Science
Class Six

Exercise book

National Curriculum and Textbook Board, Bangladesh

জলবায়ু পরিবর্তনের বিরূপ প্রভাব মোকাবেলায় বিচক্ষণ নেতৃত্বের স্বীকৃতি হিসেবে পাওয়া
জাতিসংঘের 'চ্যাম্পিয়ন্স অব দি আর্থ' পুরস্কার গ্রহণ করছেন প্রধানমন্ত্রী শেখ হাসিনা

জাতিসংঘের পরিবেশ বিষয়ক সর্বোচ্চ পুরস্কার 'চ্যাম্পিয়ন্স অব দি আর্থ' পদকে ভূষিত হন মাননীয় প্রধানমন্ত্রী শেখ হাসিনা। পরিবেশ আদালত আইন, পরিবেশ ও জীব-বৈচিত্র্য সংরক্ষণ ও উন্নয়নে সংবিধানে ১৮ক অনুচ্ছেদ সন্নিবেশ, বন্যপ্রাণী (সংরক্ষণ ও নিরাপত্তা) আইন, ইট প্রস্তুত ও ভাটা স্থাপন (নিয়ন্ত্রণ) আইন, বাংলাদেশ জীব-বৈচিত্র্য আইন প্রণয়ন এবং জলবায়ু পরিবর্তনজনিত তহবিল গঠন এমন বহু গুরুত্বপূর্ণ অবদানের স্বীকৃতি হিসেবে বাংলাদেশের প্রধানমন্ত্রীকে ২০১৫ সালের ২৭শে সেপ্টেম্বর আনুষ্ঠানিকভাবে এই পুরস্কার প্রদান করা হয়।

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Science | Exercise book

Class Six

(Experimental Version)

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Preface

In this ever-changing world, the concept of livelihood is altering every moment. The advancement of technology, in accordance with knowledge and skill, has accelerated the pace of change. There is no alternative to adapting to this fast changing world. The reason is, the development of technology is at its zenith compared to any time in the human history. In the fourth industrial revolution era, the advancement of artificial intelligence has brought a drastic change in our employment and lifestyles and this will make the relationship among people more and more intimate. Varied employment opportunities will be created in near future which we cannot even predict at this moment. We need to take preparation right now so that we can adapt ourselves to that upcoming future.

Although a huge economic development has taken place throughout the world, the problems of climate change, air pollution, migrations and ethnic violence have become much more intense than before. The epidemics like COVID 19 has appeared and obstructed the normal lifestyle and economic growth of the world. Different challenges and opportunities have been added to our daily life.

Standing on the verge of these challenges and possibilities, implementation of sustainable and effective solutions is required for the transformation of our large population into a resource. It entails global citizens with knowledge, skill, values, vision, positive attitude, sensitivity, capability to adapt, humanity and patriotism. Amidst all these, Bangladesh has graduated into a developing nation from the underdeveloped periphery and is continuously trying to achieve the desired goals in order to become a developed country by 2041. Education is one of the pivotal instruments to attain the goals and there is no alternative to the modernization of our education system. Developing an effective and updated curriculum has become crucial for this modernization.

Developing and revising the curriculum is a regular and vital activity of National Curriculum and Textbook Board. The last revision of the curriculum was done in 2012. Since then, a lot of time has passed. The necessity of curriculum revision and development has emerged. For this purpose, various research and technical exercises were conducted under the supervision of NCTB during the year 2017 to 2019 to analyze the prevalent situation of education and assess the learning needs. Based on the researches and technical exercises, a competency-based incessant curriculum from K-12 has been developed to create a competent generation to survive in the new world situation.

In the light of the competency based curriculum, the textbooks have been prepared for all streams (General, Madrasah and Vocational) of learners for grade VI. The authentic experience driven contents of this textbook were developed in such a way that teaching learning becomes comprehensible and full of merriment. This will connect textbooks with various life related phenomenon and events that are constantly taking place around us. We hope that learning will be profound and life-long now.

