Science and Technology

Grade 4

Government of Nepal

Ministry of Education, Science and Technology

Curriculum Development Centre

Publisher: Government of Nepal
Ministry of Education, Science and Technology
Curriculum Development Centre
Sanothimi, Bhaktapur

First Edition: 2022

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Preface

School education is the foundation for preparing the citizen who are loyal to the nation and nationality, committed to the norms and values of federal democratic republic, self-reliant and respecting the social and cultural diversity. It is also remarkable for developing a good moral character with the practical know-how of the use of ICT along with the application of scientific concept and positive thinking. It is also expected to prepare the citizens who are moral and ethical, disciplined, social and human value sensitive with the consciousness about the environmental conversation and sustainable development. Moreover, it should be helpful for developing the skills for solving the real life problems. This textbook 'Science and Technology, Grade 4' is fully aligned with the intent carried out by the National Curriculum Framework for School Education, 2076 and is developed fully in accordance with the new Basic Level Science and Technology Curriculum, 2078.

This textbook is initially written by Mrs. Mina Shrestha, Mrs. Rabina Maharjan, Mr. Hari Bikram Karki, Mr. Yubaraj Adhikari and Mr. Khil Narayan Shrestha. It has been translated by Mr. Keshar Bahadur Khulal. The contribution made by Director General Ana Prasad Neupane, Dr. Rajani Rajbhandari, Dr. Rishi Tiwari, Mrs. Pramila Bhakati, Mr. Yubaraj Adhikari and Mr. Khil Narayan Shrestha is remarkable in bringing the book in this form. The language of the book has been edited by Mr. Nabin Kumar Khadka. Art editing of this book was done by Mr. Shreehari Shrestha by making it four colour. The Curriculum Development Centre extends sincere gratitude to all of them.

The textbook is a primary resource for classroom teaching. Considerable efforts have been made to make the book helpful in achieving the expected competencies of the curriculum. Curriculum Development Centre always welcomes constructive feedback for further betterment of its publications.

2079 BS

Curriculum Development Centre
Sanothimi, Bhaktapur

Contents

1 Scientific Learning

How might have scientists discovered so many things? Can we too discover new knowledge?

Fig 1.1

Being curious about new objects and events is the starting point of learning. Since pre-historic times human beings have been studying their surroundings to fulfill their needs. It is said that pre-humans noticed sparks when rocks knocked against each other. From this incident, they learned to make a fire. May be the curiosity about how birds fly might have helped invent aeroplanes. Discoveries and inventions are the results of scientific learning. To observe incidents around oneself, show curiosity, make predictions, ask, compare, test, classify, experiment, etc. are the processes of scientific learning.

1.1 Observation and testing in scientific learning process

Let's read the following story and discuss it.

Rohan was returning home from school. On the way, he noticed a new fruit on a vine on the ground. He carefully observed it. It felt soft. It was red. It looked like a strawberry to him. He picked a few of them and kept them in the bag. Many questions arose in his mind about the new fruit. He started making several assumptions about the fruit. Is it sweet or sour? He asked his friends about the fruit, but even they too did not know about it. When he reached home, he excitedly showed the fruit to his father and asked, "What is its name? Is it edible?" His father observed the fruit for a while and then told him it is an edible wild strawberry. Rohan happily cleaned the fruits and started eating them. He found them sweet and juicy. He was delighted to be eating a new fruit.

Fig 1.2

Questions for discussion:

a. What did Rohan do before he ate the new fruit?

b. How did he find out that the fruit is soft?

c. How did he recognize the colour of the fruit?

d. To which fruit did he compare with?

e. How did he find out that the new fruit is edible?

f. Have you ever enquired about new objects like the way Rohan did? Share your experience in the class.

g. If you discover a new object in your surroundings, how will you collect information about it?

In the above story, Rohan found the color of the fruit by looking at it. He found the taste by tasting it. He found its softness by touching it. For these activities, he used his sense organs like eyes, tongue and skin. The process of discovering the characteristics of objects with the help of our sense organs is called observation. Observation is the first step of scientific learning. Rohan became curious after seeing a new fruit. So, he enquired about it with his found friends and father. He found out many things from the inquiry. To observe the fruit, ask questions, make predictions, compare and experiment on the fruit is a scientific approach to learning. These activities play an important role in learning.

Activity 1.1

Observe the characteristics of different objects in your classroom and fill up the following table.

S.N.	Name of the object	What is its shape?	What is its colour?	How does it feel?	What is it made of?	What is its use?
1.	Writing board	Rectangular	White	Smooth and hard	Wood	Writing on it
2.						
3.						
4.						
5.						

Activity 1.2

Collect some soil, sand, stones, sugar, salt, alum, sawdust, etc. from your surroundings. Guess which of these materials dissolve in water? Record your prediction in the table given below.

Now, test your prediction. For this, take some water in a container, add one material at a time into the water, stir well, and find out whether it dissolves in water. Fill in the following table as you perform the experiment.

S.N.	Material	Prediction (Dissolves/ does not dissolve in water)	Result of the experiment (Dissolved /didn't dissolve)
1.			
2.			
3.			
4.			
....			

a. On what basis did you make a prediction which object dissolves and which does not?

b. Did your prediction match the result of the experiment?

c. Do all objects around us dissolve in water?

Activity 1.3

Keep some water in a bucket or a large bowl. Add the following objects into the water, one at a time. Find out which objects float on water and which sink in it. Fill in the table given below.

Rubber, empty plastic bottle, leaf, iron nail, piece of dry wood, dot pen, pencil

Objects that float on water	Objects that sink in water

Activity 1.4

Fill in the following table by observing some of the flowering and non-flowering plants found in and around the school.

S.N.	Flowering plants	Non-flowering plants
1.		
2.		

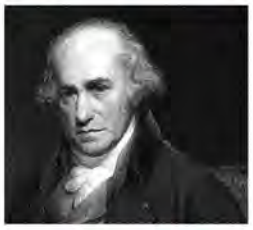
The process of keeping objects having similar characteristics in the same group and keeping objects with different characteristics in different groups is called classification. Separating objects as

dissolving and not dissolving in water, floating and not floating on water, flowering and non-flowering plants in the above activities are some examples of classification.

Who discovered what? Match the scientist with his/her discovery.

Thomas Alva Edison

Guglielmo Marconi



James Watt

Sir Issac Newton

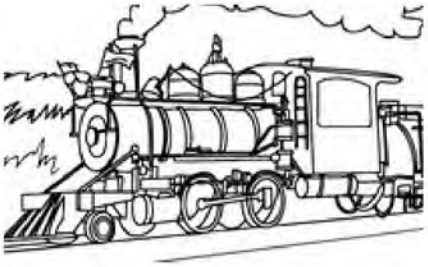


Fig 1.3

Scientific investigation is search-based activity. New knowledge is obtained only after asking many questions and making numerous observations. Therefore, observation, search, classification and experimentation are the crucial activities of scientific learning.

Do you know?

a. James Watt is a Scottish scientist. He performed many experiments. After years of observations and searches, he had invented steam engine.

b. Sir Isaac Newton noticed an apple falling from a tree. He was curious why the apple always came towards the ground instead of going up. After many years' search, he discovered the secret behind every falling object coming towards the earth.

c. Charles Darwin observed many animals, from very small to very big. He searched how different animals originated. So, he developed a theory about the origin of animals.

d. Thomas Elva Edison invented the light bulb after numerous trials and experiments.

Let's discuss:

Who is your favourite scientist? Why do you like him/her? Discuss the discoveries or inventions made by him/her.

Precautions in scientific experiment

चित्र 1.4

a. What different places are shown in the figure?

b. What are the students doing in each figure?

c. What different safety measures have to be applied while performing these activities?

Let's sing a song

प्रयोगात्मक कार्य गर्दा नियम पालन गरौं
शिक्षकका निर्देशनलाई ध्यान दिई सुनौं

प्रयोग गर्दा हतार गरी भाग्ने गर्नुहुन्न
रसायनहरू सुँघ्ने चाख्ने कहिल्यै गर्नुहुन्न

प्रयोग गर्दा नजानेका कुरा पनि सोधौं
रसायनलाई जथाभावी हातले चाहिँ नछोउँ

सबै चिज ध्यान दिई अवलोकन गरौं
नौला कुरा देखेपछि टिपोट गर्ने गरौं

उपकरण प्रयोग गरौं सही ठाउँमा राखौं
कार्य गर्ने स्थानलाई सफा गरी छोडौं

प्रयोगात्मक कार्य गरी ज्ञान अझै बढोस्
विज्ञानका सिप सिकौं जीवन सरल बनोस्

Let's Read and Learn

Science can be found in every place at home, school and the environment around them. Scientific learning becomes meaningless without observations and experiments. Accidents may occur while performing experiments. Hence, safety measures must be followed while performing scientific experiments. In general, the following safety measures must be practised at all times:

a. Teacher's instructions must be followed during educational visits.

b. Safety rules must be applied at every place.

c. We must not touch animals and plants unnecessarily.

d. Laboratory chemicals must not be touched, tasted or smelled because they might be poisonous.

e. We must not run recklessly in a laboratory while performing experiments.

f. We must work cautiously and not rush while performing experiments in a laboratory.

Practical work plays an important role in learning of science. Practical activities must be performed in the laboratory carefully.

Activity 1.5

What safety rules must be followed in a science laboratory? Prepare a chart and present it in class.

Exercise

1. Fill in the blanks with suitable words from the box.

Smelled, scientific, safety, observation, sense organs, tasted

a. During observation, ... have an important role.

b. ..... must be applied in laboratories.

c. Chemicals in the laboratory must not be ..... and .....

d. External characteristics of objects and events can be found from .....

2. Tick √ if the statement is correct and cross x if it is false.

a. Observation is not a part of scientific learning.

b. Experimentation is an integral part of scientific learning.

c. We must not run recklessly in a science laboratory.

d. Apparatus must be kept at the right place after use in the laboratory.

3. Answer the following questions.

a. What is meant by scientific learning?

b. Why is observation important in scientific learning?

c. State the importance of doing experiments in scientific learning.

d. How does asking questions help in scientific learning?

e. State any four safety measures to be applied in a science laboratory.

f. You noticed a new plant in your garden. Now, what will you do to find out the characteristics of this plant?

g. While Sabina was working in a science laboratory, a beaker fell off from her hand and broke. What should she do now?

1.3 Measurement

Let's see and discuss:

Fig. 1.5

a. What are the children and the woman doing in the above figure?

b. Can the same type of instrument be used for measuring the quantity of every substance?

c. How do you measure the quantity of a substance?

d. Why is measurement important in our daily lives?

Activity 1.6

Let's measure

First, estimate the length, breadth and thickness of your Science and Technology book. Then, measure them and compare them with the estimated values.

What difference did you notice between the estimated and measured values in the last activity? Sometimes the estimated and measured values might come out to be the same. But, very often, they are different. We could conclude whether the length, breadth and thickness of a book are equal or different only after the measurement. Therefore, measurement is necessary for comparing the length, breadth and thickness of an object.

Activity 1.7

Take two similar-looking water glasses. Estimate which glass can hold more water. Now fill up both the glasses with water. Measure the volume of water in each glass with the help of a measuring cylinder, and draw a suitable conclusion.

Fig 1. 6

Similar-looking glasses might hold a different amount of water. Thus, measurement is necessary for finding the correct quantity of any substance. No one will be at a loss if measurement is done while selling and buying a thing. It becomes easier to remember if we use measurement while borrowing things from neighbours. To make tea at home, we should first figure out for how many people we are making tea. We should then add water and milk by measuring them with a cup. Even while adding sugar, we must measure. Thus, measurement is important for determining the exact quantity of matter. Discuss where else measurement is important.

Activity 1.8

Fig 1. 7

Measure the length of the bench you sit on with the help of your ruler. Note how many times the bench is longer than the ruler. Likewise, measure the length of the board in your classroom. How many times is the board longer than the ruler?

Read and learn:


Fig 1.8

Metal weights are used for measurement while buying rice. When we say the quantity of rice is five kilograms, we understand that the mass of rice is five times the mass of the kilogram metal block. Here, the kilogram is a known mass. A kilogram is a unit of mass. The process of comparing the unknown quantity with a known unit is called measurement. Fixed quantities used for measuring different physical quantities are called units.

Oil, water and milk are measured in litre. Rope and wires are measured in metre. Corn, wheat, barley, ghee, etc. in maana, paathi, kilogram, etc. Similarly, the length of objects is measured in bitta, haat, foot, etc. time is measured in second, minute and hour. Litre, metre, maana, paathi, kilogram, second, minute, etc. are all units of measurement.

Let's measure and compare:

Activity 1.9

Take two containers of different capacities and fill them with sand or soil. Measure the sand or soil in each container with a maana or a cup. Compare which container has greater capacity.

Let's explore and learn:

Activity 1.10

Observe the measuring instruments in use at home. Ask your

parents and find out what substances are measured with each instrument and fill up the following table.

S.N.	Instrument's name	Substance measured
1.		
2.		
3.		
4.		

1.4 Scientific instrument

Let's observe and do:

Fig 1.9

(a) Are both figures shown above the same object?

(b) Which of the figure is easier to draw?

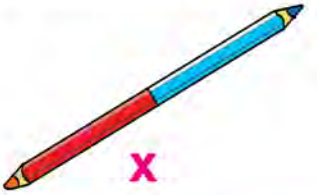
Many different apparatuses are used in a science laboratory. Simple line diagrams are used to represent these apparatuses. Symbolic line diagrams are called schematic drawings. These diagrams are drawn scientifically. Schematic diagrams are used in science because they are easy and quick to draw.

Let's try out:

Rules of drawing schematic diagrams

1. Always use a sharp pencil. Don't use blunt or coloured pencils.

Fig 1.10



2. Always use a ruler to sketch straight lines.
3. Use only a single line.
4. Drawing must be two-dimensional.

Fig. 1.11

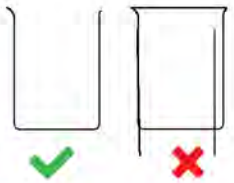


Fig. 1.12

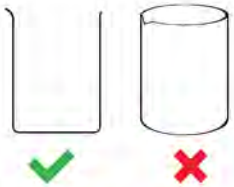


Fig. 1.13

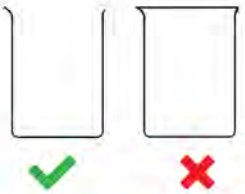


Fig. 1.14

5. Do not close the diagram.
6. Do not colour or shade the diagram.
7. Use straight lines to label parts.
8. Use the correct ratio while drawing different parts of the apparatus.

Fig. 1.15

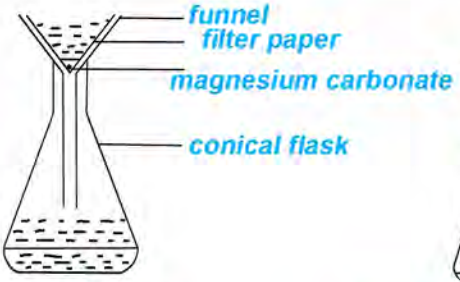


Fig. 1.16

Fig. 1.17

Diagrams of some scientific apparatus

Draw the schematic diagram of the apparatus as shown in the table below:

Real diagram of the apparatus	Schematic diagram	The schematic diagram you have sketched
 Funnel		

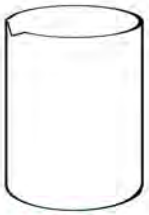
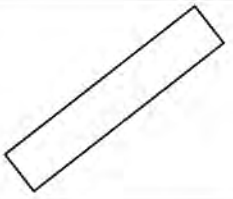
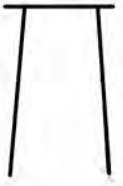
 Beaker		
 Ruler		
 Burner		
 Tripod stand		
 Conical flask		
 Test tube		

Fig.1.18

Exercise

1. Select the correct answer to the following questions.

a. What is a kilogram weight used for?

i. to measure the length of an object.

ii. to measure the quantity of matter in an object.

iii. to measure the volume of an object.

b. What is used for measuring the length of an object?

i. ruler ii. balance iii. maana

c. How should the schematic diagram be?

i. colourful ii. shaded iii. simple and clear

d. Which of the following is a rule for drawing a schematic diagram?

i. We should color or shade the diagram.

ii. We should use a single line to sketch the diagram.

iii. Diagram should be multi-dimensional.

2. Fill in the blanks with suitable words:

Watch, measurement, kilogram, metre, traditional

a. Comparison of a quantity of matter is .....

b. While buying ropes and wires, they are measured in ...

c. .....used for measuring time.

d. Maana, paathi, ... system of measurement.

3. Tick the correct statement with (√) sign and the incorrect statement with (x)sign.

a. Measurement helps us to compare objects' lengths. ☐

b. By measuring, we can tell whether the object contains a large or small quantity. ☐

c. Pan balance is used for measuring time. ☐

d. Schematic diagrams are complex. ☐

4. Match the following:

A	B
1. Inch tape	(i) to measure volume of matter
2. Stopwatch	(ii) to measure the mass of a substance
3. Balance	(iii) to measure length
4. Maana	(iv) to measure temperature

5. Give a brief answer to the following questions.

a. What is meant by measurement?

b. Write the importance of measurement.

c. How is the volume of water measured?

d. What is a unit?

e. Rama has two buckets of the same height. They are full of water. Her mother asked which bucket has more water. Describe the steps Rama should follow to find the answer to her mother's question.

2 Information and Communication Technology

You may be sharing the information have received through various means with others. Talking is the basic form of communication. This usually requires a face-to-face meeting. After the development of telephone technology, people started conversing with each other through the telephone even without meeting face-to-face. In addition, information can be obtained from newspapers, radio and television. Nowadays, due to the development of internet technology, it has become possible to have two-way communication and exchange information using the computer. Thus, the process of exchanging information through various means is communication. In today's modern age, fast means of communication technology have been developed. This makes it possible to get instant news from any part of the world.

What is the difference between the traditional and current methods of communication? Discuss how computer technology has made the communication process easier.

Fig 2.1

Technology including computers is being widely used in the fields of education, health, trade, agriculture, etc. these days. The use of technology makes our work quick, easy and comfortable.

Even before the development of modern technology, local technologies based on traditional knowledge were used. Some traditional technologies are still in use. Modern technology has been developed based on traditional technology. As modern technology makes the works faster and easier than traditional technology, its development and use are increasing. For example, millstone were traditionally used for grinding grains. Later, water mills were developed, and now a grinding mill is used.

2.1 Means of communication

Let's look at the picture and discuss:

Fig 2.2

a. What are the people doing in the pictures above?

b. Can we obtain information without using any means of communication?

c. What do we use telephones and mobile phones for?

d. Through which different media do you obtain information?

Various information can be obtained by reading newspapers, watching TV and talking on a mobile phone. Nowadays, the internet can be used to talk as well as obtain various information. Sometimes when we are unable to attend school, we inform our school by telephone or through a written application. Information is the knowledge of such important things. Sharing information from one person to another is communication.

Information can be obtained from letters, telephone, radio, television, newspapers, books, noticeboards, emails, internet. Therefore, all these means are called means of information and communication.

We can only get one-sided information from newspapers, letters, radio and TV. We cannot give feedback from these means. So, these are the means of one-way communication. However, through mobile phones, telephones and the Internet, we can listen to others and also give our views. So mobile phones, telephones, and the Internet are the means of two-way communication.

Activity 2.1

Write down how the following events are communicated.

Event	How to communicate?
To invite a friend to play	
To talk to a distant relative	
To obtain information about the various activities taking place in your locality	
To inform the Electricity Authority when there is no electricity	
To inform the parents about the school's Parents' Day	
To tell about your illness	

Activity 2.2

Collect information about different activities taking place in your school and present it in class.

Project work

1. Collect information about the events that took place in different places by watching TV or reading a magazine or reading a book in the library or searching on the internet and then present it in class.

2. After reading a part of a magazine, find out what information the magazine is trying to convey. Discuss in class.

Exercise

1. Choose the correct answer from the options given below for each question.

a. Which of the following is a means of information and communication?

i. Mobile phone ii. Photo iii. Video game

b. From which of the following devices can information can be obtained fastest?

i. Letters ii. Magazines iii. The Internet

c. Which of the following is a mode of one-way communication?

i. Mobile phone ii. Telephone iii. TV

d. Which of the following is a mode of two-way communication?

i. Radio ii. TV iii. Telephone

2. Tick (√) the correct statements and cross (x) the wrong ones.

a. Computer is a means of information and communication. ( )

b. Information can flow quickly through the letter. ( )

c. Mobile phone is a traditional means of communication. ()

d. Information can be collected from newspapers daily. ( )

3. Fill in the blanks by choosing the appropriate word from the words given below:

Means, two-way, one-way, information, communication

a. Meaningful information of anything is .....

b. The exchange of information from one person to another is .....

c. The information received from the school notice board is a ..... communication.

d. Group discussion in the classroom is a ..... communication system.

4. Answer the following questions in brief.

a. Why is the information needed in daily life?

b. How is information transmitted from one place to another?

c. Write the names of any four means of information and communication.

d. Neha is in school. If she has to call her mother to school

immediately, what medium would she use, and why?

e. Explain how the use of information and communication makes daily work easier.

f. Write down whether each tool shown in the picture provides one-way or two-way communication.

g. Write the similarities and differences between the information obtained from newspapers and television.

2. 2 Introduction to Computer

Look at the picture and identify:

Fig 2.4

a. Which parts of a computer are shown in the figure 2.4?

b. What do you use the computer for?

Fig 2.5

A computer is a device that runs on electricity. We can do many things by using it. Modern computers have evolved from the abacus. In ancient times abacus was used for calculations. The computer takes data and instructions as input. It then processes the data and gives meaningful results as output. It makes our work faster, easier and more reliable. It can remember many things. It can store a lot of information. A lot of information can be obtained from this. So, it is called a smart machine.

We use computers for different purposes in each field. We can search for different information on the computer. Mathematical calculations can also be done on it.

We can draw pictures on a computer and colour them. We can type a lot of things on a computer and save it for future uses.

Besides these, it is also used to listen to songs, watch movies and watch cartoons. We can play games on the computer. Computers are also used to perform various office tasks. It is being used as a reliable means of communication. Written documents, photos, videos, etc. can be sent to others from a computer by connecting it to the Internet. That is why the computer has an important place in the field of communication.

Activity 2.3.

Look at a computer at school or at home. Draw and color each part of it.

2.3 Parts of a computer

A computer consists of two major devices. The first is the input device and the second is the output device. The keyboard and mouse are input devices. From these, the computer takes instructions as input. A monitor is an output device. It shows the work we have done. A system unit is a computer processing unit. Monitor, keyboard, mouse and system unit are the main parts of a computer. To make a computer system, a monitor, keyboard and mouse are connected to the system unit with wires.

a. Monitor

The monitor is the main output device of the computer system. Everything we do on the computer is seen on this.

Fig 2.6

b. System unit

This is the main part of the computer. It contains all the internal parts of the computer. It controls all other parts of the computer. It does all the work assigned to the computer. So, it is also called the brain of the computer. It is also known as the Central Processing Unit (CPU)

Fig 2.7

c. Mouse

Fig 2.8

A mouse is a pointing device of a computer. This allows you to click on the icon on the monitor. The mouse is operated by placing it on a mouse pad or a flat surface. When you move the mouse, the arrow-shaped mark moves around on the monitor. You can do whatever want by pointing with the same arrow-shaped mark. You can use the mouse to play games, draw pictures, and instruct the computer to do a specific task. A mouse is an input tool. The mouse consists of two buttons, the left button and the right button. Various actions are performed by pressing these buttons. Some mouses have a scroll wheel between two buttons.

Do and learn:

How to operate mouse?

