycle



Name: _____

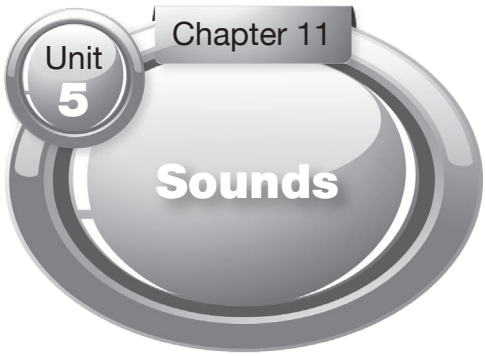
Class: _____

Date: _____

Complete the following table by showing the energy conversions.

The first one has been done for you.

S.#	Action	Energy Change
1	Torch	chemical energy ⟶ light energy
2	Radio	
3	Bulb	
4	Fan	
5	TV	
6	Food processor	
7	Generator	
8	Car	
9	Geyser (for heating water)	
10	Washing machine	
11	Catapult	



Name: _____

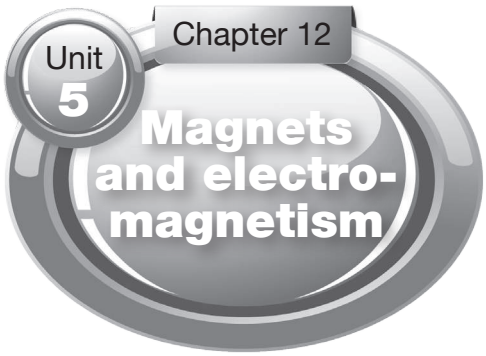
Class: _____

Date: _____

Select the best word from the vocabulary bank below to complete the sentences.

vibration	pitch	shrill	volume
vacuum	ear drum	sound	medium
	rings of waves	brain	

1. _____ is a form of energy.
2. The _____ of a sound is measure of how high or low the sound is.
3. The loudness of sound represents the _____ of the sound
4. Sound needs a _____ to travel.
5. _____ of objects causes them to produce sounds.
6. Sounds travels like the _____ ripple through water.
7. _____ is the thin piece of skin separating external and middle ear.
8. Auditory nerves sends messages to the _____.
9. Sounds do not travel in a _____.
10. A _____ sound has high pitch, whereas a deep, low sound has low pitch.



Name: _____

Class: _____

Date: _____

Observation Sheet

As the teacher is performing the experiment, observe carefully and fill in the column below.

Experiment Number	Battery Cell used	No of turns around the nail	No. of Paper clips attracted
1	1.5 V	Two turns	
2	1.5 V	Four turns	
3	3 V	Two turns	
4	3 V	Four turns	

Inference:

Depending upon your observation; discuss the reason of different number of clips attracted to the nail in the each experiment.

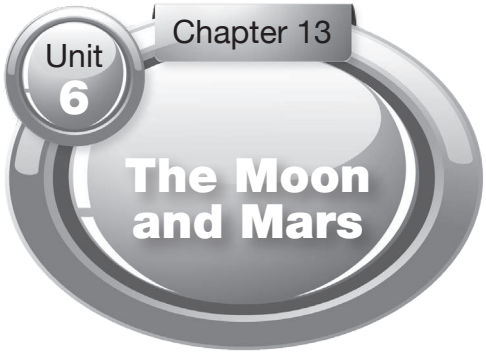
_____

_____

Conclusion:

_____

_____



Name: _____

Class: _____

Date: _____

Read the following statements carefully. Decide whether they are true or false.

In case of false sentences, correct the sentences by rewriting them below.

The first is done for you.	True	False
1. The sun is a huge planet that makes its own light.	☐	☑
2. The Moon shines because of the reflection of light.	☐	☐
3. The Moon is a ball made up mainly of gases.	☐	☐
4. Mars is a dusty and rocky planet.	☐	☐
5. Mars is also called the red planet.	☐	☐
6. Mars has two moons.	☐	☐
7. Mars is called a hot planet.	☐	☐
8. The largest mountain in the solar system is the Himalaya.	☐	☐
9. Canyon means rivers and streams.	☐	☐
10. Mars completes one rotation around the Sun in 365 days.	☐	☐

1. The sun is a star which has its own light.

_____

_____

_____

_____

_____

_____