Issues like gender, ethnicity, religion, caste, the disadvantaged and students with special needs have been taken into special consideration while developing the textbook. I would like to thank all who have put their best efforts in writing, editing, illustrating and publishing the textbook.

If any one finds any errors or inconsistencies in this experimental version and has any suggestions for improving its quality, we kindly ask them to let us know.

Professor Md. Farhadul Islam
Chairman
National Curriculum and Textbook Board, Bangladesh

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To the student

Dear students, you have been studying science in all the classes. How do you feel learning science? We are sure you enjoy doing scientific practical tasks more than reading. From now on, we will not only read science. Rather we will have some experiences that reflect the way scientists originally do their researches. Certainly you have got the textbook which is directional or reference for you. Whenever you need throughout the year, you may consult this book. And the teacher is always there to help you.

This Book is Yours!!!

This book is yours only; it is the book to jot down your tidbits of science, some sudden bright ideas and thoughts etc. All through the year, this book is going to help you like a friend!

Therefore, let us complete the introduction part right at the beginning, shall we? Write your name and ID in the blank space below:

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We should also strengthen our relationship a bit more, shouldn't we?

Write a few sentences informing the book more about you:

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Introduction

Many events continue to occur around us all the time. Certainly you have many questions about these, like why do these happen, how do they happen, etc. Some of you might have tried to seek answers to these on your own.

Now we altogether will seek answers to many such questions. This is your exercise book to make that work a little more organized. How to go through the various learning experiences step by step is given here in detail. While doing these tasks, you may need to know various types of information and theories of science; new questions may arise in your mind. The book 'Investigative Study' on Science will help you find the answers to all these questions. Moreover, these two books will directly help you in different stages of achieving learning experiences throughout the year.

Your learning experiences in class six are given beside. Take a look at them.

What kind of experience shall we have?

Title of Learning Experience	What we shall do
How big is the sky?	Who does not feel good to see the sky? Where is the end of the huge sky that we see the moment we look up? This earth, sky, universe- where did they come from? We shall look for these answers.
Science and Technology in our lives	Science is certainly not a new subject to you. This time we shall work on what science is and what science works with. Besides, we shall also learn to know various technologies we use regularly from a new perspective.
Picnic! Picnic!	The term picnic obviously enchants our minds. So, how would you feel if we arrange a picnic for this class? Yes! We are going to do that very task here; however, you are going to take all responsibilities of this picnic.
Our neighbours	Can you tell who our neighbours are? Don't you want to know them? Remember, these neighbours also include trees, birds, animals, insects etc besides the humans. We certainly want to learn about them. It's time we seek these neighbours out.
Let's make a boat!	Is anyone here who has never seen a boat? At least, you must have made paper boats to float them in the nearby drain on a rainy day. How about revising the process of making a boat? And, that too, a real boat that can float, shall we?
Insolation, water and rain	How is the weather today? Is it sunny or raining? Which weather do you like most? Is our weather same all through the year? Again, were the summers a hundred years ago the same hot? Will it be same in the future? Our tasks here will answer all these questions
The motion game	Who doesn't like to play! Many of you may have played in games competitions school, but what if you are to organize a game on your own? From fixing the date to organizing the game- if it can be done by sharing the whole task among you, then it is better! Let's see some of the familiar games from new angle in this event!

Title of Learning Experience	What we shall do
School for all	School is for all of you, isn't it? But there may be some of you who find it difficult to walk, who are to use crutches or a wheelchair. If you notice, you will see that many of them have difficulty in entering the school, the classroom or the door to the toilet. Is there anything you can do to solve this problem so that the school belongs to everyone in the true sense?
The course of the moon and sun	It is hard to find anyone who has not been overwhelmed by the moonlight on a full moon. Almost everyone has experienced a full moon or a new moon (Amabasya in Bangla), but have anyone of you ever seen a lunar or solar eclipse? From the ancient times, people have seen these strange phenomena; have searched for the reasons for them; have come up with various rational and irrational explanations; have been in danger due to misunderstandings. In this learning experience, you will get some acquaintance with the experience of the ancient people, but you will also search for the scientific explanation of these events yourselves.
Laboratory in the kitchen!	We use thousands of different things in our daily work. Different things are needed for each of the works. For cooking, we need so many things! The very kitchen is like a huge science laboratory. Let us see how the kitchen can be used for scientific research!
Mechanism of body clock	The job of science is to look into everything, from the structure of the vast universe to how a tiny wristwatch informs the time by ticking, and we have no end of questions. But have we ever wondered how the machine called our body works? Let us turn our eyes a little and try to understand this strange machine called human body!
Friendship with water	Water is the closest friend of all creatures including humans in the world. We cannot live a single day without water. But is the amount of water on earth limitless? Or can this water run out sometime? Aren't we risking our own life by our random use of water? Let's inquire about this from the closest friend of ours.