Place the mouse on the mouse pad or flat surface. To operate the mouse correctly, follow these steps:

i. Place your palm on the mouse.

ii. Hold the mouse tightly with the thumb on the left side.

iii. Place the index finger on the left button and the middle finger on the right button.

iv. Now, move the mouse over the mouse pad to move the arrow to the desired position. Select the icon by pressing the left button once.

d. Keyboard

fig 2.9

A flat board with many buttons is called a computer keyboard. The button on the keyboard is called the key. It has more than 104 buttons. These buttons contain the alphabet from A to Z, the numbers from 0 to 9 and other symbols. Letters, words, numbers and symbols can be typed by pressing these buttons. What is typed on the

keyboard can be seen directly on the monitor. So, the board is an input tool.

Do and learn:

Write about yourself and your school by pressing buttons on the keyboard and then show it to your teacher.

Storage devices

Apart from the four main parts described above, the other main part of the computer is the storage device. A storage device is a part of a computer that stores all data. There are many types of storage devices. Hard disk drives, CDs, DVDs, USBs, etc. are the most widely used storage devices.

Fig 2.10

Let's discuss why computers are used:

a. to do different office tasks.

b. to study online.

c. to communicate with relatives living far away.

d. to transact money online.

e. to treat patients in the hospital.

f. to do bank-related work.

g. to keep records safely.

2.4 Security and cleaning of computer

Look at the picture and discuss:

a. What is the girl in the given picture doing?

b. You should not use the computer for a long time at a time, why?

Fig 2.11

A computer is a useful tool but its improper use can be harmful. Improper use of computers reduces their lifespan too. Here are some ways to protect your computer:

a. Connect the computer's plug to the electrical socket safely.

b. Do not pull the wires in the computer.

c. Do not touch the computer with wet hands.

d. Do not hit any part of the computer.

e. Do not eat or drink while sitting near the computer.

f. When using the mouse, press it gently

g. Press the keyboard's buttons gently.

h. After finishing your work on the computer, shut it down properly.

Activity 2.4

Discuss ways to use the computer safely and present the findings in class.

Cleaning the computer

Activity: Let's discuss ways to clean the computer:

a. The computer and the computer table should always be kept clean.

b. Don't let dust get into the computer.

c. The computer should not be wiped with a damp cloth.

d. Food and beverages should not be spilled on the computer.

e. Do not eat or drink while sitting near the computer.

Safe use of mobile phones and computer

Improper use of mobile phones and computers can have negative effects on our health. This can lead to back pain, neck pain, hand pain and eye pain. Therefore, while operating the computer, one should pay attention to the following:

a. Sit facing the computer monitor and mobile screen directly.

b. Sit with a straight back and neck.

c. Mobile phones and computers should not be used by keeping them on very high or low tables.

d. Do not work on a very bright or very dim screen.

e. Do not use mobile phones and computers continuously for a long time.

f. Play or do not play loud songs on mobile phones and computers or use earphones.

g. Do not use of mobile phone and computer while driving or doing any important work.

Exercise

1. Choose the correct answer to the following questions:

a. How many main components does a computer have?

i. two ii. three iii. four

b. Why is the system unit called the brain of the computer?

i. because all other parts of the computer are connected to it.

ii. because all internal components of the computer are inside it.

iii. because it processes data and controls other parts.

c. Which of the following is an output device?

i. keyboard ii. monitor iii. mouse

d. Which of the following is a storage device?

i. keyboard ii. monitor iii. hard disk drive

2. Select the suitable words from the list of words given below and fill in the gaps.

gently, buttons, many, clothes, information, back, wires, left, noise

a. Computer can remember ..... things at once.

b. We type by pressing the .....on the keyboard.

c. The buttons on the keyboard should be pressed .....

d. Do not ..... in the computer lab.

e. Computer should be cleaned by wiping it gently with a clean .....

f. ..... in the CPU must not be pulled.

g. Sit in front of the computer with a straight .....

3. Tick (√) the correct statements and cross (x) the incorrect one.

a. Words can be typed by pressing keys on the keyboard. ☐

b. Pictures can be drawn with the help of a mouse. ☐

c. A computer can only do one task at a time. ☐

d. Naked wire should not be touched. ☐

e. You should play and jump in the computer lab. ☐

f. Computers like dust. ☐

g. Mouse buttons should be pressed gently. ☐

h. You can eat and drink in the computer lab. ☐

4. Match the parts of the commuter to its functions:

i. Keyboard	a. Cursor control device
ii. Mouse	b. Typing device
iii. Hard drive	c. Control unit
iv. System unit	d. Storage device
	e. Maintaining Device

5. Answer the following questions in brief.

a. What is a computer?

b. What do you use the computer for?

c. Write the names of two storage devices.

d. Write the difference between monitor and keyboard.

e. Name the buttons on the mouse.

f. Write down any four functions of a computer.

g. Write down four ways to use a computer safely.

h. Why should a computer be cleaned?

i. How is a computer cleaned?

j. What are the effects of not sitting properly while using a computer?

k. You have a keyboard, monitor and CPU separately. With these, how would you build a computer system for yourself?

l. Write down the precautions to be taken while using a mobile phone and computer.

m. Identify the computer parts shown in the picture below and write their names:

6. Give the reason:

a. Computer is called a smart machine.

b. The keyboard is called the input device.

c. The system unit is called the brain of the computer.

2.5 Paint software and typing software

Paint software

Let's look at and discuss:

a. What is the girl doing in the picture?

b. Have you drawn pictures on paper and coloured them?

c. Is it possible to draw pictures and color them on a computer?

Figure 2.12

Very nice pictures can be easily drawn and painted even on a computer. The computer uses paint software to draw and color. MS Paint and Tux paints are widely used paint software. Tux Paint is a great software for kids. To use this software, you must first download and install Tux paint on your computer.

How to install and open Tux paint

Step 1 : Download Tux paint from the Internet.

Step2 : Install Tux Paint on your computer or get it done.

Step 3 : Double click the Tux paint icon on the computer desktop. Now Tux paint opens and the Tux paint window appears on the monitor. It has a toolbar on the left and brushes on the right. In the middle is the drawing canvas. These tools and magic tools can be used to draw beautiful pictures and paint colors on a drawing canvas.

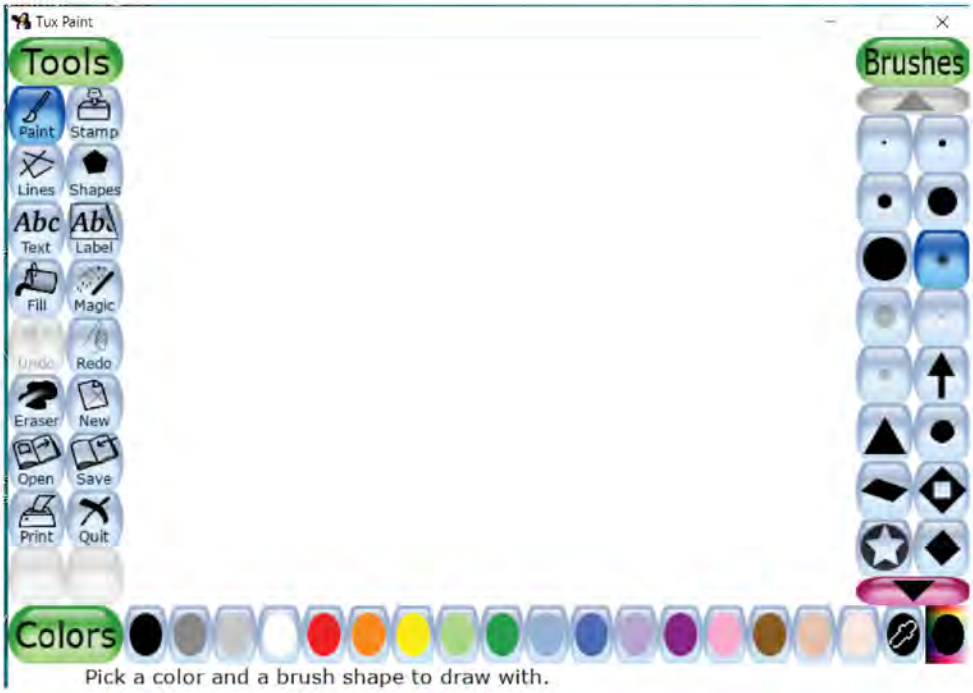


Fig 2.13

Introduction to the tools on Toolbar

1. Paint tool

This tool is brush-shaped. Logos, clip art and lines can be created using this tool.

2. Lines tool

Clip art and dotted lines can be created with this tool.

3. Shapes tool

Different shapes like circular, square, rectangular, etc. can be created using this tool.

4. Text tool

This tool can be used to write letters inside the drawing canvas.

5. Label tool

Using this tool, letters can be written inside a box.

6. Magic tool

This tool can be used to show special effects in your painting.

7. Eraser tool

This tool can be used to remove unnecessary things in the painting.

8. Save tool

This tool is used to store your paintings on a computer.

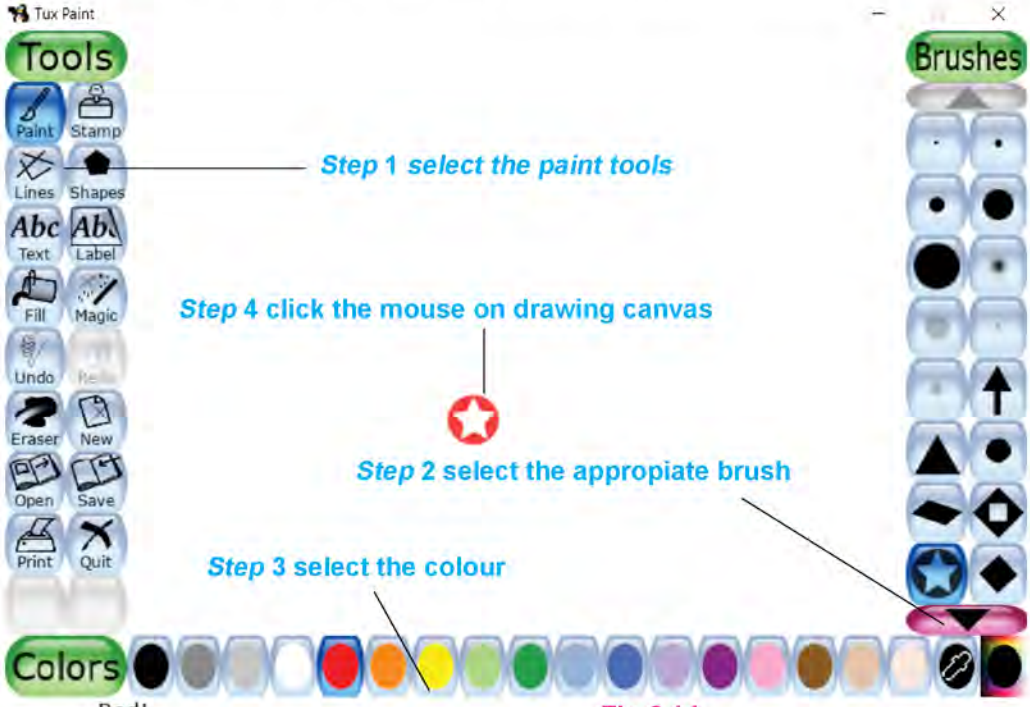


Fig 2.14

Let's learn to use different tools:

Let's learn to draw different colored lines on the drawing canvas

Step 1 : Using the mouse, move the cursor (arrow shape) to the toolbar and click on the paint tool.

Step 2 : Now, move the cursor to the color toolbar and click on the appropriate color.

Step 3 : Then move the cursor to the drawing canvas. Now the arrow shape of the cursor changes to a brush shape.

Step 4 : Draw the line you want by pressing the left button of the mouse.

Step 5 : Release the mouse button to stop drawing the line.

Draw your favorite picture using the various tools as shown in the steps above and also fill in the appropriate color.

Use of the Rubber Stamp tool

Using the Rubber stamp tool, already drawn photographic images can be copied and pasted onto the drawing canvas.

Way to use the Stamp tool

Step 1 : Click on the Stamp tool.

Step 2 : Select the image you want from the panel on the right side.

Step 3 : With the help of the mouse move the cursor to the drawing canvas and click on the desired location.

You can also paste the other pictures you want by repeating the above steps.

Fig 2.15

Pre-drawn images can also be colored by pasting them on the drawing canvas.

Way to paint readymade pictures

Step 1 : Click on the new tool in the panel on the left side of the drawing canvas.

Step 2 : Choose the picture you want from the drawing canvas.

Step 3 : Double click on the Open icon.

Step 4 : Click on the Magic tool.

Step 5 : Click Fill in the Magic tool panel.

Step 6 : Click on the color you want.

Step 7 : Click on the part of the picture you have chosen.

Fig: 2.16

Do and learn

Activity: 2.5

Draw and Save pictures:

Step 1 : Draw your favorite drawing using the tools in the toolbar.

Step 2 : Fill in the appropriate colors in the picture.

Step 3 : Save the image to your computer by clicking on the Save tool.

Step 4 : At the bottom of the Tux paint window shows,Your image is saved.

Typing software

Typing software makes it easy for us to type on a computer. It helps us to develop typing skills on our keyboards. Typing speed can be increased with a lot of practice. This software contains various typing games. There are different types of typing software available on the Internet, such as typeshala, typing.com, typing tutor, touch-type, typing trainer, etc. Typing can be practiced by downloading any of this typing software.

Do and learn:

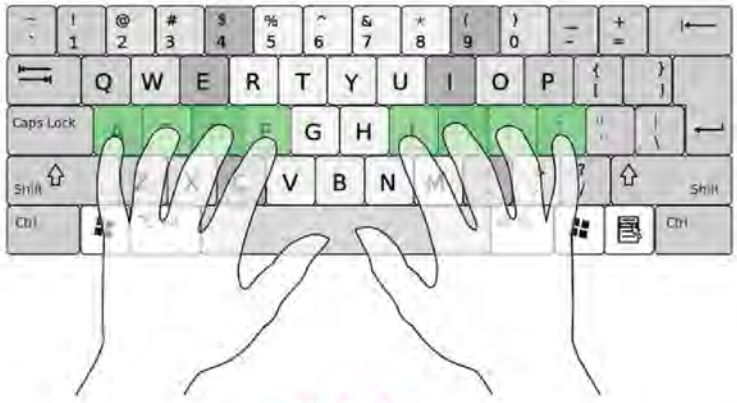


Fig 2.17

1. Download and install one of the typing software mentioned above.
2. Using the mouse, click on the software icon on the desktop.
3. Place the fingers of both hands on the buttons on the keyboard as shown in the figure. By placing your fingers in this way, you can easily move your fingers on the buttons on the lower and upper rows.
4. Now type whatever you want on the computer.
5. Although you may feel a little uneasy at first, your typing skills and typing speed will gradually increase.

6. To save what you have typed, press the ctrl (control) button and S button on the keyboard together, or go to the file and click save as. Now, type the file name and save it.

Activity 2.6

Type on typing software. Observe your typing speed. Who can type more words in five minutes? Compare with friends.

Exercise

1. Choose the correct option.

a. What is used for drawing colored pictures on the computer?

i. typing software ii. paint software iii. mobile software

b. Which of the following is paint software?

i. tux paint ii. touch-type iii. typing.com

c. Which tool is used to create different shapes?

i. shapes tool ii. lines tool iii. text tool

d. Which tool is used to draw colored lines in tux paint?

i. paint tool ii. lines tool iii. magic tool

2. Fill in the blanks by selecting the appropriate word from the words below:

Typing, Picture, Eraser tool, Shape tool

a. ..... is used to remove a part of the picture you have drawn.

b. In Tux paint, ... is used to make different shapes.

c. ..... software is used to increase typing skills.

d. A ..... can be made on the computer using Tux paint.

3. Answer the following questions in brief.

a. What is Paint software used for?

b. What is typing software used for?

c. What is the difference between paint software and type software?

d. Draw the following pictures in Tux Paint, add suitable color to them and then save them on the computer.

i. Picture of flower ii. Picture of mango

iii. Picture of house iv. Picture of computer

e. Type two paragraphs about your favorite animal and save them on the computer.

2.6 Internet

The Internet is a large network connecting computers around the world. Information can be shared through the Internet. Information from around the world can be instantly accessed from anywhere in the world using the Internet. You can live in Nepal and talk to your friends in different parts of the world while looking at their pictures. Things that interest you can be easily found. The Internet has spread worldwide. It can be used to send information, photos, videos, pictures, etc. from one computer to another computer. It contains complete information about art, literature, technology, culture, geography and the animals in the universe. Such information is stored on a computer. So, you can find the desired content from it whenever you want.

Way to search for information and data on the Internet

A web browser is used to search for information from the Internet. Various web browsers are used on computers and mobiles. Google Chrome, Internet Explorer, Mozilla Firefox, Microsoft Edge, Safari, etc. are some of the most used web browsers. Using these browsers, we can search for the desired content from the Internet. The information can be obtained from the Internet using the following steps.

Step 1: Turn on the computer:

Figure 2.18

Step 2: Open the browser on the computer:

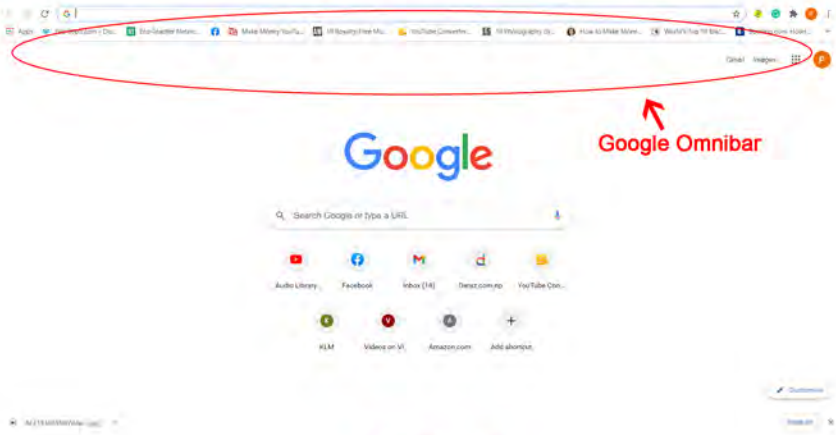


Figure 2.19

Step 3: Click on the Omni bar and type the content you want in the language you want:

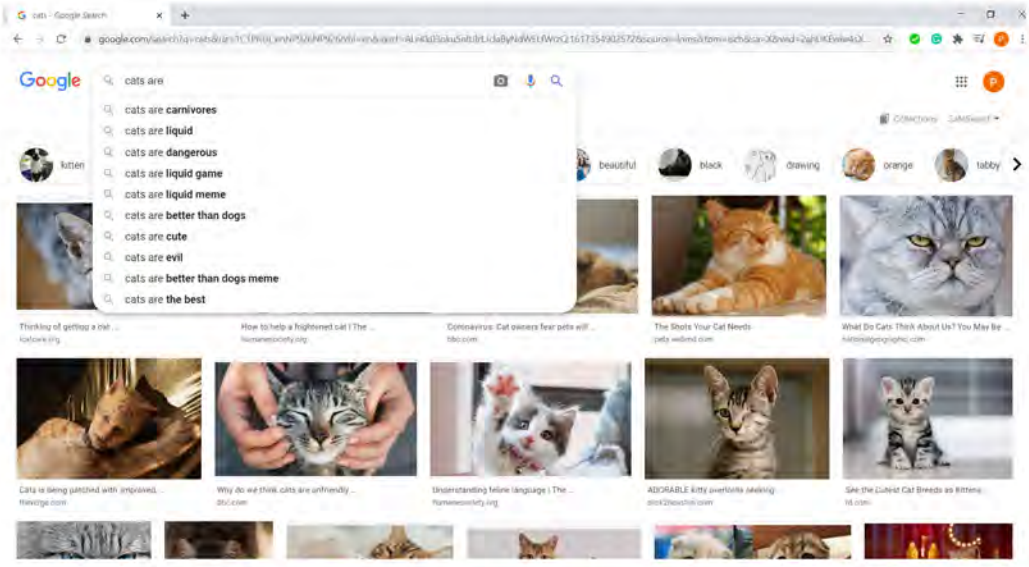


Figure 2.20

Step 4: Now, at the bottom of the Omni bar you will see various choices like : all, news, image, video, etc. Clicking on the image brings up an image related to the subject typed in the Omni bar. Clicking on the video brings up the related videos.

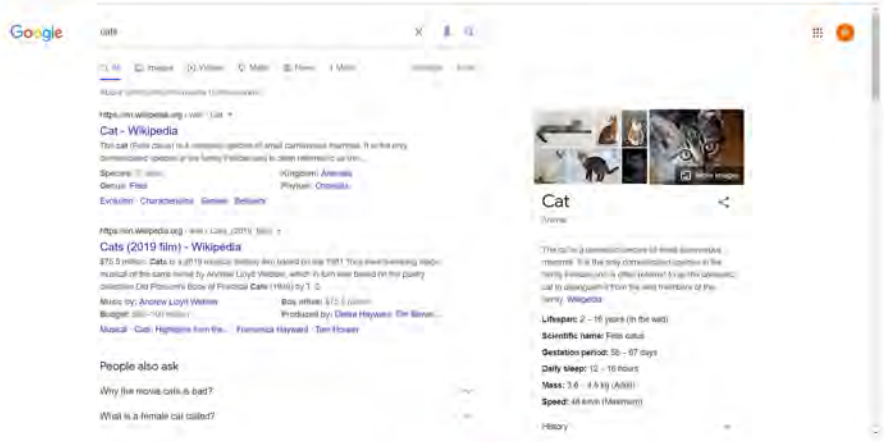


Figure 2.21

In this way, you can find the subject matter you want.

Let's try:

Activity 2.7

a. Search about your favorite animal on the Internet. Along with a picture, write about it and show it to the teacher.

b. Find a picture of your favorite flower on the Internet and show it to the teacher.

Exercise

1. Fill in the blanks:

web browser, computer, Omni, desired content, Internet

a. Using the Internet, we can search for the .....

b. To search for information on the Internet, we have to open the ..... first.

c. To search for the information on the Internet, we have to type the desired subject in the ..... bar.

d. Google Chrome is a .....

2. Choose the correct option.

a. What is Safari?

i. Web browser ii. Internet iii. mobile

b. Which language should be used for typing on the Omni bar?

i. Nepali ii. Chinese

iii. language of our choice

c. What network does the Internet connect to?

i. man ii.book iii. computer

d. What can be found through a web browser?

i. photo ii. video

iii. both photo and video

3. Match the following.

a. Microsoft edge	i. Internet
b. Networking	ii. Storage
c. Play store	iii. Web browser
d. YouTube	iv. App download
	v. Video

4. Answer the following questions:

a. What is the Internet? Write down the importance of the Internet.

b. How can the desired audio, video, image and information om the Internet?

c. The Internet has become an integral part of learning. Explain this statement with examples.

3 Organism and Environment

Let's look at the picture and discuss:

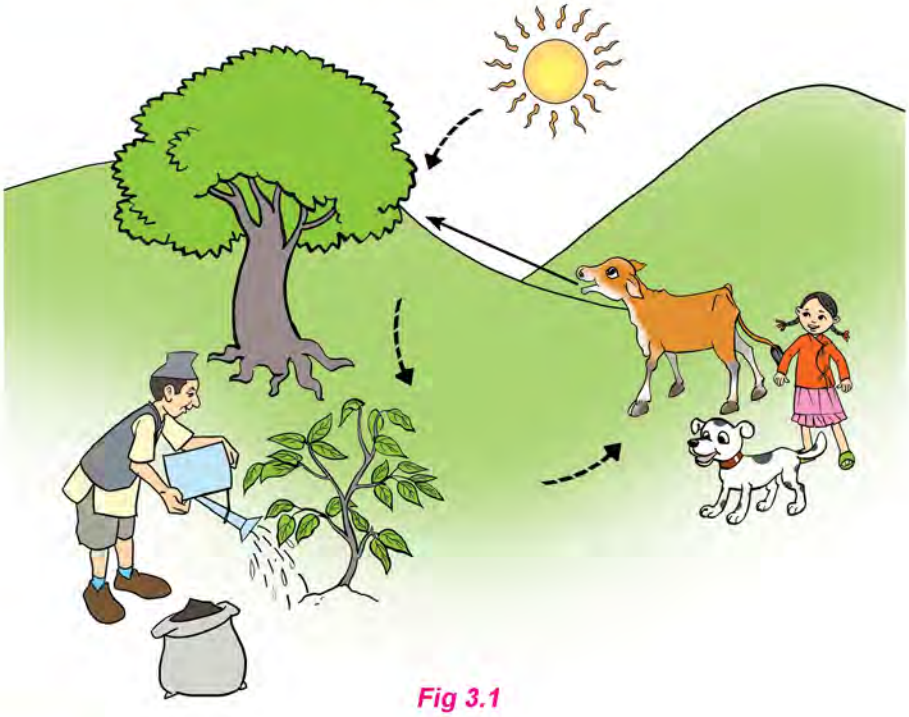


Fig 3.1

Questions

a. What kind of help does the plant seem to get from a man?

b. What has the plant got from the environment?

c. From where do living things get the oxygen they need to breathe?