Title of Learning Experience	What we shall do
Lives all over the world	How do you like to read story books or watch dramas? What if characters in the drama are something other than human beings? What if the story is your own? Let's see.
The world of colour	As we open our eyes, we see the show of countless colours in this colourful world! But why do we see red rose as red, and why the green leaves are green? Again, why don't we see the colour in ordinary water, glass or air? Have you ever thought about that? This time your job is to solve all the mysteries of the colours of this colourful world!
Those who are lost	You've already found out your neighbours. But if you look a little further, you will see that there were many more neighbours in your area who have been lost over time. Our job this time is to find out those lost neighbours-
Vaccinate your child	We all are familiar with the word vaccine, aren't we? Have you even seen children to be vaccinated in your area? But what is this vaccine? Why is it to be taken? What is the result of taking vaccines? Let's start the work of finding out the scientific answers to these questions.
Rivers will live if they have life	If you look at our country from the above, you will see that the whole country is surrounded by innumerable rivers like a net. The relationship of the people of this country with the river is very deep. Our innumerable folk songs, poems, stories focus on the river. Not only the human beings, but a large part of the biodiversity of this country revolves around the river. Through this learning experience, let's try to get to know this part of our lives- river a little more deeply. How do you feel?

How Big is the Sky?

Who does not feel good to see the sky? Where is the end of the huge sky that we see the moment we look up? How big is the sky? Where did this earth, sky, universe come from? We shall look for these answers.

What are the questions that arise in your mind as you look up at the sky? Write them down here. Once the task is complete, check answers to which of them you could find out.

Session One

Let's start with looking overhead at the sky. What do we find in the sky? Quickly fill in the list below:

What are there in the daytime sky	What are there in the nighttime sky
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Is the colour of the sky at dawn and afternoon same? What about the colour of evening sky? Does the sky change its colour so many times as it does in the morning, noon and afternoon? Which sky of a specific hour of day or night do you like most? Share your answers with your friend. Which sky does he like most? Try if you can draw the sky of your liking. If you want, you may also cut papers and paste on a poster paper.

Let's draw!

Image: Draw the sky (your friends view)

- Show the drawing/poster to your friend when it is finished. See what your friends drew. You may also ask your friend to see whether he can tell what time does your sky represent!
- Once you return home, check the night time sky more carefully. There are hundreds of stars in the sky. Are they same? Do they have the same colour? Do all of them twinkle?

Sessions Two and Three

- You have certainly seen last night that all stars in the sky are not similar. All of them do not twinkle in the same fashion. Even, all of them do not have the same colour; some are white, some yellowish while some are a little bit reddish.
- Share the result of your observation with your friends. Do they agree with you?
- If your friends observed the sky with same care, then you have certainly come to agree on some points. The tiny bright dots we see in the night sky that we call 'Stars' are not similar. They are not even 'Stars'. 'Stars are only those that appear to twinkle in the sky. Besides, we see planets and satellites in the sky which appear to shine steadily.

- Stars have their own light. That is why, sun is also a star. Many of us know about the solar system that centers round the sun. But there are millions of stars like our sun in the universe. We can see only a few of them with bare eyes. Again, these stars remain together in groups known as 'Galaxy'. The name of our galaxy is 'Milkyway'.

- Can we see our galaxy when we search in the sky? Discuss in your class if someone ever saw it.