The environment around us is made up of living and non-livings. Air, water, soil, light, animals and plants are all elements of the environment. Organisms depend on the environment for food, shelter, and other necessities. Plants and animals also depend on each other for survival.

Environment

Look at the pictures and discuss:

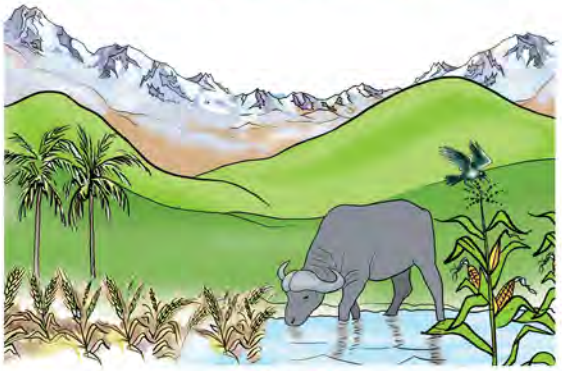


Fig 3.2

Fig 3.3

Fig 3.4

a. What do you see in the pictures?

b. What is the significance of the Sun for humans?

c. How is the buffalo quenching its thirst?

d. What would have happened if there were no pond in the environment shown in the first picture?

e. How might a cat be advantageous and disadvantageous for us?

f. How have humans, plants, and animals helped each other?

We are surrounded by a wide variety of animals and plants. These are living things. The atmosphere also contains non-living objects such as water, soil, air, heat, light, and so on. In this way, living and non-living things combine to form an environment. There is a close relationship between the living and non-living things in the environment.

Sunlight and heat

The sun is very important in our daily life. From the sun we get light and heat. Let's look at the pictures given below and discuss some of the benefits of the sun:

Fig 3.5

Fig 3.6

Fig 3.7

Plants need sunlight to make food. In winter, when living beings bask in the sun, their bodies become warm. Light removes darkness and makes things visible. The sun's heat warms the earth's surface, making it habitable for living things. The water from the earth's surface evaporates due to the sun's heat. The vapour cools and becomes a cloud. When the clouds freeze, it rains. Due to the heat of the sun, the seeds germinate and grow like plants. Electricity can also be obtained from sunlight. The sun is a source of energy that never finishes.

Activity 3.1

Discuss in groups the uses of heat and light from the sun other than those mentioned above. List them on a chart paper and present them to the class.

Water

Water is essential for the survival of animals and plants. The figure below shows the usefulness of water for living things. Discuss this in class:

Fig 3.8

Plants need water to make food. Without adequate water, plants cannot grow. Aquatic organisms live in water. Fish cannot survive without water. Animals like ducks, frogs, crocodiles, turtles, etc. live in water and on land. Animals quench their thirst by drinking water.

Air

Activity 3.2

Look at the picture below and discuss the interrelationships between animals, plants, and air.

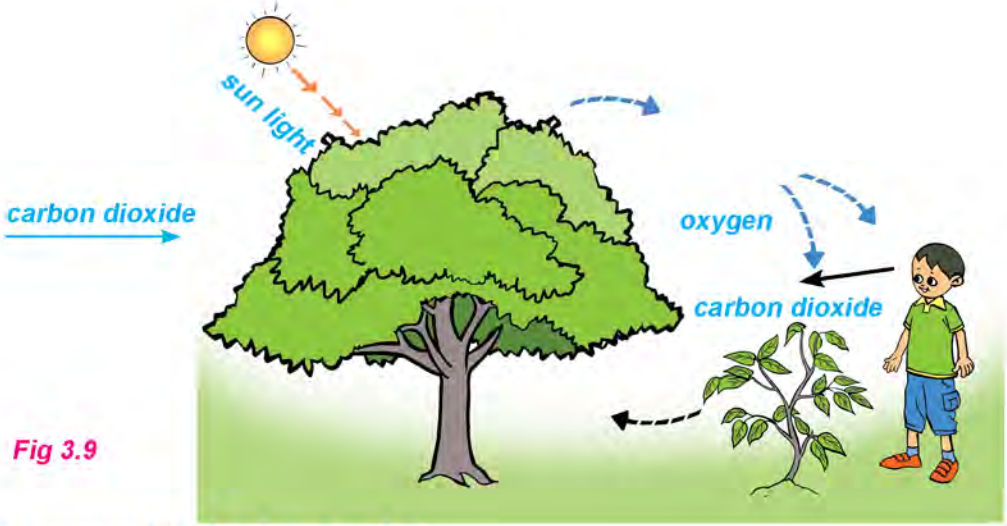


Fig 3.9

Air is an important element of the atmosphere. When living things breathe, they take in oxygen from the air. When animals and plants breathe, they take in oxygen from the air and release carbon dioxide into the air. When a plant makes its food, it absorbs the carbon dioxide gas from the air and releases oxygen. Air is useful to all living things. However, strong winds can break trees.

Activity 3.3

Seperate the useful function of air in the given below :

Help in pollination	Blow up the roof of a house during a hurricane	Breathing	Spread foul smells
Break the tall trees during hurricane	Blow the dust	Blow the seeds	Help birds fly

Useful functions of air	

Soil

Plants germinate and grow in soil. They take water and nutrients from the soil. Several animals live in the soil. Earthworms, rats, and snakes are creatures that live in the soil. Micro-organisms decompose the dead bodies of plants and animals into the soil.

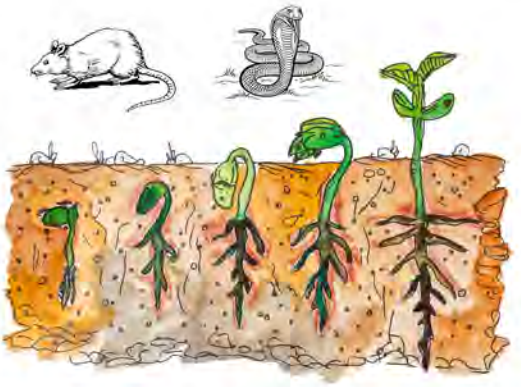


Figure 3.10

Activity 3.4

Why is soil important for the survival of animals and plants? Discussin class.

Activity 3.5

Visit the school garden. Observe the activities between the animals and the plants in the garden. How are the animals and plants in the garden helping each other? Discuss with your friends and fill up the table below:

Organisms	Role in the environment
Earthworm	Loosens the soil and increases fertility

Read the following conversation:

Place: School garden

Characters: Grade 4 students (Ujjwal, Deepti, Pravesh, Akanshya, Dorje, Manjari, Sadikshya, Diki and others)

Akanshya : Friends, what can we see in this garden?

Ujjwal : What are you asking, Akanchhya? Plants, of course! What else should there be?

Sadiksha : No, Ujjwal, there are animals in the garden along with the plants. Look here, there is a butterfly on this flower.

Dorje : I also saw earthworms in the soil.

Manjari : Yesterday, while we were returning from school, Jeevan Dai was weeding the garden.

Pravesh : When I came to the shop this morning, he (Jeevan Dai) was watering these plants.

Deepti : Plants that germinate in soil need sunlight to grow. Take air, water and manure from the environment.

Diki : The oxygen released by plants while making their food is used by living things for breathing. When a butterfly sucks the nectar of a flower, it helps to

move the pollen from one flower to another.

Diki : Carbon dioxide gas emitted by animals while breathing is needed by plants for making food.

Dorje : When the earthworms loosen the soil, it is easier for the plants to grow.

Manjari : Living things also help non-living things. To prevent the condition of air, water and soil from getting bad, people care about their condition. The roots of the plant hold the soil and do not allow the water sources to dry up.

Other students: Oh! There seems to be a close relationship between the living and non-living things in the environment. (The bell rings. All the students go to the classroom.)

Activity 3.6.

Based on the above conversation, write a paragraph on the interrelationship between living and non-living things in the environment.

Activity 3.7

Take at least two seeds of any cereal or beans. Germinate both seeds. Give adequate water and mature the seedlings on regular basis. Place one seedling in a sunny place and the other in a shady place. observe both the seedlings regularly and fill in the table below:

Planting a seedling in a sunny place	**Planting a seedling in a shady place**

Exercise

1. Fill in the blanks by selecting the correct word from the words given below:

water, plants and animals, oxygen, living things, environment, carbon dioxide

a. Living and non-living things together make the .....

b. Organisms breathe in ..... gas.

c. Both animals and plants are .....

d. Plants take ..... gas from the air when making food.

e. Animals get food from .....

2. Choose the correct answer from the given options.

a. What does the plant need to prepare its food?

i. air, water and soil ii. air, water and sunlight
iii. air, soil and sunlight

b. Why is soil important for plants?

i. because it absorbs water from the soil

ii. because it absorbs water and minerals from the soil

iii. because it takes air from the soil.

c. What do earthworms do to the soil?

i. convert into dust ii. make it loose

iii. make is hard

d. Insects carry ... from one flower of the plant to another.

i. pollen ii. nectar iii. fragrance

3. For each of the following statements, mark (√) if they are correct and (x) if they are incorrect:

a. There is a close relationship between the elements of the environment. ☐

b. Non-living things do not help living things. ☐

c. We get the food and oxygen from plants. ☐

d. All the elements needed by living beings are obtained directly or indirectly from the environment. ☐

e. Animals and plants can survive without water. ☐

4. Answer the following questions:

a. What makes an environment?

b. How do animals help plants?

c. What benefits can we derive from animals?

d. How do bees help the following organisms?

i. human ii. Plant

e. Make a list of environmental factors affecting animals and plants.

f. Mention the benefits of sunlight and soil to living things.

g. What does a plant need to make food?

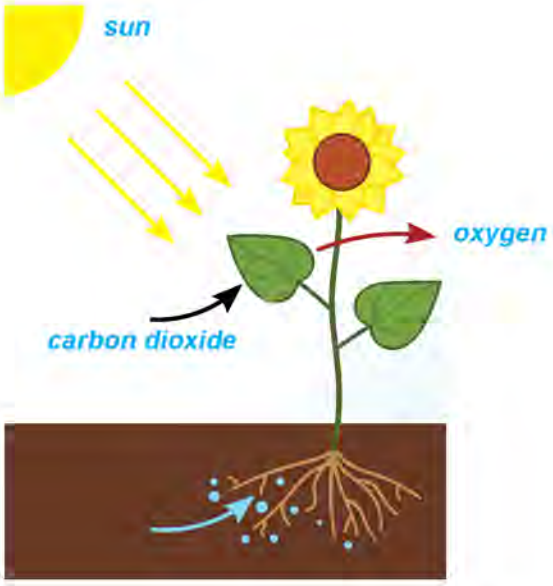
h. Describe the interrelationship between the organism and the environment.

i. Write down how animals and plants can benefit from water.

j. Earthworms are very useful organisms for soil and plants. Justify this statement.

k. Answer the following questions by looking at the picture:

i. What process is shown in the picture?



ii. What is the function of plant roots in the process of making food?

iii. What is the role of the leaf in the process of making food?

l. Write an essay entitled "My Favorite Environment".

Glossary:

Fertility	:	ability of a plant to grow in fertile soil
Germination	:	the process of seedlings coming out of the seed
Pollen	:	small particles found on top of the male part of a flower

Inter relationship between Organisms and Environment

Look at the picture and discuss:

Figure 3.11

a. Why does deforestation occur in an area where the population is growing?

b. What effect will deforestation have on the environment?

c. What is the reason for the animals running away in the picture above?

d. What type of relationship is there between the environment and living things?

Read and Discuss:

Human population is increasing day by day all over the world. The amount of materials used by human increases with increase in population. Human depend upon the environment for food, shelter and clothes.

The amount of air, water, soil, forest, etc. available in the environment is limited. The excessive use of these materials due to the increasing population leads to a shortage of such items in the environment. Population growth can have the following negative impacts on the environment.

a. Deforestation
b. Shortage of water
c. Shortage of cultivable land
d. Increase in temperature
e. Increase in the amount of garbage produced
f. Unmanaged urbanization and industrialization
g. Air pollution
h. Disaster

As the population increases, more food is needed. To grow more food, we need more land. While trying to increase farmland, deforestation occurs. Deforestation leads to the destruction of wildlife's habitat. Deforestation increases the amount of carbon dioxide in the air. This leads to the air increase in the temperature of the place. When the number of plants decreases, the amount of oxygen decreases and air pollution occurs.

Building houses on cultivable land increases urbanization. The unplanned operation of industries and factories pollutes the air. Garbage increases due to overpopulation. Water is contaminated when waste is mixed with water sources. Deforestation reduces rainfall and dries up water sources. As the use of the vehicle increases, the amount of smoke and dust emitted by them increases too. Smoke and dust pollute the air and have a adverse effect on our health.

Activity 3.8

Discuss the negative effects of excessive population growth on environmental factors. Present the findings on a chart paper in the following format:

Environmental factor	Impact of population growth
Air	
Water	
Cultivable land	
Forest	
Temperature	
Soil	

Project Work

By asking your parents or elders, find out the state of the environment around you now and ten years ago. Note the findings in a table similar to the one shown below and then discuss them in class.

Current environment	Environment ten years ago

Project work

How is the kitchen waste such as vegetable peels, rice grains, husk, straw used for tying vegetables, and as well as weed pulled out from the farm managed at home? Find it and discuss it in class

Exercise

1. Fill in the blanks by selecting the appropriate word from the set of words given alongside:

a. Rapid population growth has .....effect on the environment. (positive / negative)

b. Deforestation increases the amount of ..... in the air. (oxygen / carbon dioxide)

c. The amount of cultivable land ..... due to urbanization. (decreases / increases)

d. As the number of people increases, so does the amount ..... in the environment. (forest / garbage)

e. Water sources may be ..... due to deforestation. (drying /bursting)

2. Write "True" if the following statements are true and "False" if they are not true.

a. Population growth does not affect the environment.

b. As cultivable land becomes scarce, people destroy forests.

c. The higher the number of plants, the higher the amount of oxygen in the air.

d. Wildlife habitat is lost due to deforestation.

e. If the amount of carbon dioxide gas in the atmosphere increases, the temperature of the atmosphere decreases.

f. Smoke and dust coming out of the vehicle pollute the environment.

3. Answer the following questions:

a. Write five negative effects of excessive population growth on the environment.

b. How does population growth cause air pollution?

c. Mention the negative impact of population growth on forests in an area.

d. How does population growth create water scarcity?

e. What changes occur in the state of air when the number of animals increases and the number of plants decreases?

f. Write how the amount of garbage increases when the operation of industries and factories goes unmanaged.

g. Trees have been cut down on the slopes around a village. Due to this, the people there are now facing natural disasters like drying up of water sources, drought and landslides. What can you do to keep the environment clean?

4 Classification of Living Beings

Plants and animals are living things. Some of these are found in water and some on land. Some of the animals give birth to babies and some lay eggs. There are two types of plants: flowering and non-flowering. We are surrounded by a wide variety of plants and animals. It is difficult to study them separately. Therefore, organisms with similar characteristics are studied in a group. The separation of animals and plants into different groups based on their characteristics is called the classification of living things.

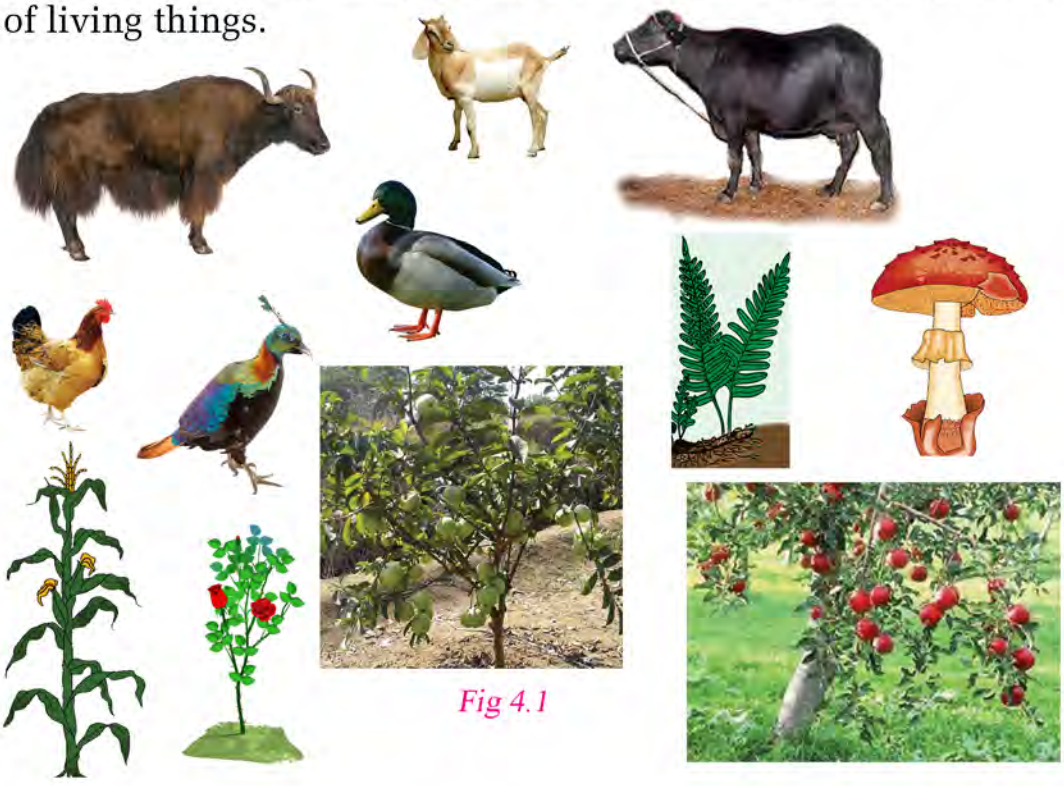
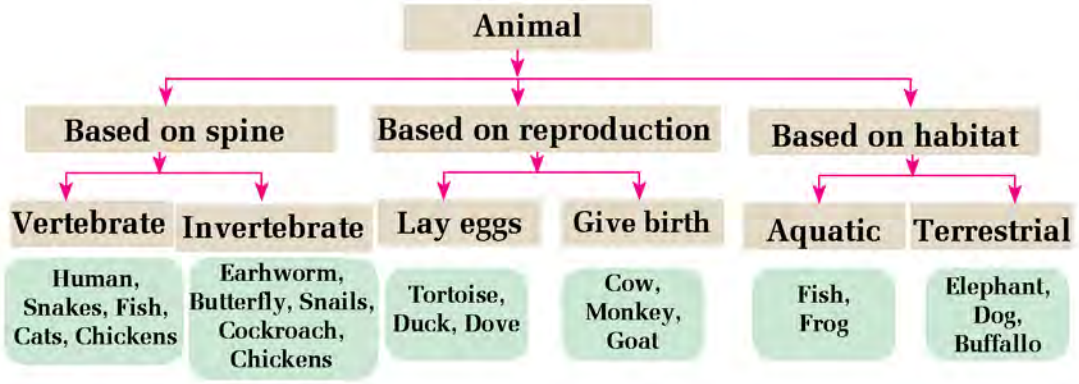
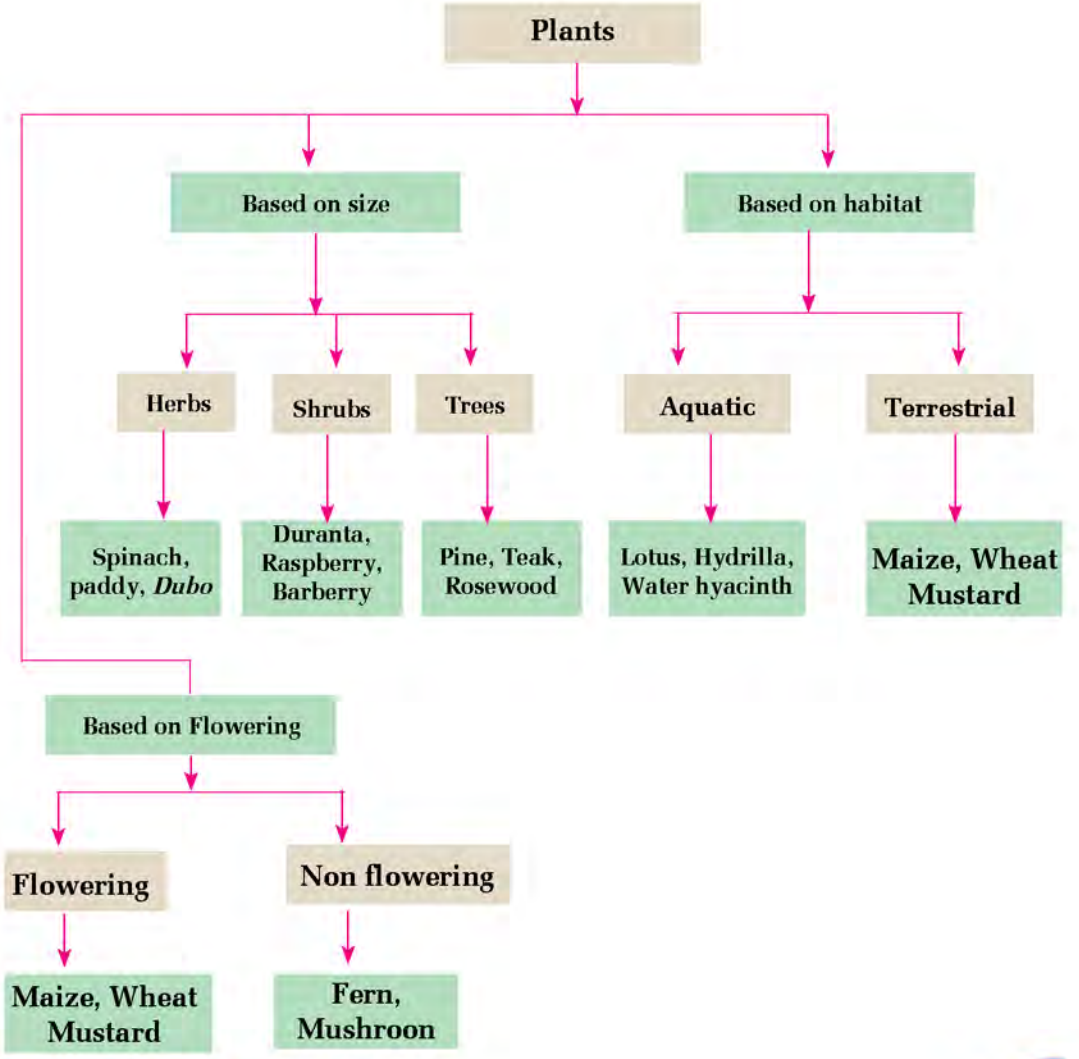


Fig 4.1

a. Which are the flowering and non-flowering plants in the picture above?

b. Which animals in the picture lay eggs and which give birth to babies?