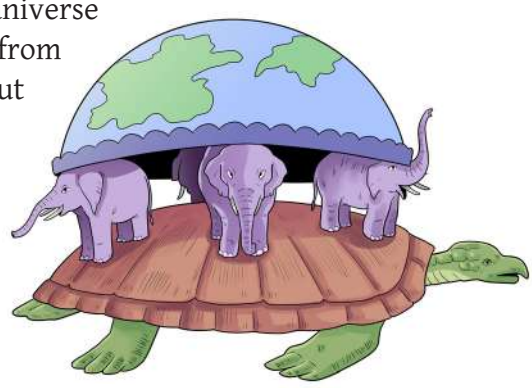
- Like our Milkyway, there are many other galaxies in the universe. How many are they? Can you guess how many stars are there in each of these galaxies? Can you guess how does a galaxy look like when numerous stars gather in a galaxy? Discuss with your partner beside and then write down your guesses:

	Number of galaxies	Number of stars in a galaxy
Your guess		

- Now read what is written about galaxy in your science investigative study book. Try to learn how a galaxy looks like. How many stars like sun are there in each galaxy? What can be the number of galaxies in the universe? Now match the information with what you guessed and wrote. Write down what your learning is.

	Number of galaxies	Number of stars in a galaxy
Your guess		
Scientists' guess		

Do you realize that this huge universe certainly had a beginning? Man, right from the ancient times have thought about this beginning of the universe. Stories were made orally. For example, once some people used to believe that the world rests upon the backs of four giant elephants; the elephants were standing on the back of a giant tortoise.



Obviously you can realize, these stories are nothing but imagination. No scientific proof is possible for them. However, Man not only made stories about the creation of the universe. They have searched for scientific knowledge too. Your investigative study book contains explanation of 'Big Bang', the latest scientific theory about the creation of the universe. Read that once and answer the following questions after a bit of thought:

Is the Big Bang theory based on scientific research or an imaginary idea?.....

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* Have the scientists found any proof for this theory?

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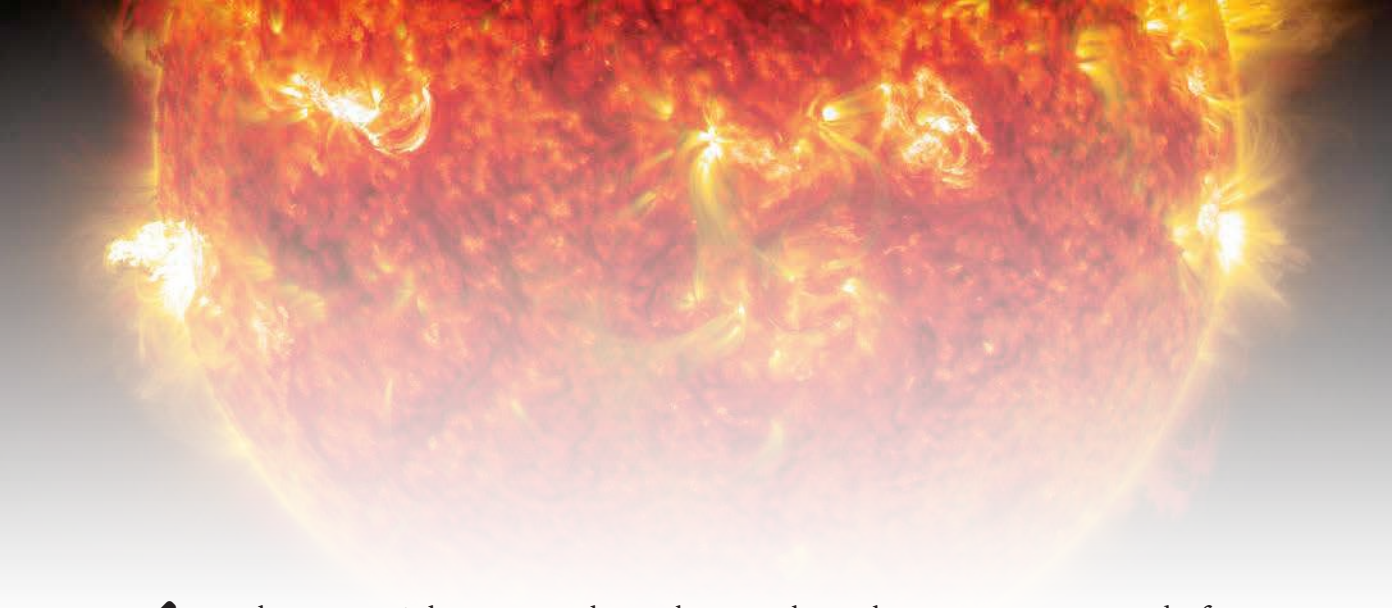


- You have certainly come to know by now how the stars were created after the creation of the universe. We also know that the stars have their own light. We light candles, hurricanes, charger lights etc to light up our homes. The lights go out as the fuel or battery is finished. Might the fuel of the stars get finished some day? If they finish, what actually happens to the stars? Think about two minutes. Then, discuss and hear what your classmate thinks about it. Now share your ideas with your teacher. After this, match what the teacher says with what the investigative study book says.
- Observe the sky again tonight. After learning about the beginning of universe and birth- death of stars, the sky, for sure, appears new in your eyes.
- In tonight's sky, try to find the star formation like the two pictures below.

Sessions Four

Did you find the star formation like the picture that was given the day before? Find out who else is in the class got it? Find out what others say from discussion.

Fig: (From left to right) Orion, Ursa Major (the Great Bear) and Scorpio

Have you noticed that there are many figures hidden among the innumerable stars in the sky? The ancient people also imagined many such figures from these star formations. Many myths were created from these imagined figures. In your investigative study book, there are a number of such figures are presented in photos. Take a look!

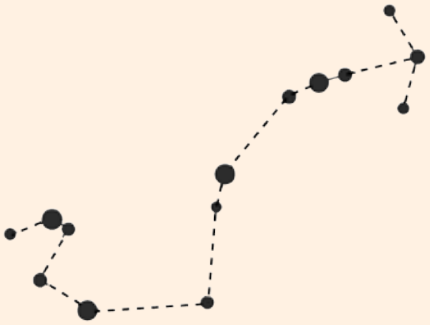
All the three images above relates with some fantastic stories of ancient mythologies. Can you imagine any such picture?

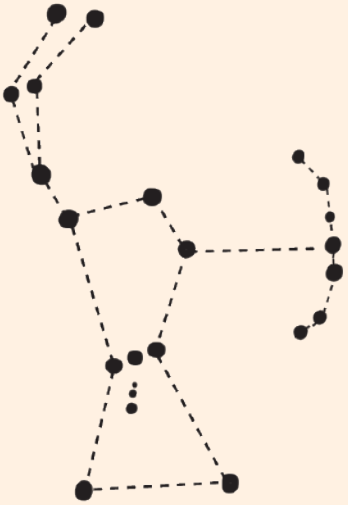
Work with your study partner. Check the pictures star formation and try to create your own stories.

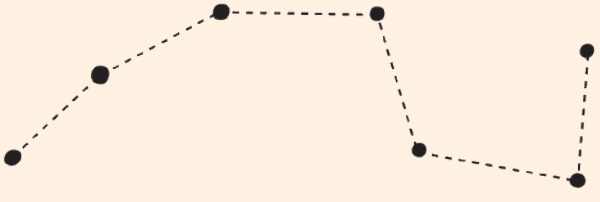
The Myth of Orion

Orion was a famous warrior and hunter! He was arrogantly proud! He used to claim that he could hunt all animals! The gods became angry at such arrogance in him! They sent a Scorpio to teach him a good lesson! A bite from that Scorpio killed Orion! The gods decided to place both Orion and the Scorpio in the sky as example for the humans. When the humans see them in the night sky, they learn the result of such arrogance! That is why, still, the Scorpio is still seen in the sky running after Orion!

Compare your picture and story with that of your friends, Take comments of teacher.