Animal
Based on spine
Based on reproduction
Based on habitat
Vertebrate
Invertebrate
Lay eggs
Give birth
Aquatic
Terrestrial
Human, Snakes, Fish, Cats, Chickens
Earhworm, Butterfly, Snails, Cockroach, Chickens
Tortoise, Duck, Dove
Cow, Monkey, Goat
Fish, Frog
Elephant, Dog, Buffallo


Plants
Based on size
Based on habitat
Herbs
Shrubs
Trees
Aquatic
Terrestrial
Spinach, paddy, Dubo
Duranta, Raspberry, Barberry
Pine, Teak, Rosewood
Lotus, Hydrilla, Water hyacinth
Maize, Wheat Mustard
Based on Flowering
Flowering
Non flowering
Maize, Wheat Mustard
Fern, Mushroon

Animals around us

Invertebrate animals

Activity 4.1

Let's look at and discuss:

Fig 4.2

a. Have you seen the animals shown in the picture? What are their names?

b. Are their bodies soft or hard?

c. Do they have a backbone in their body?

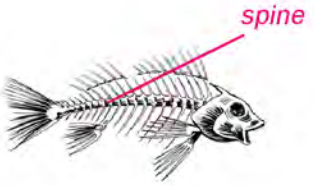
d. What other similar vertebrate animals have you seen?

Of the animals shown in the picture above, butterflies, liver fluke, spiders, starfish, crabs and mosquitoes do not backbones in their bodies. These animals without backbones are invertebrates. Animals without backbone have softer bodies. These animals cannot stand up straight. Most animals that do not have a backbone are small. In addition to the animals mentioned above, house flies, centipede, jellyfish, bees, etc. are some more examples of invertebrates.

Vertebrate animals

Activity 4.2

Let's look at and discuss:



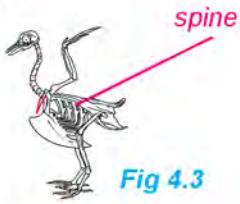
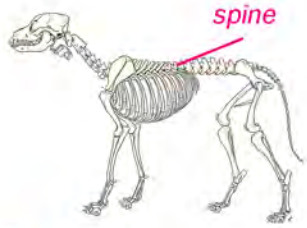


Fig 4.3



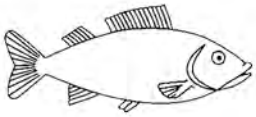


Fig 4.4

a. What difference did you find in pictures 4.3 and 4.4?

b. What is the long hard object on the back that extends from neck to tail?

c. Why are their bodies strong?

d. What other animals with backbones have you seen?

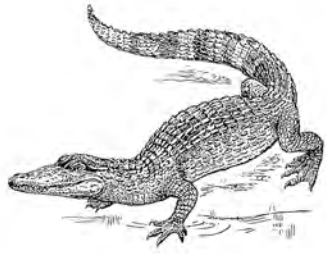


Fig 4.5

Humans and crocodiles are vertebrates. Animals with backbones are strong and stiff. The backbone supports the body of the animal. Animals with backbone can stand strong and often upright. Frogs, snakes, pigeons, monkeys, elephants, etc. are examples of some animals that have backbones.

Activity 4.3

Separate the given animals with a backbones and animals without backbones:

Fruit fly, lizard, jackal, prawn, snail, bird, turtle, mosquito, buffalo, cockroach

Animals without backbone	Animals with backbone
1.	1.
2.	2.

The body of ananimal with a backbone is relatively stiff. The body of an animal without a backbones is soft. Most animals with backbones have a tail at the end of their body. Animals with backbone have a definite body shape.

Activity 4.4

Write the differences between vertebrates and non-vertebrates on the following bases:

Basis	Animals without backbone	Animals with backbone
Bone		
Physical appearance		
Size		

Project work

a. Make a list of the animals you have seen around your school and home. Classify them as animals with and without a backbone.

b. Observe an animal with a backbone and another without a backbone, study its structure and present it in class.

Fig 4.6

Question to think

Why can an earthworm not stand upright like a human?

Project work

Collect photos of five vertebrates and five invertebrate animals and paste them on a chart paper as shown below. Present your table in the class.

Vertebrates	Invertebrates

Oviparous and viviparous animals

Let's see and discuss:

Fig 4.7

a. Which animal is seen to be giving birth in the above figure?

b. Which animal is seen to be hatching eggs?

c. What other animals have you seen giving birth and laying eggs?

The way animals give birth is different. Some animals do not lay

Fig 4.8

eggs but give birth directly to babies. Elephant, buffalo, rabbit, kangaroo, hippopotamus, dolphin, etc. are the animals that give birth to babies. Some lay eggs. Egg-laying animals do not give birth directly. The baby hatches from the egg. Birds, snakes, fish, frogs, butterflies, ants, doves, ducks, turtles, crocodiles, etc. are egg-laying animals.

Activity 4.5

Among the animals listed below, identify the animals that lay eggs and give birth and fill in the table given below:

Ostrich, dog, mice, lizard, spider, cat, snake, crow, sheep, elephant, cockroach, be mosquitoes, whale, and bat.

Oviparous animals	Viviparous animals

Fig 4.9

Fish and frogs lay eggs in water. The baby emerges from the egg in the water. The snake lays eggs in a hole and wraps itself around the eggs to incubate them. Animals such as tortoises and crocodiles lay eggs in soil and eggs hatch in the soil. Birds like chickens, pigeons, doves, etc. roost on their eggs to incubate them. Ducks and cuckoos make other birds incubate their eggs.

Project Work

Prepare a list by observing the surrounding animals. Divide them into two groups, one for egg laying and the other for childbirth. Discuss their other characteristics in class.

Habitat of animals

Let's look at and discuss:

Fig 4.10

Fig 4.11

i. Where is the fish's habitat? ii. Which organ of the fish helps to breathe? iii. What covers the body of a fish? iv. With the help of which organ does the fish move from one place to another in the water? v. What other aquatic creatures can live in water?	a. Where is the goat? b. Through which organ does the goat breathe? c. What covers the body of a goat? d. Which part of the goat helps it to go from place to place? e. What other creatures like a goat can live on land?

Question to think

Why can a goat not survive in water?

The place where animals live is their habitat. Animals' habitats vary. Some animals live on land. Some animals live in the water.

1. Terrestrial animals

Fig 4.12

Cats, mountain goats, tigers, and deer live on land. Animals that live on land breathe through their lungs. The bodies of land animals are covered with hair or feathers. Animals that live on a land walk with the help of their feet.



Fig 4.13

Animals on land also vary from place to place. Polar bears and penguins are found in cold regions. Camels and lizards are animals found in hot places. Animals like tigers, bears, leopards, jackals and monkeys live in the forest. Butterflies, bees, flies, and birds can fly in the air.

Activity 4.6

Prepare a list of the animals that live on the land around you. Fill in the names of these animals according to their habitat in a table similar to the one below.

Habitat	Animal	Habitat	Animal
Tree		Forest	
Shed		Pen	
Sand (Desert)		Cold place (Mountain region)	
Hole		Hot place (Terai region)	
Nest			

2. Aquatic animals

Fish, crabs, and octopuses are aquatic animals. Most aquatic animals breathe through gills. Their bodies are covered with

Fig 4.14

scales. Most animals living in water have fins. Fins help them to swim in the water.

Fig 4.15

Seahorses, jellyfish, octopus, and starfish are found in the sea or ocean. Fish, dolphins and crabs are found in fresh water. Animals such as ducks, frogs, and crocodiles can live both in water and on land.

Project work

Collect pictures of some aquatic and terrestrial animals. Divide a chart paper into two sections, aquatic and terrestrial. Then, paste the pictures accordingly. Discuss the differences between aquatic and terrestrial animals based on the charts.

Questions to think

a. Why does a frog survive on both land and water?

b. What is the difference between fish and crocodiles' way of living water?

Exercise

1. Select the correct option.

a. Snake (has/doesn't have) spine.

b. The body of invertebrates is (soft/hard).

c. (Duck /Cow) gives birth to offspring.

d. Lizard lives (on land / in water).

e. (Seahorse/Frog) is an organism that lives in both land and water.

2. Fill in the blanks with the words given below:

hot, skin, cold, milk, egg, bone

a. Animals with vertebrae have..... in their bodies.

b. Birds such as chickens, sparrows, pigeons incubate their .....

c. Youngs of animals like cows, buffaloes, and humans get nourishment from.....

d. Yak is an animal found in ..... place.

e. When the frog is in the water, it breathes from its .....

3. Match the following:

i. Swimming	a. Rabbit
ii. Crawling	b. Fish
iii. Jumping	c. Pigeon
iv. Walking	d. Crocodile
	e. Human

4. Answer the following questions:

a. What kind of animal has a soft body?

b. Write the names of five animals that do not have a spine.

c. Write any three features of a vertebrate.

d. Make a list of any five vertebrates.

e. Write the difference between vertebrates and invertebrates.

f. Mention two ways in which animals produce babies.

g. Both snakes and crocodiles are animals that incubate eggs. How does their incubation style differ?

h. What is the respiratory organ of an aquatic animal called?

i. Mention the habitat of the following animals:

1. Earthworm
2. Frog
3. Squirrel
4. Buffalo
5. Mouse
6. Fish
7. Sparrow

j. Name one animal each with the following characteristics:

1. Has a sharp beak and lives in a hole in the ground,
2. Has a soft and segmented body, makes the soil is loose and lives in it,
3. Has fins and breathes through gills,
4. Baby grows in the mother's womb for nine months after conception and is then born,

5. Has a backbone and lives in a hole in a tree trunk.

6. Crawls, lives in both water and land, lays eggs and produces babies from eggs.

k. Write the characteristics of animals having vertebrae and not having vertebrae in the appropriate places in the Ven diagram.

1. Normally large and fast-moving animals

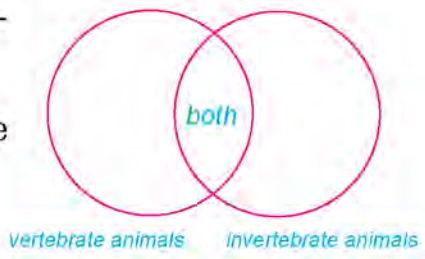
2. Animals found in a large number

3. Animals that can walk

4. Animals with warm blood

5. Animals that live on land or water

6. Animals that have more than two pairs of legs



Plants Around Us

Let's see and discuss:

Spinach

Rose

Pipal

Fig 4.16

a. Which group of plants is the tallest?

b. Which group of plants is the shortest?

c. How long do herbs survive?

d. Among shrubs and trees, which have stronger stems?

e. Which plants belong to the shrubs?

f. Based on the size, how many types can plant be divided into? What are they?

Activity 4.7

Collect the names of five plants in the herb, shrub and tree groups:

Herbs	Shrubs	Trees
1.	1.	1.
2.	2.	2.
3.	3.	3.
4.	4.	4.
5.	5.	5.

Let's read and understand:

Plants are the living things found in the environment. Plants vary in features and characteristics. Some plants are found in water. Some plants grow on land. Some plants are small. Some plants are medium and some plants are large. Such plants can be studied by dividing them into different groups.

A. Classification of plants based on size

Activity 4.8

Look at three plants each with the following characteristics and write their names:

Plants are small. As the roots are small and fine, they can be easily uprooted. Usually, live only for one or two seasons The stem is soft and non-woody.	(Herbs) 1. ..... 2. ..... 3. .....
Plants are of medium size. Plants look bushy. The stem is neither too strong nor too weak.	(Shrubs) 1. ..... 2. ..... 3. .....
Tall and big plants. Has long roots that go deep into the ground. Survive for many years.	(Trees) 1. ..... 2. ..... 3. .....

Garlic

White Jasmine

Fig 4.17

Pine Tree

There are many types of plants around us. Some plants are very small whereas some plants are of medium size. Some plants even grow very large. Small plants are called herbs, medium plants are called shrubs and large plants are called trees.

Herbs include wheat, maize, paddy, mustard, cauliflower, coriander, etc. Lemons, pomegranates, roses and oranges belong to the shrub group. Plants like mango, neem, pipal, walnut and pine belong to the tree group.

Activity 4.9

Observe the various plants around you and write down in the following table whether they are herbs, shrubs or trees:

Herbs	Shrubs	Trees
1.	1.	1.
2.	2.	2.
3.	3.	3.
4.	4.	4.
5.	5.	5.

a. Herbs

Bermuda grass

Paddy

Millet

Fig 4.18

Lemon grass

Plants in the herbs group have short and fine roots. Such plants usually survive only one season. They have only one stem. The plants in this group are weak and soft. Bermuda grass, potato, mustard, ginger, barley, turnip etc. fall under herbs.

b. Shrubs

The plants in this group are larger than herbs and smaller than trees. Their roots are longer and stronger.



Fig 4.19

Since they have several branches coming out of the stem, they look bushy. Such plants survive for several years. Their stems are quite hard and strong. Such plants are often used for fencing around the house and decoration. Tea trees, peach trees, jasmine trees, etc. are some examples of shrubs.



Fig 4.20

c. Trees

A very big plant around us is called a tree. Trees are tall and strong. Their roots are very long and the stems are hard. Wood is obtained from this hard trunk of the tree. Plants in the tree group live for many years. Uttis, Chilaune, Okhar, Sal, Sisau, Pipal, Neem, etc. are examples of trees.

Activity 4.10.

Find out the differences between herbs, shrubs and trees to complete the table.

Basis of classification	Herbs	Shrubs	Trees
1. Lifespan			
2. Softness of stem			
3. Plant size			
4. Root size			

Let's look at the picture and discuss:

a Fig 4.21 b

a. Which of the plants in Figure (a) and Figure (b) above are on land and which one is in water?

b. Between the plants found on land and in water, which have long and developed roots?

c. Which of the plants in Figure (a) and Figure (b) has a hard stem?

d. Among plants found on land and in water, which survive longer?

B. Classification of plants based on habitat

Plants around us are found either in water or on land. Hence, plants can be classified as terrestrial and aquatic plants based on their habitat.

a. Aquatic plants

Fig 4.21

The plant that germinates and grows in water is an aquatic plant.

Algae, lotus, water hyacinth, waterlily and hydrilla are examples of aquatic animals.

Activity 4.11

Visit the water sources around you and observe the plants there. Make a list of plants observed. For one plant among the ones on your list, carry out a detailed study. Among the facts given in the table below about roots, stems and leaves, tick (√) the ones that apply to your plant.

1. Root	weak and undeveloped ☐	hard and developed ☐
2. Stem	solid and strong ☐	hollow and soft ☐
3. Leaf	large and broad ☐	thin and thick ☐

Aquatic plants are small and underdeveloped. Their roots are not well developed. Therefore, the roots of such plants are spread in the water. Their stems are soft and hollow. The broad leaves help the aquatic plants to float in the water. The leaves of some aquatic plants are thin too. The leaves and stems of some aquatic plants are covered with a slimy substance like wax.

Question to think

How does the wax-like slimy substance found on the outside of an aquatic plant help those plants?

C. Terrestrial plants

chilly

walnut

small babmoo

Fig 4.23

Plants that germinate on land and grow in the soil are called

terrestrial plants. Such plants are also called ground plants. Orange, banana, mango, cauliflower, maize, catweed (Vanmara), bermuda grass (Dubo), persimmon (Haluwabed), etc. are some of the plants found in the land.

Questions for discussion

a. Why is it not easy to uproot the terrestrial plants?

b. Why can't the terrestrial plants be broken easily?

Most of the plants around us are found in the ground. Apart from the herbs found in the soil, the plants are big, tall and strong. The roots of such plants are well developed. Since the roots of the plants found in the soil are long, they go deep into the soil. The stems of most plants found in the soil are hard and woody like timber. The leaves of terrestrial plants are broad or elliptical or elongated in shape.

Different parts of the plant

Activity 4.12

Discuss the following questions and identify the parts of the plant:

a. Identify the different parts of the plant in the picture above.

b. What part of the plant is under the soil?

c. Which part of the plant is colorful?

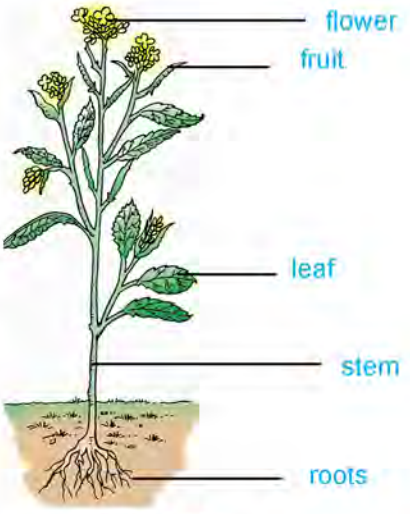


Fig 4.24

d. Which is the hardest and strongest part of the plant above the ground?

e. What parts of plants are green? What does it help?

f. Each of the students in the class collects one of the different plants and identifies different parts of it.

Although it looks simple, a plant has many parts. Some parts of the plant are under the ground. The underground part of the plant is called the root. The roots of the plant are usually white. Most parts of the plant are out of the ground. Such parts include stems, branches, leaves, buds, flowers, fruits, etc. The stem of the plant is hard, strong and cylindrical. The leaves of the plant are green. This makes the plants look green when viewed from a distance. Small parts emerge from the stem of the plant. They are called branches. The flowers of the plant are attractive and colorful. When the flower matures, it bears fruit. The fruits of some plants are edible.

Activity 4.13

Collect any five plants, observe the color of their roots and fill in the table below:

Name of the plant	Color of the root
1. Maize	White
2.	
3.	
4.	
5.	

Activity 4.14

rose *marigold* *hibiscus* *rhododendron*

Fig 4.25

Observe the flowers shown above and write their size, shape and color in the table:

Name of the flower	Color of the flower	Shape of the flower	Size of the flower
1.			
2.			
3.			
4.			

Activity 4.15

Write the names of any six fruits you have eaten or tasted.

Project Work

Make a clear picture of one of the plants found around your home and name all the parts listed below:

a. Root b. Stem c. Leaf d. Flower e. Fruit or Seed

Exercise

1. Identify the characteristics for the following plants and match the pair:

a. Walnut	i. the colorful part of theplant
b. Watercress	ii. shrub
c. Root	iii. tree
d. Fruit	iv. the underground part of plant
e. Rose	v. aquatic plant
	vi. food preparing part of the plant

2. Write 'true' for the correct statements and 'false' for the incorrect ones.

a. All plants are tall and strong.

b. Plants belonging to the herb group survive only for one or two seasons.

c. Watercress is a plant that lives in the soil.

d. Shrub is used for fencing around the house.

e. Trees are perennial plants.

3. Fill in the blank with the given words:

a. Coriander falls under the .....group. (herb / shrub / tree).

b. Herbs survive for ..... (some years / many years /only up to one or two seasons).

c. Tree stems are ..... (hollow and soft/solid and hard / easily broken).

d. Lotus grows in ..... (water/soil/air).

e. Roots of terrestrial plants are .....(short and fine/ thin and underdeveloped/long and well developed).

4. Answer the following questions:

a. State the types of plants based on size.

b. What are the characteristics of plants belonging to the herbs group.

c. What kind of plants are called trees? Give an example.

d. Write the names of any three plants belonging to the shrub group.

e. Write the characteristics of aquatic plants.

f. Write the names of any four plants found in the water

g. Present the difference between aquatic and aquatic plants in the table as follows:

Basis of difference	Aquatic plants	Terrestrial plants
Root		
Stem		
Leaf		

h. Separate the following plants into terrestrial and aquatic plants.

Algae, paddy, water hyacinth, watercress, mustard, rose-wood

i. Draw a clear picture of a plant, name the different parts of it and write down the two functions of each part.

Vocabulary

Spine : A group of bones extending from the neck to the tail in the back of the body.

Incubate : To sit on the eggs and keep them warm until they hatch.

Hatching : the process of a chick coming out of an egg.

5 Life Process

Activity 5.1

Let's observe and discuss the life cycle of plants and animals:

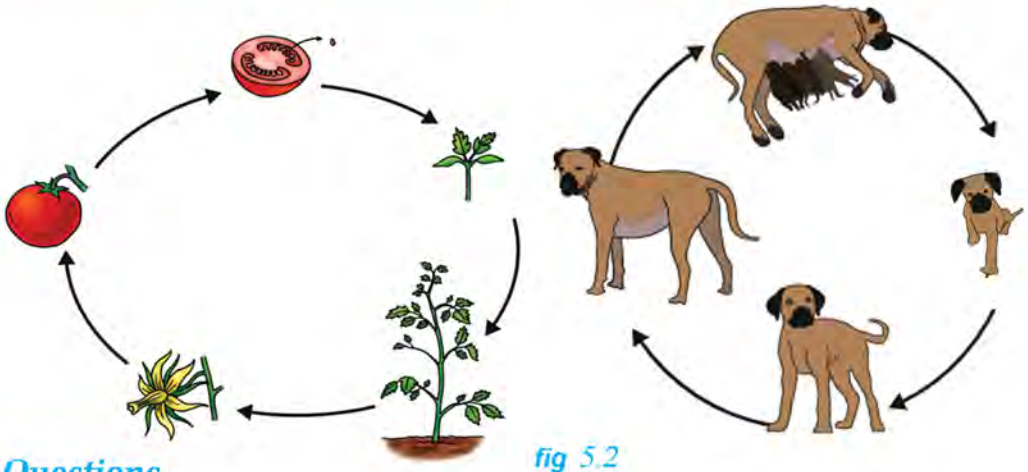


fig 5.2

Questions

a. What needs to be sown in the soil to produce a new tomato plant?

b. What is developed when a flower matures?

c. What are the different stages that have to be passed for a tomato seed to turn into a fruit?

d. How big are the puppies at the time of birth?

e. Do the puppies remain the same size forever?

f. What do puppies become when they grow up?

Birth, growth and death are the continuous processes that occur in every living being in the world. In the initial stage, all living things are immature. As they get older, they evolve. When they mature, they can produce offspring. At the end of life, they grow old and die. The life cycle of living beings includes all evolutionary stages from birth to death.

Activity 5.2

Assign suitable numbers from 1 to 6 to indicate the developmental stages in the figure given below:

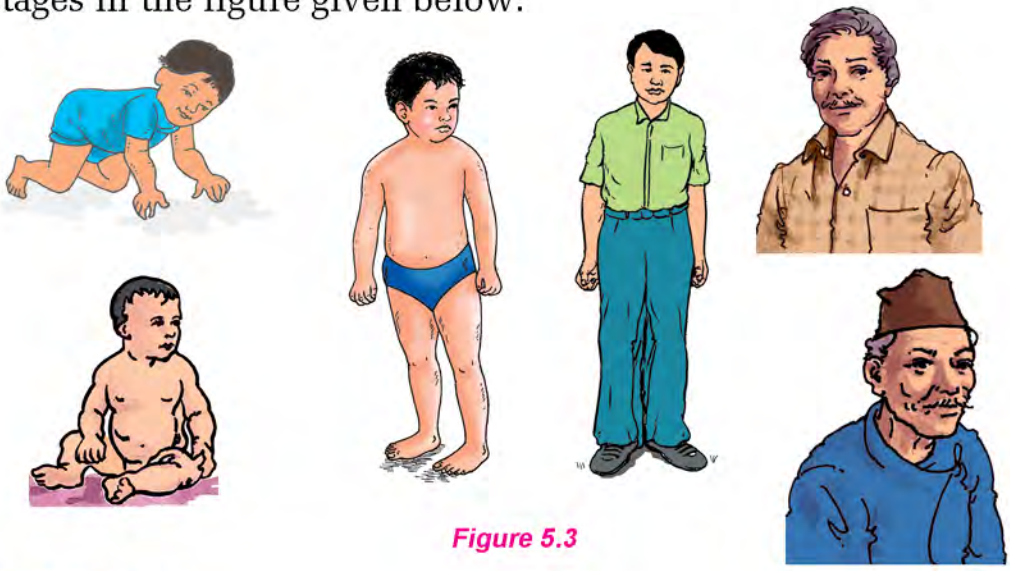


Figure 5.3

Activity 5.3

A. The following animals are shown with their babies. Write the names of their babies:

Figure 5.4

Baby of a lion is .....

Baby of a buffalo is .....

Baby of a sheep is .....

Figure 5.5

Baby of a dog is ... Baby of a cat is ..... Baby of a cow is .....

Figure 5.6

Baby of an elephant is .....

Baby of a horse is .....

Baby of a chicken is .....

B. Do all animals be small at birth, grow big and then die when they become old? Discuss.

Let's read the conversation:

Aditi, Abhushan, Lakpa and Vilakshan are students of grade four. They go to school via. Dandagaun. Today, Aditi arrived shortly after Abhushan, Lakpa and Vilakshan arrived there.

Aditi : Hello friends!

Abhushan, Lakpa and Vilakshan: Hello Aditi!

Abhushan : Aditi, why are you late today?

Aditi : Oh! Our goat gave birth to a kid early this morning, and I became late for school because I watched the kid for some time.

Lakpa : I also have a 15-day-old baby goat at home. She runs with me, jumping and dancing.

Vilakshan : We have a goat farm in our house. In about six months, kids become as big as their mothers. After one year of their birth, they also give birth to babies.

Abhushan : The goat in my house is old. She can't even walk or eat properly. Probably will die soon.

Aditi : All the animals around us look small and weak at birth, yah! How beautiful and strong they become as they turn to adults. We have also seen those animals give birth in adulthood and die in old age. What a surprise! This sequence continues in all animals.

Vilakshan : It's not only the animals, the process of birth, growth and death occurs even in plants.

Abhushan : Yes, that's true Vilakshan. Let's take a look at this field. The mustard seeds that Harke Dai sowed two months ago have already germinated, grown and turned yellow. Probably, it will bear fruit in the next few weeks. When the pods are fully ripe, the mustard plants will dry up and die.

Lakpa : Wow! While talking, we didn't even notice that we have already reached the school. Let's tell all these things to the teacher in today's class.

Other friends: Okay!

Let's read and discuss:

The process of birth, growth and death continues in living beings. Organisms go through different

Fig 5.7

stages of development from birth to death. This process is called the life cycle. Some organisms have a short life cycle while others have long.

The adult hen lays eggs. She incubates the eggs for about 22 days. Then these eggs hatch into chicks. The chicks grow up to be adult chickens. Adult female chickens begin to lay eggs again. The chicken dies when it is old.This completes the life cycle of a chicken.

Question to think

Do all eggs that are laid by a hen hatch into chicks? Why?

Life cycle of a butterfly

Activity 5.4

Collect the leaves where the butterfly has laid eggs. Place these eggs in a transparent glass or plastic bottle. Close the lid of the bottle but make holes in some parts of the bottle to allow air to pass. Observe the larvae emerging from the eggs. Observe a larva, pupa, and adult butterfly. Explain the stages of a butterfly's life cycle through this activity. Draw a chart and present it to the class.

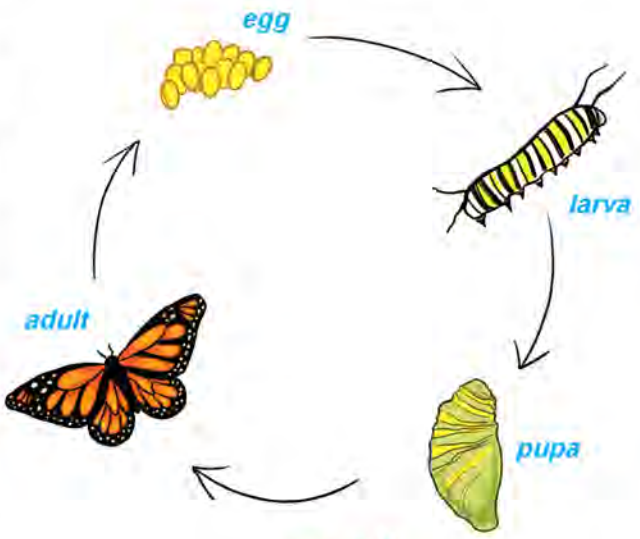


Fig 5.8

The butterfly is a type of insect. Its life cycle is completed in four stages. The four stages are egg, larva, pupa and adult. The female butterfly lays eggs on the leaves of the plant. After a

while, butterfly larvae emerge from those eggs. The larvae of a butterfly are called caterpillars. The caterpillars eat the leaves of the plant. It enters the pupae state when it stops eating leaves. In this case, the pupa stays inside the thin shell. The developed pupa comes out from the thin shell by making a hole in it. After a while, the wings dry out and the butterfly begins to fly. The life cycle of most insects is similar to that of a butterfly.

Activity 5.5

Collect photographs that show different stages of an animal's life cycle. Make a collage by sticking them in a order and present it in your class.

Plant Life

Fig 5.9

a. What are the sequential stages of plant growth?

b. What is required for the seed to germinate?

c. Which part of the plant later bears fruit?

d. In which part of the plant do seeds develop?

Like animals, plants have a life cycle, too. Seeds are planted in the soil to grow new seedlings. Seeds are sown in the soil and they germinate when the environment is favorable. Seeds germinate and seedlings emerge. Seedlings grow into young plants. They are called saplings. The saplings grow into adult plants. Flowers bloom on adult plants. When the flower matures, it bears fruit. Seasonal plants die after fruiting.

Activity 5.6

Discuss the life cycle of the maize plant with classmates.

Questions to think

a. Do all plants grow only from seeds?

b. Do all plants have a flower?

Fig 5.10

Project and experimental work

Sow pea or bean seeds in a pot in your school garden. Add some manure and water the seedlings growing from these seeds. Observe the different stages of plant development seen in this process. Based on this activity, write down the different stages of the life cycle of a pea or bean in proper sequence. Sketch each stage and display in the classroom.

Do you know, how potato seedlings are produced ?

Fig 5.11

When a potato plant matures, it bears white or purple flowers like other plants. The flowers also bear tomato-like fruit. This fruit contains fine seeds similar to chili seeds. These potato seeds do not produce good seedlings. That is why new seedlings are produced by cutting the potato and planting the pieces.

Activity 5.7

Discuss and write:

Discuss among friends how new plants are produced in the following plants:

To produce a new tomato plant,	Way to produce saplings
Rose	
Sweet potato	
Bamboo	
Apple	
Banana	

Is the life cycle of all plants of equal length?

We have seen the seeds of various plants sown in the fields. Have we ever considered the time it takes for a new plant to bear fruit and for those plants to die? Of course, some plants bear fruit shortly after planting. Likewise, we have to wait a long time for some plants to bear fruit. The life cycle of some plants is short and that of others is long. The life cycle of plants like potato, maize, paddy and wheat is short. The life cycle of plants like teak (Sal), rosewood (Sisau), Senegalia catechu (Khayar), pine (Salla), etc. takes a long time to complete.

Activity 5.8

Observe the life cycle of any of the five plants you have seen around you and record the time taken by each of them to complete their life cycle in the table below:

Plant's name	Time taken to complete the life cycle
Mustard	3 months
1.	
2.	
3.	
4.	
5.	

Project work

Make herbarium

Collecting different stages of a plant found in your field or garden, prepare a herbarium and display it.

How to make herbarium

a. Collect different stages of any plant in the field or garden. For example, sprouts, seedlings, saplings and flowering plants.

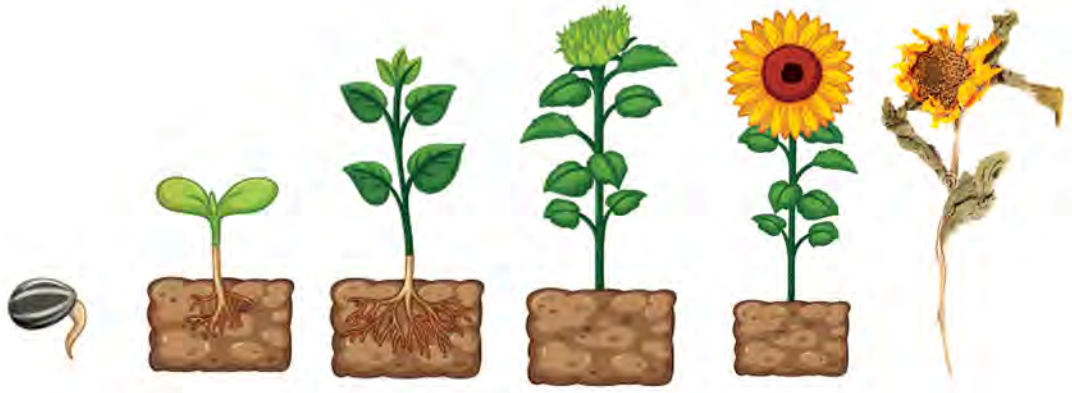


Fig 5.12

b. Keep all these separately inside a newspaper or magazine.

c. Press the newspaper or magazine with a certain object and leave it for about a week.

d. Now, paste these plant stages on a chart paper in a sequence. The herbarium is ready.

Exercise

1. Match the following animals and their babies:

Animal	Baby
Tiger	Calf
Buffalo	Pup
Dog	Cub
Rhino	Lamb
Cow	Calf
Horse	Boy
Sheep	Foal
	Kid

2. Fill in the blanks with the correct words given below.

Caterpillar	ShortChick	Adult
Pupa	Life cycle	Sprout

a. The sequence of stages from birth to death of an organism is called .....

b. The life cycle of small organisms is .....

c. The four stages of the life cycle of insects include egg, larva, ...and adult, respectively.

d. The larval stage of a butterfly is called .....

e. The seed of the plant germinates and a ..... appears after sowing in the soil.

f. Chicken's baby is called .....

3. Answer the following questions:

a. What is life cycle?

b. What are the stages of human life cycle?

c. Write the names of different stages of the pigeon's life cycle.

d. What are the stages in the life cycle of an insect?

e. Write the names of different stages life cycle of a bean plant.

f. Write the name of the stages of the life cycle of spinach.

g. Name the babies of the following animals:

i. Swan ii. Cow iii. Elephant iv. Rhino

v. Fish vi. Frog vii. Lion viii. Butterfly

h. Write the different stages of the frog in a sequence.

i. Draw a clear picture of the butterfly's life cycle and write the name of each stage.

6 Matter

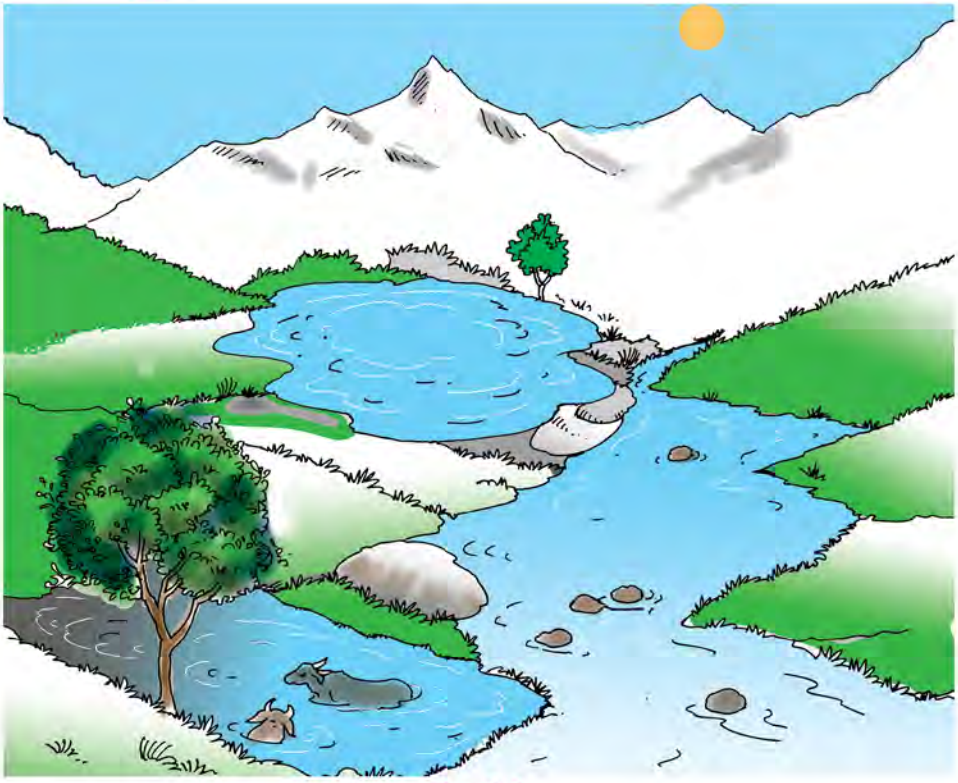


Fig. 6.1

We are surrounded by a variety of objects. Light, shade, animals, water, stones, benches, books, air, potatoes, rice, etc. are some of the objects around us. Can all these things be weighed? Do they all take up space?

Anything that has mass and occupies space is called matter. Light, sound and shadow cannot be weighed. They don't even take up space. They are not matter. The matter is found in a solid, liquid or gaseous state. Air, water vapour, smoke, etc. are gaseous materials. Stones, ice, snow, benches, copies, books, etc. are solids. Similarly, water, milk, oil, etc. are liquids. Solids, liquids and gases have different properties.

Water

States of water

Fig. 6.2

In the winter, you must have seen dewdrops on the grass and leaves in the morning. You may have also noticed the water level in rivers and streams decreasing in the dry season. Where does the water that evaporates from rivers, streams and ponds go? How does rainfall occur? Likewise, you have also noticed that it usually rains when the sky is covered with a dark clouds.

What could be the cause of such phenomena that are constantly happening in nature?

In nature, water exists in three forms: solid, liquid and gas. Ice, snow, and hailstones are the solid states. Water is a liquid state while water vapour is a gaseous state.

Activity 6.1

Put a little water in the refrigerator for a few hours. After the water is frozen, take some ice cubes and heat them in a beaker. Continue heating for a while. After a while, make the water vapor coming out of the beaker come in contact with a cool surface.

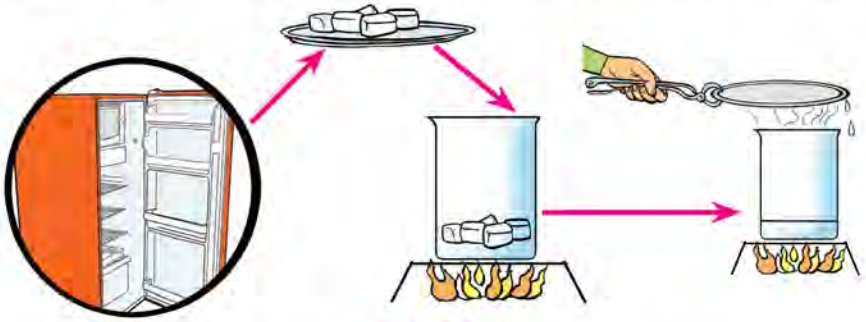


Fig. 6.3

i. What happens when water is kept in the freezer?

.....

ii. What happens when the ice cubes are heated?

.....

iii. What does it change changed when water was heated?

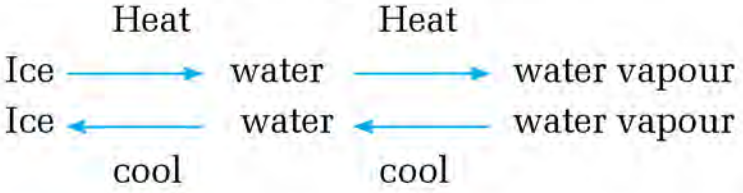
.....

iv. What happens when water vapour is made to come in contact with the cold surface?

.....

When water is cooled, it changes to its solid form (ice). The process of water turning into a solid-state while cooling is called freezing. When ice cubes are heated, water is produced. That means when ice is heated, water changes from the solid-state to the liquid state. The process of ice changing into liquid water while heating the ice is called melting. When water is heated, water vapour is produced. Thus, the process of water changing

into water vapour during heating is called evaporation. Water vapour turns into water when it comes in contact with a cold surface. The process of turning water vapour back to water by cooling it is called condensation.



Question to think

Why do drops of water appear on the outer surface of a glass containing ice?

Physical properties of water

Activity 6.2

Find the taste, odour (smell) and colour of the tap water by drinking, smelling and looking at it. From this activity it can be concluded that there is no ..... and ..... of water.

Activity 6.3

Put water in three cups. Add a drop of red ink in the first cup, blue ink in the second and black ink in the third. How did the colour of water change in each cup? Fill the table with your observations. Write what you conclude from this activity.

Fig. 6.4

Water	When red ink is added	When blue ink is added	When black ink is added
Change			

What difference did you notice in the colour of water before and after adding ink to it?

From this activity, it can be concluded that water does not have its colour. It becomes the same colour as what is added to it.

Questions to think

Wet clothes dry out in the sun, why?

Activity 6.4

Take water in five beakers. Add a teaspoon of salt in the first, a teaspoon of sugar in the second, a drop of ink in the third, a few drops of oil in the fourth, and a teaspoon of sand in the fifth. Stir the water in each beaker.

Observe and put a tick mark in the table given below.

Substance	Dissolves in water	Does not dissolve in water
Salt		
Sugar		
Ink		
Oil		
Sand		

From the above activity, it can be concluded that not every substance dissolves in water.

Activity 6.5

Take a glass of water and pour it into a glass, bowl and plate and observe. What shape did the water take when it was kept in the glass, bowl and plate? What conclusion can be drawn from the activity?

Fig 6.5

Activity 6.6 Discuss the picture and find out the property of water

Fig 6.6

a. Which way is the water flowing in the picture? Why?

From the above activities the properties of water can be described as under:

a. Water is tasteless, odorless and colorless

b. Water exists in three states - solid, liquid and gas.

c. Water is a solvent that can dissolve many substances.

d. Water has no fixed shape. It takes the shape of the container it is kept in.

e. Water always flows towards a lower place from a high place

f. Water occupies space.

Activity 6.7

Write the properties of water in an attractive way on chart paper and present it in the classroom.

Water cycle

Activity 6.8

Put hot water in a glass. Cover the glass with a plate. After a while, remove the plate and look at it. Drops of water can be seen at the bottom of the plate. Where could have these water drops come from? Discuss.

In the above activity, water evaporates due to heat and turns into water vapor. After coming in contact with the cold surface of the plate, it liquefies again and turns into water. Even in na-

ture, such a process is constantly going on. In the rainy season, you must have noticed that the sun shines, a black cloud forms in the sky and then it rains. But, let's think for a moment about how rainfall takes place?

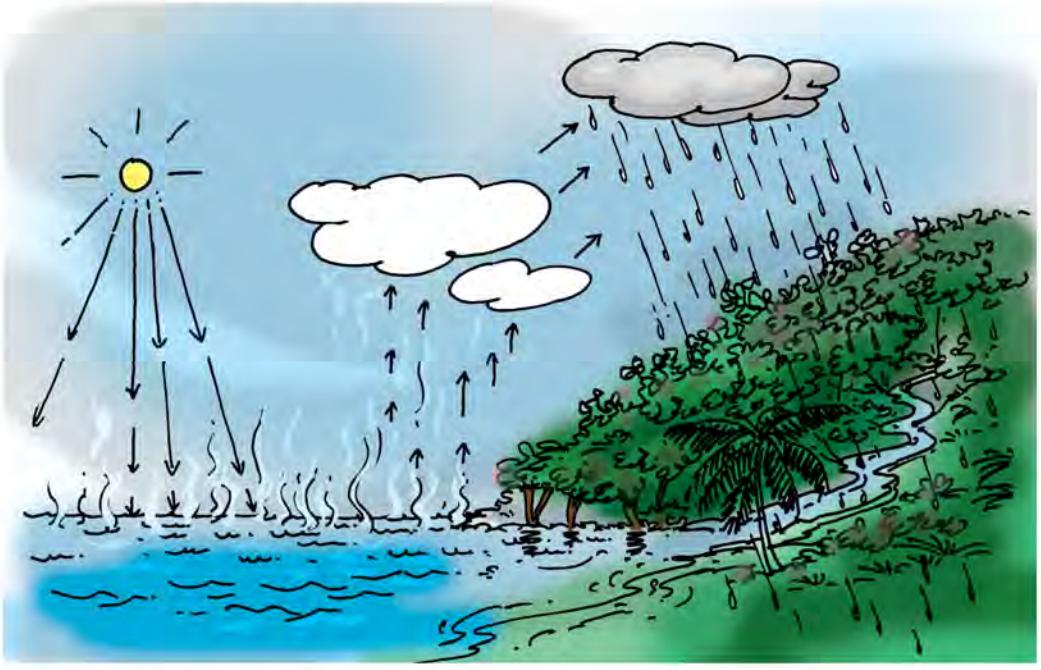


Fig 6.7

In the picture of the water cycle above, what different activities do you see? Write them in order.

Because of the Sun's heat, water from rivers, lakes and ponds evaporates.

Water that comes out of the human and animal bodies in the form of sweat evaporates. Water vapour is produced while cooking food and boiling water. Water from wet clothes evaporates when it is hung in the sun. Even the plants produce water vapour. All this water vaopur rises to the sky and liquifies to form a cloud. When clouds cool, they become heavy and fall as rain. This is a continuous cycle. This cycle is called the water cycle.

Question to think

All rivers in the world end up in the ocean. But, the amount of water in the ocean does not change much, Why?

Sources of water and its conservation

Figure 6.8

a. What is the source of water used in your home?

b. Have you seen water collected like in the picture?

c. What could be other sources of water besides these?

Places, where water is found, are called water sources. Water is found on the ground surface as well as under the ground. Rivers, lakes, ponds, seas, etc. are the water sources on the surface whereas wells, springs and tube wells are the sources of ground water.

Activity 6.9

Make a list of the surface and ground water sources around you and present it in class.

We use water for drinking, cooking, cleaning and irrigation. Water is also used to generate electricity and to run water mills. Life is not possible without water. Therefore, sources of water must be conserved.

Among the different activities shown in the pictures below, tick (√) the ones that we should do and cross (×) the ones that we shouldn't do to conserve water:

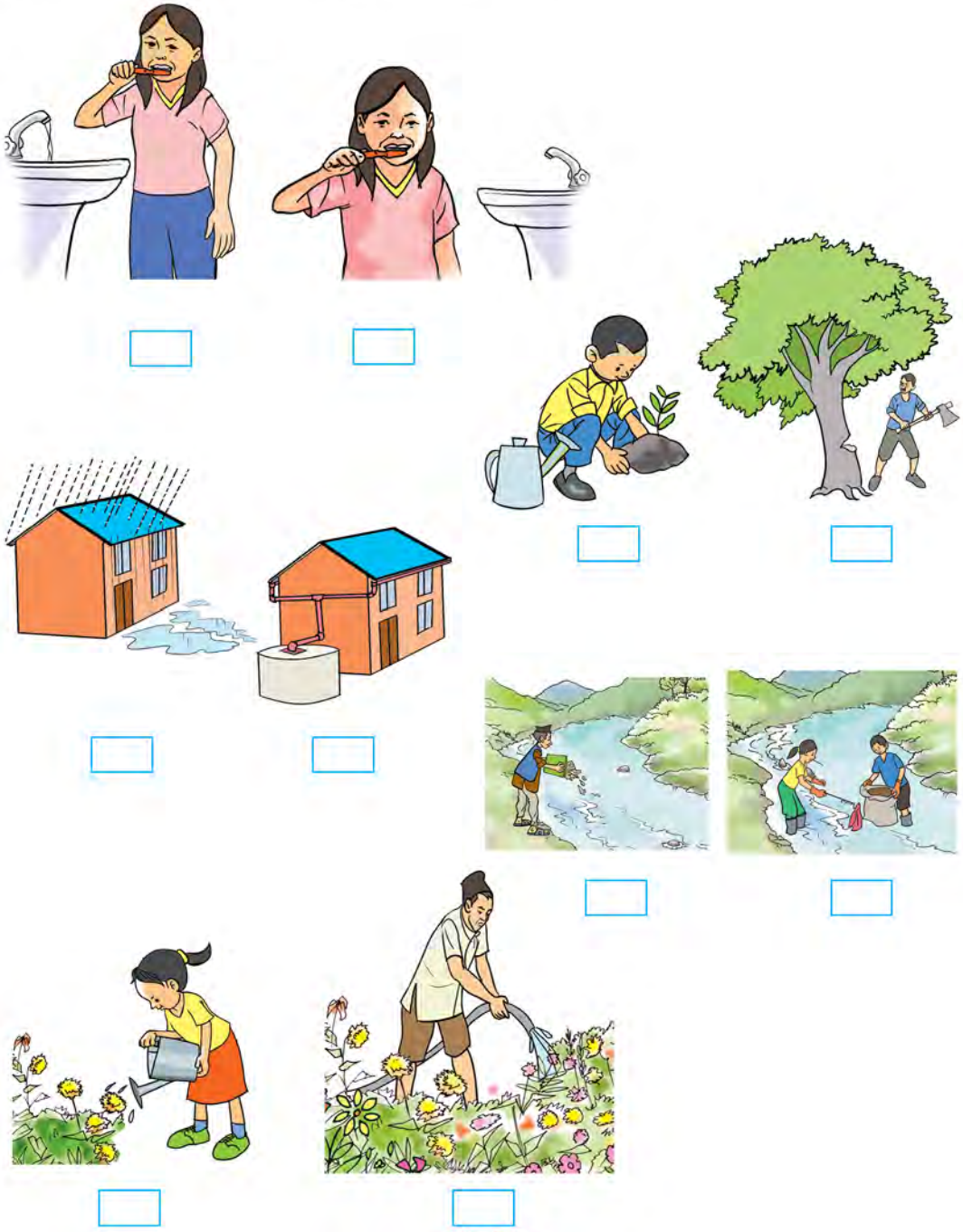


Fig 6.9

Apart from this, the method of recharging the ground with rainwater is also an excellent method to conserve water. In this process, arrangements are made to send rainwater back to the ground. For this, rainwater can be sent to wells, roadsides and open spaces can be covered with bricks instead of concrete or asphalt.

Uses of water in technology

Fig 6.10

A. Watermill

Let's construct a water turbine model.

Apparatus required: Plastic spoon or ice cream spoons, plastic bottle's cap, pin, knife or sharp cutting object, glue, wire, tap water, etc.

Method

i. Make a hole in the center of the bottle's cap with a pin and cut five evenly spaced slits on the rim.

ii. Take five plastic spoons or ice cream spoons and shorten them by cutting off the handle in the middle.

iii. Place the gum in the slits, insert a spoon's handle in every slit and stick it firmly.

Fig. 6.11

iv. Insert the wire into the hole in the center of the lid and place it on a wooden stand as shown in the picture. Now, place your water turbine in the sink so that the water from the tap falls on its blades.

Questions to think

What happens when water hits the turbine blades forcefully? How does this happen?

The water mill that operates on the water flowing in the river in villages is called *panighatta*. Watermills are generally constructed

near streams and rivers flowing through steep hillsides. A rod with wooden or metal blades is placed in the water current under the mill (pani ghatta). This is called a turbine. Two flat stones placed one on top of the other, are attached to the rod.

The upper stone of the mill rotates when the water current turns the turbine. Then the grain falling into the hole of the upper stone begins to grind.

Questions to think

Can a water mill be constructed in a plane area? Give reason.

B. Hydroelectricity

The electricity generated using running water is called hydropower. Hydroelectricity is also the energy produced by utilizing the energy of water flowing in a river. For this, water from the river or stream is collected in a lake by building a dam. The dam is built well above the powerhouse. The water collected behind a dam in a high place is then made to flow downhill. Such water has a lot of energy and thus it turns a turbine at the power house and generates electricity.

Water Pollution

Activity 6.11

Visit the water sources around your home or school and answer the following questions. Tick the correct option for each.

1. How is the environment around the water source?

   Clean ..... dirty .....

2. What is the color and smell of water in the sources?

   Colorless ..... Murky ..... Smelly ..... Odorless .....

3. Are activities like washing clothes done around a water source?

   Yes ..... No .....

4. Are there any activities like bathing the cattle around the water source?

   Yes ..... No .....

5. Are there any activities like urination and defecation around the water source? Yes ..... No.....

6. Are sewage and effluent from factories and industries mixed into water sources? Yes .... No ....

Fig 6.12

Unwanted changes in the natural color, smell and taste of water because of the mixing of unnecessary substances in water sources is called water pollution. Several natural and human activities pollute the water.

What is polluting the river in the above picture? What measures can be taken to prevent this? Fill in the table below:

Causes of river pollution	Measures to reduce pollution

Exercise

1. Fill in the blanks with the given words

Atmosphere gases air pollution

oxygen weight

a. Air is a mixture of different .....

b. The sheet of air covering the earth is called .....

c. The air is .....

d. To burn anything, ... is required.

e. Planting trees helps to reduce .....

2. Choose the correct answer from the given answers:

a. Which of the following is required for a living thing to breathe?

i. water ii. air iii. soil

b. Which one of the following is the reason for the stench coming from the place which has been accumulating garbage for many days.

i. the air has its odor

ii. the odor comes from the garbage

iii. air has different gases mixed in it

c. Which of the following changes occurs when air is filled in a football?

i. the weight of the football increases

ii. the weight of the football decreases

iii. the weight of the football does not change

d. Which one of the following activities helps control air pollution?

i. population growth

ii. tree plantation

iii. increase in the number of vehicles

e. Which of the following is responsible for global warming?

i. air pollution ii. water pollution iii. soil pollution

3. Answer the following question:

i. Write the uses of air in daily life.

ii. Even though there is air around us, we cannot see it, why?

iii. What is air pollution?

iv. What human activities cause air pollution?

v. What effect does air pollution have on the earth's atmosphere?

vi. What effect does air pollution have on people?

vii. Anu constructed a wind vane and tried to run it on a day when there was no wind. But it did not move. What must be the reason for this?

viii. If there is air pollution in the area you live in, how will it affect public life? And what efforts can be made to reduce pollution?

Glossary

Mixture : mixing of two or more substances
Windmill : a mill that is operated by wind
Solar Energy : energy received from the Sun.

Activity 6.12

Place your hand in front of your nose and feel the air. Now close your mouth and breath in and out from the nose. How was your experience? Discuss. While breathing, which gas do we take in and which gas do we throw away? Discuss. We need air to breathe. The earth is covered with air. Air contains nitrogen gas, oxygen gas, carbon dioxide gas, etc. So, the air is a mixture of different gases. Besides this, water vapour and dust particles are also mixed in the air.

Physical properties of air

Activity 6.13

Observe the air around you and put a tick (√) mark in the suitable box in the table below.

Color of air Yes ..... No .....

Smell of air Yes ..... No .....

Taste of air Yes ..... No .....

From this activity it can be concluded that air has no ....., ... and .....

Activity 6.14

Take two equal-sized balloons. Blow them to equal sizes. With the help of a thread, hang them on either side of a straight stick. Tie a thread in the middle of the stick and balance it. Now with the help of a pin, inflate the balloon on one side. How is the balance affected? Tick the correct answer.

Balance is maintained ..... Balance is lost .....

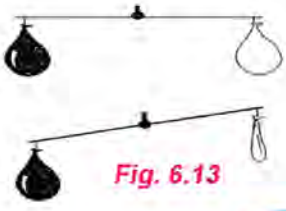


Fig. 6.13

From this activity, it can be concluded that air has weight.

Activity 6.15

Fill a large bowl with water. Take an empty glass, make it face vertically down and push it into the water. Then tilt the glass a little. Based on your observation, answer the following questions.

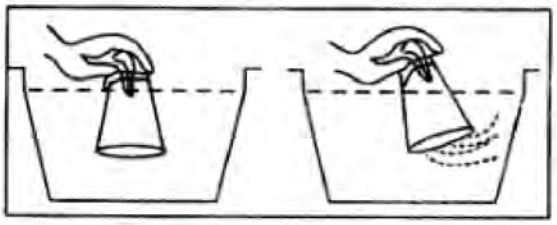


Fig 6.14

i. When the empty glass was pushed vertically down into the water, did water from the bowl enters the glass?

ii. Why didn't the water enter the glass when pushed vertically down?

iii. When the glass was tilted a little, did the water enter the glass or not?

iv. Why did the water enter the glass when it was tilted a little?

From this activity, it can be concluded that air occupies space.

Activity 6.16

With the help of an air pump, inflate objects such as a balloon, football, swimming tube and bicycle tire. What shape did air take in each activity? Discuss it in class.

Fig. 6.15

From this activity, it can be concluded that air does not have its shape. It takes the shape of an object it is kept in, and air can be compressed easily.

Activity 6.17

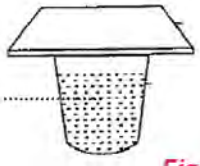


Fig 6.16

Fill a glass to the brim with water. Then cover it with cardboard or postcard and then turn the glass upside down as shown in the figure. Slowly remove your hand from below the postcard. Did the postcard drop? Why? Discuss it in class.

When a glass full of water is covered with cardboard or a postcard and then inverted, the cardboard or postcard does not fall due to air pressure. So, from this activity, it can be concluded that air gives pressure.

Based on the above activities, list the properties of air on a chart paper and present it to the class.

Use of air in daily life

Let's discuss the uses of air:

Fig 6.17

Questions

i. Can we fly a kite or wind vane (firfire), as shown in the picture, when there is no wind?

ii. What helps seeds to go from one place to another?

iii. What is there inside a football, balloon and bicycle tire?

iv. Who helps a kite to fly in the sky?

Living things need oxygen in the air to breathe. Every object needs oxygen in the air to burn. Likewise, wind helps the seeds to move from one place to another. Air is needed to operate windmills. Air fills the car tires, footballs and balloons. Air is also needed to fly aeroplanes, kites and balloons in the sky.

Air Pollution

Look at the picture and discuss the given points.

Fig 6.18

i. Is the air in the place shown in the picture clean?

ii. What is the cause of air pollution in the area?

iii. What effects would the air have on the people living there?

iv. What should be done to make the air of that place clean?

The unwanted change in the quality of air due to the addition of dust, smoke and other harmful substances in the air is called air pollution. Various human activities pollute the air. Polluted air can cause various diseases in humans.

Let's read smoke's autobiography:

My name is Smoke.

I am born from different activities. I am born when people burn firewood, run vehicles, or when there is a forest fire. People don't like me because they say I pollute the air. They say air pollution harms their health. They get lung, eye and heart disease because of me. They even blame me for road accidents because they say they could not see properly because of me.

But they do not know that I was born because of them. To pollute the air, is it only my fault? The dust coming from road digging, demolition of old houses and various other reasons also pollutes the air. Not only that, the stench from the rotting garbage thrown everywhere causes air pollution too. Why do people blame only me?

Is it difficult to prevent air pollution if people are self-aware?

If solar energy, wind energy and electricity are used instead of fuels like firewood, kerosene, petrol and diesel, I won't be born.

Even by planting trees, the air can be made clean.

So, instead of giving birth and then abusing me, they better stop the activities that produce me.

Answers to the following questions are based on the autobiography of smoke.

i. What are the causes of air pollution?

ii. How does air pollution affect us?

iii. What can be done to reduce air pollution?

Project work

Fill in the facts below by observing the air pollution around you.

S.N.	Causes of air pollution	Measures to reduce air pollution
1.		
2.		
3.		

Exercise

1. Fill in the blanks with the given words.

Atmosphere gases air pollution oxygen weight

a. Air is a mixture of different .....

b. The sheet of air covering the earth is called .....

c. The air is .....

d. To burn anything, ... is required.

e. Planting trees helps to reduce .....

2. Choose the correct answer.

a. Which of the following is required for a living thing to breathe?

i. water ii. air iii. soil

b. Which one of the following is the reason for the stench coming from the place which has been accumulating garbage for many days.

i. The air has its odor.

ii. The odor comes from the garbage.

iii. Air has different gases mixed in it.

c. Which of the following changes occurs when air is filled in a football?

i. The weight of the football increases.

ii. The weight of the football decreases.

iii. The weight of the football does not change.

d. Which one of the following activities helps control air pollution?

i. population growth ii. tree plantation
iii. increase in the number of vehicles

e. Which of the following is responsible for global warming?

i. air pollution ii. water pollution

iii. soil pollution

3. Answer the following questions:

a. Write the uses of air in daily life.

b. Even though there is air around us, we cannot see it, why?

c. What is air pollution?

d. What human activities cause air pollution?

e. What effect does air pollution have on the earth's atmosphere?

f. What effect does air pollution have on people?

g. Anu constructed a wind vane and tried to run it on a day when there was no wind. But it did not move. What must be the reason for this?

h. If there is air pollution in the area you live in, how will it affect public life? And what efforts can be made to reduce pollution?

Rocks

Look at the picture below and discuss where these rocks are from.

Fig. 6.19

The hard solid material found in the land, river banks and mountains is called rock. The hard solid material found under the ground is also a rock. Rocks like chalk, marble, slate and granite are found around us. Study the rocks shown below:

Coal

slate

sandstone

granite

marble

chalk

Fig 6.20

A rock is made up of more than one mineral. Some rocks contain prints of animals and plants from ancient times. Thus, the study of rocks is important.

Physical properties of rocks

Go to a riverbank with your parents. Collect rocks and show them to friends in class. Study the collected rocks and fill in the table given below. Paste the filled tables on the wall of the classroom.

Rock	Colour	Shine (yes/no)	Texture or surface (rough or smooth)	Print (scattered, lined or other)
1.				
2.				
3.				
4.				

From the above activity, we can make the following conclusions in relation to the physical properties of rocks. There are many types of rocks in the world. They have different physical properties too. For example:

Size : small, large, thick, thin, long, short

Size : Round, flat, elongated, round, irregular

Shine : Shiny, not shiny

Surface : slippery, rough, dull, soft, hard

Colors : gray, white, blue, black, red, orange, yellow, gray, silver, green

Types of rocks

Activity 6.19

With the help of a teacher, collect chalk, coal, limestone and other locally available stones.

Now try scratching each rock with a nail or a knife. For the ones that cannot be scratched, try breaking them with a hammer. Then fill in the table below:

S.N.	Soft rock that can be cut with a knife	Hard rock that cannot be cut with a knife

Not all the rocks around us are hard. Some rocks are soft and some are hard.

A soft rock can be cut with a nail or a knife, while a hard rock requires a hammer or similar equipment to break. Plants grow easily on the hills made of soft rocks but landslides take place easily on them. Plants don't grow well on the hills made of hard rocks but the chances of landslides are low. Limestone is example of soft rock whereas marble and granite are examples of hard rock.

Activity 6.20

Pasang and Lakhan are studying rocks using the Internet on computers. For this, they go to the computer lab with the internet facility, type the word "Rock" on the internet browser that searches for content on the internet and click on the "Search" button. In doing so, the computer showed many rock-related materials available on the Internet. Of these, they read only what they thought was appropriate and took note of the information that they considered useful.

With the help of a computer in the computer lab or at home or your parents' mobile phone, collect information from the internet on rocks, their types, special features, and the process by which soil is formed.

Rocks expand and shrink constantly because of the heat, cold, rain, wind, etc. Not only that, but they also collide with each

other or rub against each other. Due to these processes, even large rocks break and crumble into small pieces over time and eventually turn to soil.

Uses of rocks

Study the given picture and discuss where all rocks are used.

Fig 6.21

Based on the observation of the picture above, write down the uses of rocks as shown in the table below:

To build a house	To make a roof for a house	
To make statues	To make jewelry	To extract metals
In the process of soil formation	To study the history of the earth	.....
.....	.....	.....

Activity 6.21

Paste a chart paper on the classroom wall. Write the importance of rocks in the middle of it and then everyone, in turn, should write how rocks are being used in their homes, school, or community.

Try to make the chart attractive and artistic by writing the uses of rocks in different shapes. Once done, request the teacher for feedback.

Exercise

1. Fill in the blanks with words from the list given below:

mineral rock metals soil jewelry coal

a. Mountain is composed of snow and .....

b. A rock is composed of one or more .....

c. Precious rocks are used to make .....

d. The rock becomes turbulent .....

e. Various ..... are also found in rocks.

2. Choose the correct answer from the given options.

a. Why are rocks considered important for studying the history of the earth?

i. Rocks contain precious metals.

ii. The rock bears the imprint of an animal.

iii. The rock is under the ground.

b. Which of the following is a soft rock?

i. chalk ii. marble iii. granite

c. Which of the following processes in a rock causes soil to form?

i. It stay underground for a long time.

ii. It is very hard.

iii. It expands and contracts continuously.

d. What is a rock made of?

i. a mixture of two or more gases

ii. a mixture of two or more minerals

iii. a mixture of two or more metals

e. The physical properties of rocks are different but all have one common property. What is that property?

i. Minerals are found in all rocks.

ii. All rocks have the same color.

iii. All rocks have the same shape.

3. Answer the following questions:

a. What is a rock?

b. Distinguish between a soft and hard rock.

c. Write any two uses of rock.

d. Name any two hard and soft rocks found around your school or home.

e. Prepare a list of items made using rock in your school and home.

f. Write down any four physical properties of rock.

7 Energy

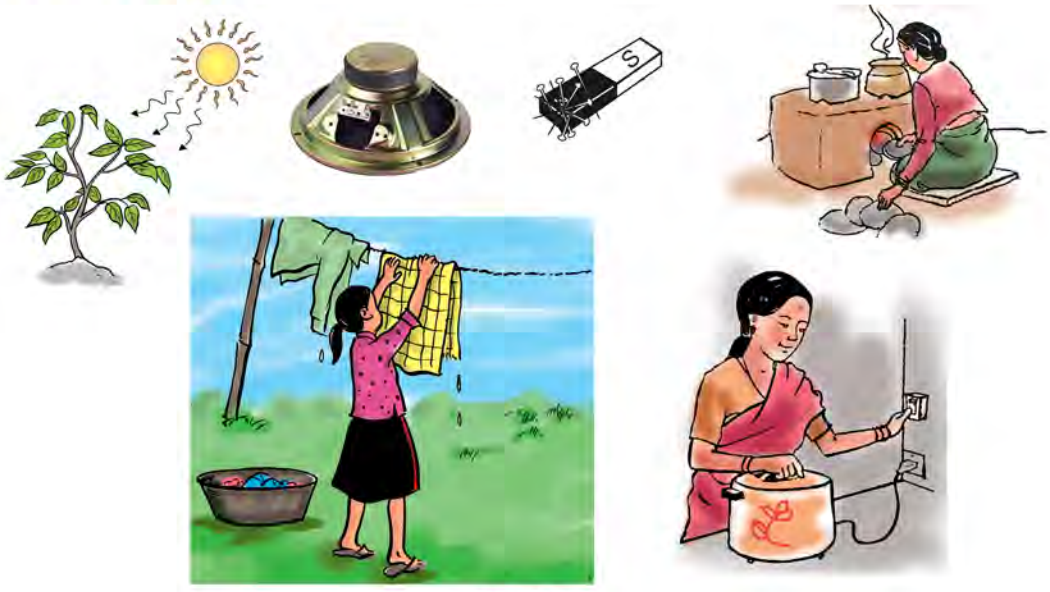


Fig 7.1

a. Which forms of energy are shown in the picture above?

b. What different forms of energy have you seenat home?

How does it feel to work without eating food? Do cars run without petrol? Why do living things need food and vehicles need petrol? Where do they get that energy from? Do we get the same kind of energy from everything? We get energy from various objects found in nature. Energy comes in different forms. Have you ever dried clothes in the sun? Have you seen the food cooked with firewood? Have you seen any electrical appliances in your house running without electricity? What produces electricity? What kind of energy is produced by a magnet inside an electrical appliance? What different works have you done using a magnet?

Magnets are used in various devices we use. Energy is obtained from light, heat, electricity, magnets, etc.

7.1 Introduction to energy

	
What kind of energy is needed to cook food?	Can you work for long hours without eating?
	
How can water carry big logs?	What energy helps to fly a kite?
	
In the above picture, the plant is taking energy from the Sun. The rabbits are eating grass. The cow is also eating grass. Why do all these living things need to eat food?	What does the train get from the electricity line?

Fig 7.2

We feel weak on the day we don't eat. We need the energy to walk, play, read, write, speak and do other daily tasks. Just like us, the other living things need the energy to move around and carry out their daily activities. Energy is necessary to operate vehicles. To run cars, trains and aeroplanes, energy is needed. Thus, the capacity to do work is called energy.

Let's study the following table and discuss the forms of energy, their uses in daily life and their sources.

Forms of energy	**Uses in daily life**	**Where is it obtained from?**
Heat energy	To cook food, to dry clothes, ...	Sun, fire, burning gas, heater
Sound energy	To hear sound	Radio, TV, when objects collide, the voices of humans and animals, ...
Electrical energy	To operate electrical equipment	Generator, battery
Magnetic energy	To search for magnetic objects, to find the direction	Magnet .....
Light energy	To light a place, for plants to make food	Sun, electric lamp .....
Chemical energy	For humans and animals to survive, to run factories and vehicles	Food, petrol, diesel, kerosene .....

7.2 Sources of energy

Activity 7.1

What do the animals and objects in and around your home and school get their energy from?

Ask your parents and write in the table below:

SN	Name of a living being or object	Where do they derive energy from?
1.	Man	Food
2.	Car	
3.	Plant	
4.	Mobile phone	
5.	Fan	
6.	Watermill	

Food is a source of energy for living things. Fuel is the source of energy for automobiles.

Televisions, mobile phones and other electronic devices operate on electrical energy. Objects from where energy can be obtained are sources of energy. Sun is the main source of energy. The living things receive heat and light energy from the sun. There are natural and artificial sources of energy.

Natural and artificial sources of energy

Fig 7.3

Fig 7.4

a. What natural and artificial sources of energy are shown in the above pictures?

b. What are the other sources of energy in our daily life?

Figure 7.5

Activity 7.2

Divide the class into two groups. A member of the first group should draw a picture of a source of energy and then a member of the second group should draw a picture of a living thing or an object who uses that source of energy. Paste the drawings on chart paper as shown in the table below. Then, stick the chart paper on the wall and discuss.

Source of energy	Use of the energy
	

Fig 7.5

Look at the picture below, Discuss who needs more energy?

Fig 7.6

Fig 7.7

The ability to work varies with organism and object. According to their abilities to work, the amount of energy they use also varies. The one who does a lot of work needs more energy and the one doing less work needs less energy.

Let's sing a song and then discuss the importance of energy:

उठेदेखि सुत्दासम्म शक्ति प्रयोग गर्छु
शक्ति आर्जन गर्नलाई खाना खाने गर्छु

खाना पाक्न राप दिन्छौं, चिसो हुँदा ताप
गर्मी हुँदा चिस्याउन शक्तिको नै साथ

खेल्न, कुद्न, घाँस काट्न शक्ति नभई हुन्न
निर्जीवलाई चलाउन, शक्ति नभई हुन्न

घरमा चल्ने उपकरण, शक्तिकै भर पर्छन्
उद्योगधन्दा कलकारखाना, शक्तिबाटै चल्छन्

बिरुवामा खाना बन्न, शक्ति नै चाहिने
यसका लागि सूर्यको प्रकाश नभई नहुने

ताप, प्रकाश, विद्युत् र, रासायनिक शक्ति
यान्त्रिक, ध्वनि, चुम्बक सबै, शक्तिका रूप भनी

शक्ति तिम्रा रूपहरू, अनेक अनेक पायौं
जन्मदेखि मृत्युसम्म, तिम्रै प्रयोग जान्यौं ।

List out and discuss the uses of energy based on the above song.

Project work

Prepare an energy booklet in an exercise book or in a diary by including the following points.

a. Introduction to energy

b. Sources of energy

c. Forms of energy

d. Use of energy and magnitude of energy

e. Ways to save energy etc.

Decorate each point with suitable pictures.

Exercise

1. Choose the correct option for the following questions.

a. Where do living things get their energy from?

i .petrol ii. battery iii. food

b. Which of the following is a source of energy?

i. coal ii. soil iii. stone

c. Which of the following vehicle requires a lot of energy?

i. motorbike ii. car iii. truck

d. Which of the following is a natural source of energy?

i. battery ii. petrol iii. biogas

2. Fill in the blanks with the correct words listed below.

more energy fuel main battery

a. Ability to work is called .....

b. The sun is the ..... source of energy.

c. The aircraft receives energy from .....

d. Adult people need .....energy than a small child.

3. Put the right (√) sign if true and the wrong (x) sign if the statement is wrong:

a. Energy is required to do any work. ☐

b. Plants get energy from the sun. ☐

c. Firewood is not a source of energy. ☐

d. Human beings generate energy from food. ☐

e. Heat energy is considered to be the major source of energy. ☐

4. Match the objects and the sources of energy.

A	B
Aeorplane	Electricity
Plant	Dry cell
Television	Sun
Wall clock	Food
Human being	Petroleum products
	Wind

5. Answer the following questions:

a. Define energy.

b. What is meant by the source of energy?

c. Write the names of any four sources of energy.

d. Name any four forms of energy.

e. Write any five importances of energy.

6. Give reason:

a. The sun is considered to be the main source of energy.

b. When we do not eat, we feel weak.

7. A big tractor and another small tractor have been used for ploughing a field. Answer the following question based on this piece of information.

a. Which tractor can plow more field at the same time? Give reason.

b. Which tractor requires more diesel to run for an equal time? Why?

8. Write the energy source required to operate the following equipment:

7.3 Use of electric energy

Write the purpose listed below and the electrical appliances shown in figure 7.8.

To play the radio, to run the fan, to heat water, to iron the clothes, to produce light, to charge the mobile phone, to watchTV

Fig 7.8

Various devices can be operated by electrical energy. Light bulbs, grinders, washing machines, heaters, etc. are electrical appliances. Hair-dressing machines, speakers, bells, water pumps, etc. can also be operated with electricity. Mobile phones, laptops, tablets, flashlights, etc. also need electricity. Nowadays electricity is used even to run large machines in various factories and industries.

Activity 7.4

Search for electrical appliances used in or around your home. Discuss their usage and complete the table below.

S.N.	Name of the device	Use
1.	Fan	To cool the room
2.		
3.		

Electric energy can be converted into other forms of energy. Heat is produced in a rice cooker. Light bulbs, TV and computers produce light. All of these devices use electrical energy.

7.4 Sources of electric energy

Activity 7.5

In the presence of a teacher or parents, open the back of a mobile phone or an alarm clock or a wall clock or a stopwatch. Discuss where these appliances get obtain energy from.

Fig 7.9

Fig 7.10

The electricity used in our house is produced from the energy of flowing water. The water rotates the turbine connected to the electrical generator. When the turbine rotates, the generator produces electricity. The electricity generated in this way is called hydroelectricity. The electricity generated by the generator is transmitted from house to house with the help of wires. This is called main line. Electrical devices are connected to the main line and used. Electricity can be generated even from high-speed winds. The wind rotates the turbine. Therefore, the main source of electricity is the generator. Dynamo is a smaller form of a generator.

Activity 7.6

Connect a small bulb to a dynamo with the help of a wire. Rotate the dynamo slowly and observe what happens.

Fig 7.11

a. What energy is the solar light in the picture using to produce light?

b. What energy is used to drive an electric car?

Fig 7.12

Clocks, mobiles, stopwatches, remotes, etc. run on batteries. Electric cars run because of the battery in the car. Solar batteries are used to light solar lamps. Mobile, laptops, tablets and flashlights are equipped with rechargeable batteries. So, batteries are also a source of electricity.

Activity 7.7

Separate the devices shown in the picture as the devices operated by connecting to the mainline and the devices that run on batteries. Then prepare a chart

Fig 7.13

Let's sing a song about electricity and then discuss.

हाम्रो नेपाल जलस्रोतको दोस्रो धनी देश
जलविद्युत् निकाल्नलाई छ है अति बेस

पानीबाट टर्बाइन घुमाई विद्युत् निकालिन्छ
प्रयोग यसको गरीकन जीवन चलाइन्छ ।

विद्युत्को मुख्य स्रोत पानीलाई मान्छौं
सौर्य उर्जा प्रयोग गरी सौर्य बत्ती बाल्छौं

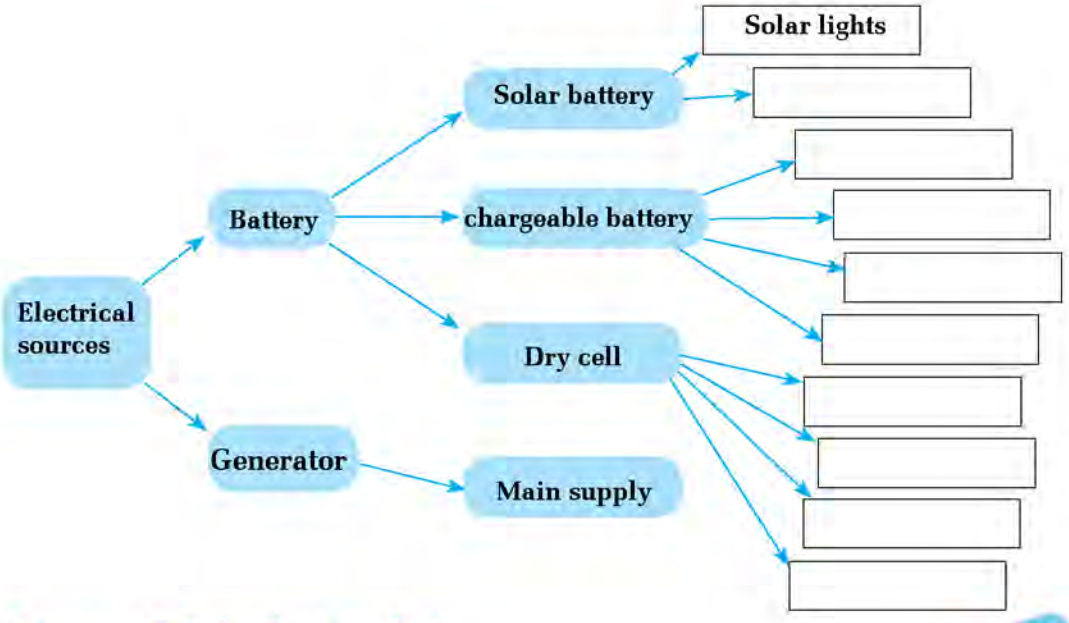
रेडियो र टर्चलाइटमा ड्राइसेल प्रयोग गर्छौं
मोबाइल र ल्यापटपमा त चार्जिङ ब्याट्री हाल्छौं

डाइनामो नै घुमाएर विद्युत् निकालिन्छ
जेनेरेटरचाहि धेरै विद्युत् निकाल्न चाहिन्छ

विद्युतीय कार चलाउन कार ब्याट्री चाहिन्छ
विद्युत्को प्रयोगबाट सुविधा पाइन्छ ।

Activity 7.5

Based on the above song, prepare a chart on sources of electricity and their importance. Paste the chart on the classroom wall.



7.5 Conductor and Insulator objects

Activity 7.9

Collect objects such as wood, rubber, plastic, coins, stones, pins, nails, pieces of pencil lead, and other objects that are easily found around you. Connect a light bulb to a dry cell with wires as shown in figure 7.14. Use tape or glue to stick the wires. Connect the coin between the ends of the two wires P and Q and see if the bulb lights. Then in place of the coin, keep other objects, one at a time, and test whether the bulb lights or not.

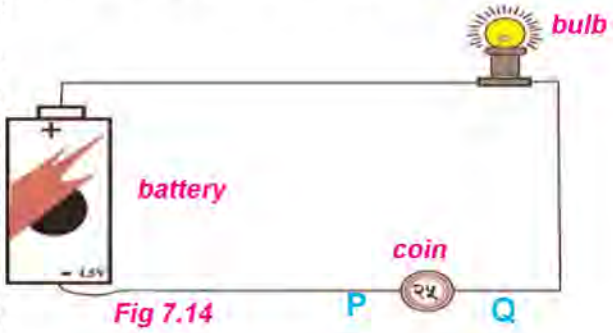


Fig 7.14

Record your observations in the table below.

Object	Bulb lights	Bulb does not light	Conductor	Insulator
Coin				

In the above activity, the bulb lights because of the electricity flowing through the coin. In the same way, the bulb lights even when an iron pin or a nail is placed in a place of a coin. Such objects in which electricity can flow are called conducting materials or conductors. Copper, gold, silver, aluminum, brass, etc. are all conductors. In addition, other types of metals are also conductors.

Did the bulb light when stones, rubber, eraser, etc. were kept in a place of a coin in the above activity? From the above activity, it can be concluded that electricity does not flow from stone, rubber, eraser, or plastic. Such objects are insulators. Therefore, objects from which electricity does not flow are insulators. Wires are covered with plastic on the outside because plastic is an insulator. Thus, we do not get an electric shock (current) when we touch the outside of the wires.

Exercise

1. Choose the correct answer.

a. Which of the following devices uses a battery?

i. water pump ii. television iii. torch light

b. What does a solar battery generate electricity from?

i. petrol ii. coal iii. sunlight

c. What is hydro-electricity generated from?

i. dynamo ii. water iii. petrol

d. Which of the following sources of electricity is used for generating a lot of electricity?

i. dynamo ii. generator iii. battery

2. Fill in the blanks using the following words:

Solar battery electricity energy batteries sound

a. ..... energy is used to operate a computer.

b. Solar light runs from .....

c. Mobile is a device run by .....

d. Dry cell is the source of .....

3. Put a tick (√) sign if the statements are true and cross (X) sign if the statements are incorrect:

a. Electric energy is used in oil crushing machines.

b. Computers generate electricity.

c. Dry cell is the source of electricity.

d. Dry cell is required to generate electricity from water.

4. Give reason:

a. Hydro-electricity is considered the major source of electricity in our country.

b. Electricity is an important source of energy.

5. Answer the following questions:

a. Write the names of any four electrical devices.

b. What is meant by the source of electricity?

c. Write any two uses of electricity.

d. Write the names of any four sources of electricity.

e. How is energy produced from a dynamo?

f. How is hydro-electricity generated? Explain with a diagram.

6. Name the devices shown below.




7. Name the sources of electricity used in the following appliances.




7.6 Magnetic and non-magnetic substances

Let's read a story:

Fig 7.15

Many years ago, there lived a shepherd in a place called Magnesia in Greece. He used to bring his sheep to the mountain pastures for grazing. Every time he took the sheep for grazing, he used to carry a metal stick. One day, some of his sheep got lost. While searching for the sheep, he touched a black stone with his stick. But, to his surprise, the stick got stuck on the stone. He got frightened by it. He stepped on the stone to pull off the stick, but that too got stuck on the rock. It panicked him. When his friends came and saw what was happening there, they were be wildered. They named it a "Magic rock." The villagers explored more about the rock. They discovered that the stick and the shepherd's shoes both contained iron. Other objects were kept on the rock. Not everything is stuck on the rock. Only the objects made of iron stuck on the rock. Studies showed that the rock was made of magnetite. Because of that, the rock was called a magnet. In Nepali, it is called chumbak.

Let's watch and discuss:

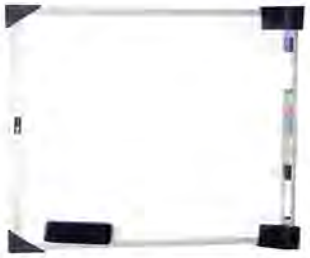


Fig. 7.16

a. In the picture above, why was the child able to get the coins out?

b. How does the duster stick on the board?

c. What is used in the speaker to produce sound?

Study of an incident

Phurba's grandmother dropped the needle while sewing clothes. She began to search for the needle. When Phurba asked, she informed her that the needle went missing. Phurba brought a magnet and flipped it around on the floor. The magnet found the needle. The needle got stuck to the magnet. Grandmother was surprised to see the needle attached to the magnet. She was very happy that the needle was found and she thanked Phurba.

Fig 7.17

a. What other objects like needles stick to the magnet?

b. Do plastic pieces, wood dust and paper pieces stick to the magnet?

c. What is the secret of some objects sticking on a magnet and others not?

Let's do and learn

Collect different materials found around you, for example, copy, pen, pencil, safety pin, plastic ruler, shoe, wooden piece, pin, eraser, pencil, etc. Take a magnet in hand and touch each item in turn. Based on the magnet's sticking and non-sticking properties separate the magnetic object and the non-magnetic object and fill in the table below:

Magnetic objects	Non-magnetic objects

Read and understand:

An object attracted by a magnet is called a magnetic object. A magnet attracts a magnetic object. This property is called the magnetic property of a magnet. Magnet does not attract paper, wood, plastic, copper utensils, aluminum utensils, pencils, erasers, etc. An object not attracted by a magnet is called a non-magnetic object.

7.7 Properties of the magnet

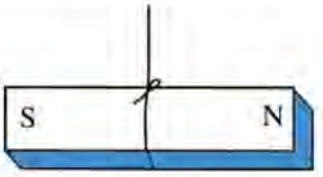


Fig.7.18

Activity 7.10

Take a thin string or a thread that does not stretch. Tie a bar magnet in the middle with the thread and hang it as shown in the figure. Make sure that there are no magnetic objects or magnets near the hanging magnet. Note the direction in which the hanging magnet points when it comes to rest.

If a bar magnet is tied in the middle and let hang freely, it is always such that one end faces north and the other end faces south. Similarly, a bar magnet shows the same direction if it floats in water in a plastic box. Thus, a magnet placed in such a way that it can rotate freely always points north and south. This property is called the directional property of a magnet.

Activity 7.11

Take a bar magnet and some iron dust. Tie a string in the middle of the magnet. Take some iron dust on a piece of paper. Roll the magnet over the iron dust. Now, pull the string up and lift the magnet carefully. What do you notice?


Fig.7.19

In this experiment, more iron dust appears to be attached to the ends of the magnet and decreasing towards the center. In fact, there is no iron dust in the middle. This activity shows that the power of a magnet is concentrated at the end of a magnet and decreases towards the middle.

Activity 7.12

Figure 7.20

Hang a bar magnet by a string tied in the middle. Take another bar magnet in hand. Move the north pole of the magnet in your hand closer to the north pole of the hanging magnet. Notice what happens. Now, move the south pole of the magnet in your hand closer to the north pole of the hanging magnet. Notice what happens this time.

There is repulsion between similar magnetic poles such as the north and north poles and the south and south poles, and attraction between the opposite poles, that is. the north and south poles.

It can be concluded from the above activity that like poles of a magnet repel and the unlike poles attract.

Activity 7.12

Figure 7.21

Take a bar magnet. Using a hammer, break the magnet into two pieces. With the help of a compass needle, if both the pieces have two poles.

Similarly, the second piece also has two poles. Thus, it can be concluded that the poles of a magnet never separate.

Let's play a pin finding game:

Divide into groups and take a bar magnet each. Mix some pins with sand or soil. Then find the pins with the help of a magnet. Whose magnet attracted the maximum number of pins?

Count the pins.

Let's do and learn

Activity 7.14

Divide into groups and each group takes two bar magnets. With each magnet, in turn, try to attract the magnetic objects in the surrounding. Which magnet could attract far-away objects?

Read and understand

Magnetic force is the force with which a magnet pulls a magnetic object towards itself. A magnet can only pull a magnetic object towards itself within a certain area around it. This area is called the magnetic field. The strength of a magnet varies. Some magnets can attract objects at great distances, while some magnets can pull only the objects at close range. Based on this, a magnet can be classified as a very powerful or less powerful magnet.

Activity 7.15

Find and learn:

From what you have seen at home or by asking your parents. Make a list of the different devices that use magnets. Draw the devices and present them in class.

Use of magnets in daily life

a. Magnet helps to pick up small magnetic objects that our eyes cannot see.

b. Magnets are used to pick up small objects such as needles, pins, small nails, paper clips, etc. that are difficult to pick up with our hands.

c. Magnets are used in television, computer monitor, radio, clock, TV remote control, speaker, microphone, dynamo, generator, compass needle, etc.

d. Magnets are used in cassette players, computer hard disks, ATM cards, etc.

e. Magnets are used to remove any iron pieces mixed with flour, rice and other food materials.

Exercise

1. Tick the correct answer for the following questions.

a. Which of the following is a magnetic object?

i. rubber ball ii. pen nib iii. plastic roller

b. Which of the following is a non-magnetic object?

i. paper clip ii. pin iii. paper

c. In which device magnet is used?

i. water heating rod ii. Radio iii. light bulb

d. Which of the following facts is true about a magnet?

i. attraction between the like poles

ii. attraction between unlike poles

iii. repulsion between unlike poles

e. Which of the following is an example of a conductor?

i. rubber ii. aluminium iii. plastic

2. Fill in the spaces with appropriate words from the list provided:

Force of attraction Field magnetic repulsion

Non-magnetic magnetite

a. A magnet can pull a magnetic object only within its magnetic .....

b. The ability of a magnet to ..... magnetic objects is called magnetic force.

c. An object attracted to a magnet is called ..... object.

d. Plastic is a ..... object.

e. ..... occurs between the like poles of a magnet

3. Tick (√) if the statements are true and cross (×) if the statements are incorrect.

a. Iron is a magnetic object. ☐

b. A magnet is used in the speaker. ☐

c. Non-magnetic objects are attached to the magnet. ☐

d. The pulling capacity of a magnet varies. ☐

e. Independently hung rod magnet always sets east-west. ☐

3. Answer the following question:

a. Write the names of any three examples of magnetic and non-magnetic objects.

b. What kind of object is called a magnetic object?

c. Define magnetic force.

d. Write the difference between magnetic and non-magnetic objects.

e. Write any four utilities of a magnet.

f. You have two magnets. Describe the process you will follow to compare their strengths.

g. Write the three differences between a conductor and a non-conductor of electricity.

h. Some of Neha's coins fell into a deep pond. She desperately needs these coins. How can Neha retrieve the coin bag without going inside a pond?

i. Write any four properties of a magnet.

8 The Earth and Space

Fig 8.1

The surface of the earth we live on is not uniform. Somewhere, as in the picture, there are high mountains. Somewhere there are flat terrains. There is water in some places and land in others. The earth is surrounded by a layer of air. This layer of air is called the atmosphere. Different weather conditions can be experienced on earth at different times. Weather can be predicted based on clouds in the sky. Similarly, you may have heard of various natural disasters. Such disasters cause many human and financial losses. Such disasters can be natural and man-made.

Earth

Activity 8.1

Study the globe given below and discuss the following questions:

Fig 8.2

a. What color represents the water surface on the globe?

b. Find our country Nepal on the globe.

c. Estimate the size of the earth based on the size of the globe.

d. The globe is kept tilted slightly, not straight, why?

The globe is a model of the earth designed to study the earth. Earth, as shown on the globe, is not completely round, but slightly flat at the two poles and bulged in the middle. The shape of the earth can be compared with the shape of an orange. The earth is not straight but tilted slightly in its orbit. The earth's surface is made up of land and water. About 71 percent of the earth's surface is covered by water and 29 percent by land. The atmosphere surrounds the earth. Earth is the only planet in the universe where living things can survive.

8.1 Lithosphere

Study the picture and discuss the following questions:

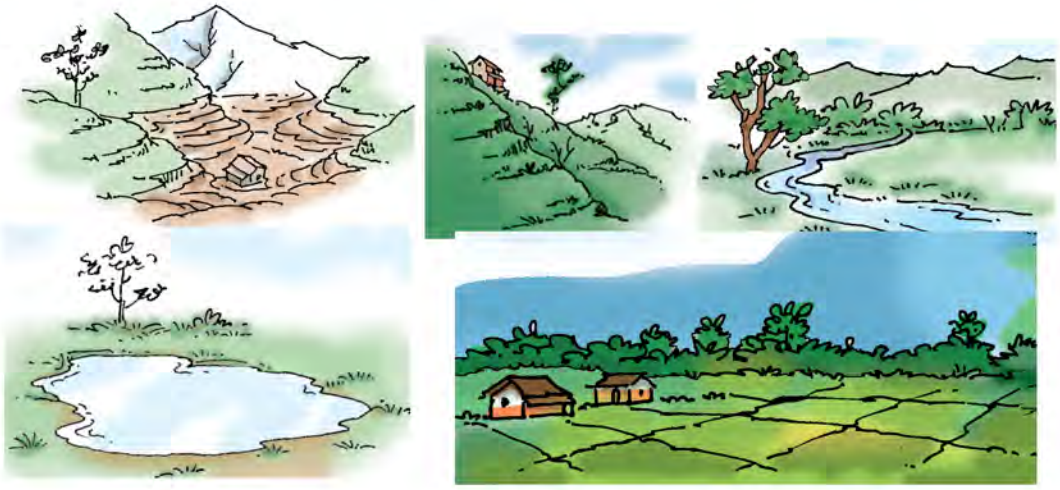


Fig 8.3

Questions

a. What kind of land is shown in the picture other than the peaks and the high mountains?

b. Which of the following earth surfaces is found in our country?

c. Which of the following resembles the place you live in?

d. Which of these do you see around your home or school?

e. What kind of land surface have you seen? Tell based on the hints given below.

Tall spiky surface covered with snow

Smaller than the mountains, the sources of most rivers

Flat surface, fertile land

Surface covered with dry sand

Look at the picture and discuss:

Fig 8.4

a. What different landforms are shown in the picture?

b. Apart from these landforms, what other things have you seen?

c. What colors are used to show land and water on the globe?

e. What part of the globe is occupied by land and how much by water?

If we look at a globe, we see that the surface of the earth is separated into land and water. Three-quarters (about 71 percent) of the earth's surface is covered by water and only one part is land.The part covered by land is called the lithosphere. The water part is called the hydrosphere. The lithosphere is not the same everywhere. According to the structure, the lithosphere consists of hills, plains and valleys. The flat part of the lithosphere is called the plain. The Terai region of our country falls in this category. Terai is considered a fertile land. The land surface rising from the plains is called hills. Hills are of different heights. Tall hills that are always covered with snow are called mountains. Mt. Everest, the world's tallest peak, is also a mountain. A flat land surrounded by hills and mountains is called a valley. Kathmandu, Pokhara, Dang, etc. are valleys. Some parts of the earth have very tall mountains whereas some places have large deserts. Some parts of the earth are covered by forests.

Hydrosphere

What kinds of water sources have you seen? Name the water sources based on the hints given below.

Water collected in a small place .....

The water collected in a big place surrounding a hill .....

Water collected in a very large place .....

Constantly flowing water .....

Water falling from hills and high places .....

Water flowing only during rainy season .....

Frozen water at the foot of the mountain .....

Let's study the pictures and discuss:

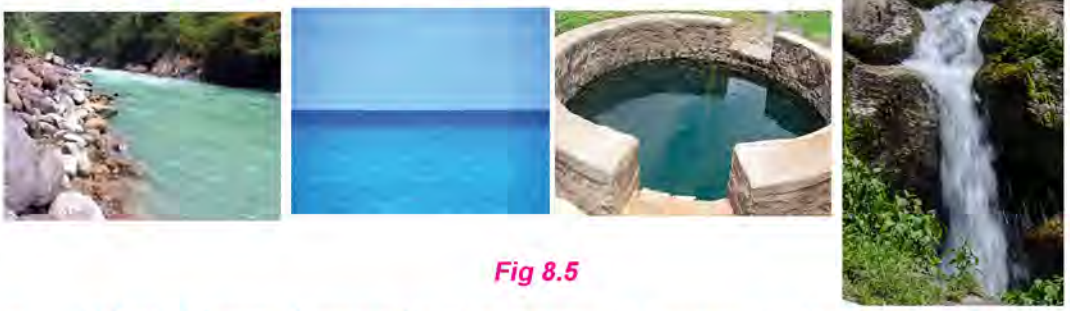


Fig 8.5

a. What different forms of hydrosphere do you see in the pictures?

b. Other than these forms, what different forms of hydrosphere have you seen?

On the surface of the earth, water is found in springs, wells, ponds, lakes, rivers, waterfalls, seas and oceans. The part of the earth's surface covered with water is called the hydrosphere. Similarly, up in the mountains where it is very cold, a lot of water is found frozen in the form of snow. The sun's heat evaporates water from rivers, ponds, lakes, wells, seas, and other places and it mixes with the air. Water, snow, vapor are all different forms of water. Among the various forms, water vapor and snow are called above-ground water, while water in the seas, rivers, lakes, waterfalls, ponds, etc. is called surface water. Similarly,water

coming out from springs and wells is called groundwater. Hence, the hydrosphere is spread above, on and under the surface of the earth.

Project work

Observe the surface of the land around your village or town and fill in the given table:

S.N.	Name of the place	Landforms (flat, slope, hill, mountain, valley)	What is it covered with? (Rivers and streams, ponds, lakes, forests, farms)
1.			
2.			

Project work

With the help of teachers and parents or by searching on the internet study the landform and natural structure of Nepal. Then discuss it in a group and present it in your class.

Atmosphere

Fig 8.6

The earth's surface is surrounded by air. The layer of air that surrounds the earth is called the atmosphere. The atmosphere contains a mixture of different types of gases.

Questions to think

What must be the reason for the survival of living things on earth?

Study the pictures and answer the given questions.

Fig 8.7

Questions

a. Does air contain dust particles too?

b. How did the drops of water form on the outside of the glass containing ice?

c. What makes the flag flutter?

d. What's in the air?

The atmosphere is made up of air, water vapour, clouds, dust particles, etc. The air in the atmosphere is a mixture of gases such as nitrogen, oxygen and carbon dioxide. All living things breathe with the help of oxygen in the air.

Exercise

1. Write "True" for the correct sentences and "False" for the incorrect ones:

a. About 60 percent of the earth's surface is covered by water.

b. The surface of the earth is the same everywhere.

c. The shape of the earth is not completely spherical but is slightly flat at the poles and bulged towards the equator.

d. The earth is tilted slightly in its orbit.

e. Atmosphere is made up of air, water vapor and dust particles.

f. The lithosphere includes the hydrosphere.

2. Choose the right option from the options given below:

a. Whose shape resembles the shape of the earth?

i. egg ii. orange iii. papaya

b. Which of the following is the driest landform on earth?

i. mountain ii. hill iii. desert

c. Which of the following helps living things to breathe?

i. water vapour ii. air iii. dust particles

d. Which of the following statements is true for the Earth's atmosphere?

i. Atmosphere is a mixture of gases.

ii. Atmosphere is the source of earth's heat.

iii. The atmosphere is the first layer of the earth's surface.

3. Answer the following questions:

a. What type of land is found in the Terai region of Nepal?

b. What is the reason for the lack of vegetation in the mountains?

c. Write the names of the different surfaces of the earth that you have seen.

d. Write any two differences between mountains and hills.

e. What is a hydrosphere? What forms does it cover?

f. What is the atmosphere?

g. What is the atmosphere made of?

Weather

Sing and learn

How is the weather today?
Is it sunny?
Or is it cloudy?
How is the weather today?
Is it raining?
Or is hail falling?

How is the weather today?
Is it windy?
Or is there a hurricane?
How is the weather today?
Is there lightning?
Or is there thunder?

How is the weather today?
Is it too cold?
Or is it just warm?
How is the weather today?
Is it foggy?
Or is it frosty?
How is the weather today?

Fig 8.8

Based on the above song, discuss the following questions:

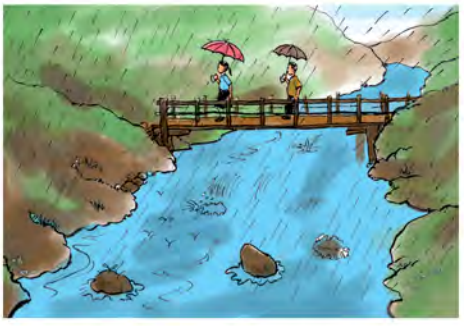
a. What seasons are discussed in the song above?

b. What weather do you like? Why?

c. What is the current weather?

d. In what seasons should we be very careful?

Pair the following pictures with a straight line:



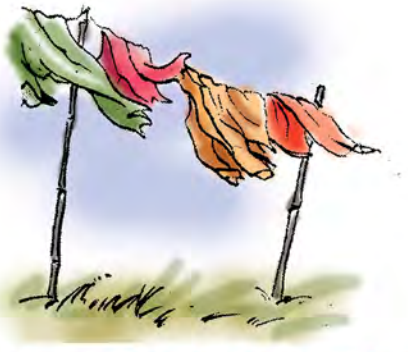


Fig 8.9

How is the weather outside now? What will it be like after a while? Let's call a relative or friend living a little far away from where we live and ask what the weather is like there now? Sometimes it is raining at the school but when we reach home it is not raining there. Have you ever experienced something like this?

Weather is the state of the atmosphere of a certain place at a certain time. Even in the same place, the weather may be different from time to time, and weather in different places may be different at the same moment.

Activity 8.2

Discuss the following table with different weather conditions like sunny, rainy, stormy, cloudy, etc. and their characteristics, activities, and safety measures to be taken in these weathers and complete the table given below.

Weather type	Special characteristics	Measures to be taken
Hot	Sun shines brightly	Wear an umbrella while out in the sun
.....	.....	Switch off electrical equipment
.....	Atmosphere's temperature decreases	.....
Stormy	.....	.....
.....	Difficult to see distant objects clearly	.....

Fill in the table by guessing the weather based on the given activities?

Activity	Weather
Seating in front of the fire	
Difficulties in the movement of vehicles	
Corrugated iron sheets are blown away	

Planting paddy	
Landslides occur	
Stars are clearly visible in the night sky.	

Activity 8.3

Divide the students in the class into two groups and ask them to act out. When one group acts out the activity related to certain weather the other group predicts it.

8.4 Change in weather

Project work

Observe the weather of a place at different times of the day for a week and prepare a report. Present the report in class.

Student Name ..... Roll No. ..... Project work No. .....

Date	Day	At sunrise	At 8 Am	At noon	At sunset	At 8 PM
	Sunday					
	Monday					
	Tuesday					
	Wednesday					
	Thursday					
	Friday					
	Saturday					

Questions to think

a. Why is the daytime temperature higher than morning and night temperatures?

b. What could be the reason for different weather in the morning, day and night?

The weather is constantly changing. The weather is different at different times even on the same day. The weather can be different every day. The weather varies according to the season too. Weather changes for a variety of reasons. Factors like solar energy available in the place, cloud type and its size, wind speed and direction, etc. all affect the weather of a place.

8.5 Weather Forecast

Discuss

Grade four students are going to a picnic tomorrow. Can we predict what the weather will be like tomorrow? On what basis can the weather be predicted? Discuss in class and record the points obtained in the table below.

S.N.	Basis of weather forecasting
1.	
2.	
3.	
4.	

Weather forecasting plays an important role in daily routines to agricultural work, to various business ventures. Not only that, the weather forecast can save the loss of lives and property by giving advance notice of dangerous natural disasters. The weather forecast also helps in planning short or long journeys.

Activity 8.4

Fill in the table with the information about the 24-hour weather activities of a particular day as broadcasted on television or radio or printed in the newspaper.

S.N.	Weather activities	Description
1.	Temperature	
2.	Humidity	
3.	Hours of sunshine	
4.	Time of sunrise	
5.	Time of sunset	

Our national televisions and radios broadcast the weather forecast for the next 24 hours at the end of the daily news bulletin. Similarly, weather activities are also given in newspapers. In today's era of technology, the weather in the future can be predicted using various apps on a mobile phone. Information on temperature, humidity, rainfall, sunrise and sunset time, etc. can be obtained from the weather report.

Study of clouds in the weather forecast

See if there is a cloud in the sky now or not? If there is, what kind of cloud is it? Are the clouds seen at the time of sunshine and the clouds seen while it is raining similar? Discuss in class.

The water on the surface of the earth evaporates due to the heat of the sun. The water vapour goes high up in the sky, cools and forms clouds. So, the cloud contains millions of water vapour molecules and ice particles that, once very heavy, return to Earth as rain.

Cloud types and weather information obtained from them

Figure 8.10

Study the clouds in the picture and write down what they look like.

1. Cirrus

The cloud that looks like a bird's feathers is called Cirrus. It is seen usually when the weather is clear. Cirrus is a very cold cloud because it is high up in the sky. When this cloud is seen in the sky, it might rain with hailstone.

Fig. 8.11

2. Cumulus

The cloud that looks like a pile of cotton or cauliflower is called Cumulus. If a Cumulus cloud carries rainwater, it is called Cumulonimbus. Cumulonimbus is dark ash gray in colour. When a Cumulonimbus cloud is in the sky, it rains heavily with lightning and thunderstorm.

Fig. 8.12

3. Stratus

Stratus clouds are dark ash gray in color. When this cloud is close to the ground, it looks like fog. It is seen early in the morning or late in the evening when there is no wind. When the sky is covered with this cloud, the weather is calm and it rains for a long time.

Figure 8.13

4. Nimbus

Nimbus is a thick dark gray cloud. It is found at the lowest altitude. When the sky is covered with this cloud, it becomes dark and rains a lot.

Figure 8.14

Activity 8.5

Make models of different clouds With the help of cotton, dye and gum, . On a chart paper, draw pictures of weather pattern seach cloud brings about and display them in class.

Exercise

1. Fill in the blanks with the matching words from the list given below

Plans Travel Changes Cumulonimbus Cirrus Paddy plantation

a. The weather .....continuously.

b. Weather forecast helps in making .....

c. The weather is clear when there is ..... cloud in the sky.

d. It rains heavily when there is ..... cloud in the sky.

e. ..... is done in the rainy season.

2. Choose the correct answer from the given option.

a. Which of the following precautions should be taken when lightning strikes?

i. Umbrella should be worn.

ii. The fire should be extinguished.

iii. Electrical equipment should be turned off.

b. Which of the following weather has the characteristics of low atmospheric temperature?

i. cold ii. hot iii. rainy

c. Which of the following is difficult to do on a foggy morning?

i. to drive a vehicle

ii. to walk around the house

iii. to work in the field

d. Which of the following clouds is found only in the upper part of the atmosphere?

i. Stratus ii. Cumulus iii. Cirrus

e. Which of the following clouds falls uniformly in the sky?

i. Cirrus ii. Cumulus iii. Nimbostratus

3. Answer the following question:

a. Define weather.

b. What is meant by weather forecast?

c. Why is the weather forecast so important?

d. How many types of clouds are there and what are they?

e. Distinguish between Cirrus and Stratus.

f. What means of communication are used in weather forecasting?

g. Write an essay on your favorite weather topic.

h. Find weather-related words in the search grid and circle them.

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

8.6 Natural disaster

In what kind of disaster do we experience the following events? Write the answer after discussing it with your classmates.

a. The ground is shaking and tall buildings are collapsing. .....

b. There is water everywhere and people are sitting on the roofs of the houses. .....

c. Soil has fallen from the hills and mountains, obstructing the movement of vehicles .....

d. The forest is on fire and animals are running away. .....

Below are some natural activities. Tick (√) the ones that may damage human life and property.

S.N.	Natural disaster	Tick (√)
1.	To rain	
2.	To rain continuously for many days	
3.	Forest in fire	
4.	Water flowing normally in a river	
5.	The water level rises in a river and enters the surrounding fields.	
6.	Wind blows	
7.	The wind blows at high speed.	
8.	Powerful shaking of the earth's surface	
9.	The vibration of the ground due to falling of big rocks	
10.	A large amount of soil and rocks slide down a hillside	
11.	Lighting strikes a settlement	
12.	Lightning flashes	

What is the difference between normal natural activity and natural disaster? What do we call a disaster? Let's think for a moment!

Rainfall is not a disaster, but if a loss of life and property occurs because of heavy rains then it is a disaster. In the dry season, a small area of land naturally catches fire and burns to ashes but there is no loss of life and property. It is not a disaster. But, if the same fire spreads and affects a large area of forest, animals and the surrounding human settlements, then it is called a disaster. Therefore, if any natural calamity causes loss of life and property, such an event is called a disaster. Floods, landslides, hurricanes, fires, cold waves, earthquake etc. are disasters.

Activity 8.6

Discuss with your classmates the recent natural disasters that have claimed lives and property in your neighbourhood. Talk about when and where those events happened and how effects they had.

8.7 Floods and landslides

Let's read and discuss:

Figure 8.15

It has been raining uninterrupted for four days in Lakhan's village. It had rained similarly last year too and the village had a flood. Cattles were washed away. The first floors of houses had water everywhere. Lakhan remembered all crops getting destroyed and they were left with nothing. The memory terrified Lakhan. His father consoled him saying such a thing would not happen this time as a dam has been built on the river. If there is a possibility of water overflowing the dam, the government will inform in advance and they will have enough time to move to a safer place. Lakhan finally calmed down.

Questions

a. Why was Lakhan scared?

b. How much damage was caused by the last year flood?

c. Why was Lakhan's father confident that there would be no flood this year?

d. What should be done to avoid the effects of floods?

Question to think

What could be the cause of floods other than continuous rains?

Flood is the increase in the amount and speed of water flowing in rivers and streams. Foods come mostly in the rainy season.

Causes of flood

a. Continuous rain

b. Excessive melting of mountain snow due to an increase in atmospheric temperature

c. Burst of glaciers due to excessive water pressure

d. Landslides block rivers and streams and form lakes that ultimately burst

The effects of floods

a. Houses, farms and bridges may be damaged or washed away.

b. Land becomes less fertile because the good soil is washed away and it is covered with stones, sand and garbage.

c. The environment and water get polluted when the dead animals swept by flood decay. It can even spread various infectious diseases.

d. The shape of the land changes.

Flood prevention measures

a. Build embankments or dams along streams and rivers

b. Plant trees

Look at the picture and think about it.

Questions

a. What natural disaster is shown in the picture?

b. What problems have people got due to this incident?

c. What can be done to prevent this from happening?

The process of soil, stones and rocks sliding down a slope is called a landslide. Heavy rain and river cutting are the main causes of landslides. Loose soil slides easily but not the soil covered with vegetation. As the roots of the plant bind the soil, the soil is compact and the rainwater does not affect it. Therefore, tree planting helps prevent landslides.

Cause of landslide

a. Cutting down trees on slops

b. Cultivation on steep slopes without making terraces

c. Uncontrolled grazing of animals

d. Carrying out developmental activities without proper planning, etc.

Effect of landslide

a. Decrease in yield due to the fertile soil being taken away by landslides

b. Loss of life and property as landslides can sweep away homes, farms, cattle and people with it.

c. Landslides will obstruct the roads and cause traffic problems

d. Landslides block rivers and streams and cause flooding.

Project work

Take out earth clod from a garden or field so that it contains some grass and small plants. Place it on a tray. Put some soil without any plants in another tray. Keep the trays slanted so that both trays make the same angle with the ground. Slowly pour water into both the trays at equal speed.

a. Which tray's soil was easily washed away?

b. Why did this happen?

c. What conclusions can be drawn from this activity?

Prevention of landslide

a. Protect the forest and plant trees in the empty areas.

b. Practice terrace cultivation on the slopes.

c. Do not graze animals in one place all the time, etc.

8.8 Hurricane

Discuss what is to be done during a storm.

Figure 8.17

a. What natural disaster is shown in the picture?

b. What should be done to protect ourselves from such a disaster?

Hurricane is also a natural disaster. Generally, the wind blowing at high speed is called a hurricane. In a hurricane, a strong wind blows carrying a lot of dust. Because of the strong wind, roofs of houses are blown away and trees and electricity poles topple. Sometimes, the hurricane is accompanied by lightning, due to which houses may catch fire and loss of life and property may occur.

Effects of hurricane

a. Topples road-side trees and obstructs transportation as well damages vehicles.

b. Destroys rural huts, cowsheds and schools.

c. Damages urban areas by toppling trees and blowing up branches, corrugated iron sheets and hoarding boards.

d. Electric and telephone wires break, and transformers are affected.

d. People and livestocks lose life as they get crushed by falling trees and cut by flying corrugated iron sheets.

e. Damages crops and orchards.

f. Since occurs in dry seasons, jungles and houses catch fire.

Ways to protect ourselves from hurricane

a. Must not panic and run around during a hurricane.

b. Must stay indoors during the storm.

c. Close the windows securely because the glass might shatter and hurt people.

d. Take shelter in the nearby shop or house in case you are outside.

e. Do not stay near or below the electric poles and wires because you may get electric shocks.

f. Avoid being hit by corrugated iron sheets, tree branches, hoarding boards, etc. that are blown away by the hurricane.

g. Just like building earthquake and rainproof houses, also focus on building houses that can protect you from the hurricane.

8.9 Cold wave

Look at the picture and think about it:

Figure 8.18

Questions

a. What kind of natural disaster is shown in the picture?

b. What effect does it have on a person's daily life?

c. What measures can be taken to avoid such natural calamities?

A cold wave is a seasonal disaster caused by the extreme coldness of the air. The main reason for the cold wave is the decrease in air temperature. The blowing of cold air due to the formation of a thick mist is a cold wave.

The impact of cold waves in winter in the Terai region is very high. In recent years, cold waves have become the main threat to the lives of people living in the Terai region. The average temperature drops below 10 to 15 degrees Celsius. During the cold wave, a thick cold mist blocks the sun for many days.

Effects of the cold wave

a. Cold waves cause swelling, drop in body temperature, blood clotting and other serious diseases.

b. Continuous cold waves make grazing difficult and hence animals might starve to death.

c. Water pipelines freeze and burst.

d. Consumption of fuel and electricity increases.

Ways to protect ourselves from cold waves:

a. Stay in a warm place inside the house as much as possible.

b. Stay well informed about the weather conditions and emergency measures by listening to the news on the radio or television.

c. Drink an adequate amount of hot liquid to maintain the body temperature and prevent dehydration.

d. Wear thick and warm clothes.

e. Store enough water, fuel and other essential items.

f. Adults need to take special care of the children and elderly because they catch a cold easily.

8.10 Fire

Read the following incident and discuss the given questions:

Resham had an exam the next day. He was studying till late at night for the exam. Just then, the light went out. He hadn't finished his preparation. So, he lit a candle and continued reading. He fell asleep while reading. The window was open. Because of the wind coming through, the candle fell to the ground and the flame caught the curtains. The curtains began to burn.Just then, Resham woke up. Seeing the curtains in flames, he panicked. He tried to run away but the door was closed. He opened the door by pushing the handle with the help of a broom nearby. He came out and cried for help. His parent srushed to his room and put out the fire by sprinkling water and sand on it. Resham's heart pounded for a moment and he thought,"Is fire our friend or enemy?"

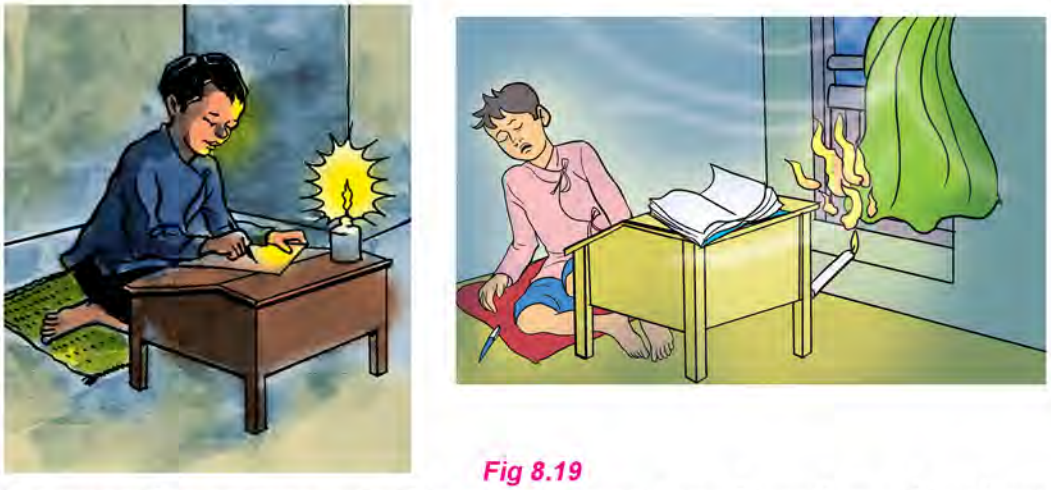


Fig 8.19

Discuss the answers to the given questions based on the above incident:

a. What mistake of Resham caused a fire in the room?

b. Why did Resham open the door with the help of a broom instead of opening it with his hands?

c. Is fire our friend or enemy? Why?

Have you seen the fire engine? What does the fire engine do?

What is the sound of the fire engine's siren-like? Why do fire engines play the siren?

Fig 8.20

A fire engine is a vehicle used for fire fighting. If any place is on fire for any reason, then we call the fire control department and ask for the fire engine. In our country, the fire control department's phone number is 101. Fire can cause a huge loss of property. That is why we must call the fire control department whenever we see places on fire. We must try to put out the fire with the help of water or a fire extinguisher while waiting for the fire engine to arrive.

Ways to prevent fire

a. Be careful while using fire.

b. Store matches and lighters away from the reach of children.

c. Keep the gas cylinder far away from the gas stove.

d. Be careful while using electricity because a short circuit of electrical wires may cause a fire.

Activity 8.7

Group the following actions as "Do's" and "Don'ts"in case your home or school is on fire.

Actions: Cry in panic, try to get out as soon as possible, shoutor

Call someone for help, hide under a table, jump out of a window, crawl out of the room, call the fire control department once you are out of the room, go out of the room wearing a thick blanket or clothes

Do's	Don'ts

Activity 8.8

Request the headmaster or class teacher to arrange a visit to the fire control office in your area. Go and see how fire engines and firefighters work to control fires.

Or, Request the teacher to or invite the firefighters to the school and find out how they work. Prepare a report of your findings.

Project work

Prepare a group report by asking the elders about the natural disasters that have occurred in your community in the past. It should include what the disaster was, its cause, effects and cautions.

Exercise

1. Tick (√) if the following statements are true and cross (x) if they are false.

a. Natural calamities invite disaster.

b. Infectious diseases spread due to floods.

c. Electrical appliances should be turned off in case of a hurricane.

d. We should wear light clothes during cold waves.

e. In case of fire, we should jump out of the window.

2. Tick (√) the correct option.

a. Which of the following is the cause of the flood?

i. continuous rain

ii. strong wind

iii. extreme heat

b. Which of the following activities is suitable for the prevention of landslides?

i. terraced farming

ii. cutting trees on slopes

iii. building dams on rivers and streams

c. What should be done in case of a sudden cold wave?

i. go out of the house

ii. stay inside the house

iii. drink cold water

d. In case of fire, which numbers should be called?

i. 101 ii. 102 iii. 103

e. Which of the following is the effect of a hurricane?

i. spread of contagious disease

ii. cracks in the ground

iii. topplingof tall trees

3. Answer the following questions.

a. What is a flood?

b. State the causes of flood.

c. What measures should be taken to prevent landslides?

d. Why are there less landslides on a slope planted with trees?

e. How does a flood cause the spread of contagious disease?

f. What is a cold wave?

g. What are the effects of a cold wave?

h. What measures should be taken to protect ourselves from cold waves?

i. What are the safety precautions to be taken in case of a hurricane?

j. When Rita was returning home from school, her neighbor's house was on fire. In that case, what measures should be taken to prevent additional damages?