Doesn't it look like a painter's brush work? This is a real picture of a nebula far away from the earth! What a wonderful thing, isn't it?

- The fact that so many stars in the sky together create a picture or a story in the eyes of our imagination, are all of them neighbours? No, they are not. Some of these stars are very far from Earth, some are closer. But even the nearest star is so far from Earth that we see each of them as a single dot of light. It is not at all possible for us to understand the distance between them with our naked eyes.
- We all know that the earth revolves around the sun, and it takes a year for the sun to revolve around it. Since the earth is not in the same place all year round, we do not see the same constellations in the sky all year round.
- If you do not believe, find the Orion in the sky in the summer!
- Ancient astronomers divided the sky into twelve parts based on the constellations seen in the sky at different times of the year. They named each part a zodiac sign. The cycle which is completed by turning around all these parts once was named the zodiac.
- The idea of these twelve parts of the sky is very ancient. People have used it for various purposes in different times of civilization. There are two types of usage in your book; Bangla Barsapanji or calendar, and astrology or fortune telling. Sit with your friends in group and discuss these two issues, and keep the following questions in mind.
- Once you agree, write the answers on the table in the next page. If you do not agree, write it down as well!

	Bangla Barsapanji or calendar	Astrology or fortune telling
How did it come?		
Why is it used?		
Is there a scientific basis?		

Session Five

Have you identified any unscientific practice or superstition from the previous day's discussion? Have you ever seen someone in your family or neighbourhood who believes in such superstitions? What should be your responsibility in these cases? Discuss with friends and make a decision and write it on the table in the next page. Share the group opinions with others including the teacher in the class, to see if other groups agree with you.

Common unscientific practices or superstitions		
What should be your responsibility?		

- We've talked, thought, and learned a lot about "How big the sky is". The work of looking at the sky with paper and pen is over this time, but there is no obstacle for you to see the sky!
- Before you finish, write down your thoughts in the table below. Think about the questions on the left and put your answers on the right.

Looking at the sky, what new things are coming to mind now, or what new thoughts are coming to mind?	
What other questions are revolving around in your mind?	

Surely many of your questions are yet to be answered? You will find those answers one day, maybe in one of the higher classes. Even if not in the higher classes, you can find answers to many questions on your own; Now you all know how to find the answer to a question through scientific inquiry!

There are thousands of books in the world beside school books!

Science and Technology in Our Lives

The subject, Science is certainly not new to you! What is science or what science works with this is our work this time! At the same time, we may learn to look at the technology we use in our daily life with new eyes.

Sessions One and Two

- In previous learning experiences, you must have got some idea of how science works. You have known that there must be enough evidence to support what science says, and that a theory can also change on the basis of evidence. In this new learning experience, we will try to look more closely at science, scientists, the process of scientific inquiry and technology.
- We all read science in school investigative study books, but have you ever wanted to know how the real scientists work? Well, have you ever seen a real scientist with your own eyes? How do scientists look?

Let us draw the scientist of each of our imagination-

Image: The scientist in my eyes

- See how the drawing of the friend on the next bench is. How has the rest of the class drawn? What are the features of the appearance or clothing of the scientists mostly seen in the paintings drawn by everyone?
- Now read from the investigative study book what is written in the first part of the first chapter about the concept of science, the example of Madame Curie, Isaac Newton and Haripada Kapali. Do you find any similarity between your reading and the image of the scientist in your own imagination? Discuss with the classmate next to you and match your idea!

Now write the answers to the following questions quickly based on the discussion!

What are the characteristics found in true scientists? Can anyone become a scientist if he wants to?	
Does the scientific research or inquiry always need a lot of modern laboratories or equipment?	

Now go back to the discussion. Scientists do inquiry or research in order to find the answer to a question or to solve a problem. Now, do you have to be a professional scientist to do this inquiry? Or can you also do scientific inquiry to solve a problem in the same way? You have read the story of the discovery of two scientists; now take a closer look at the process of their research again! Do you see any similarity in the working processes of the two scientists? Write down your thoughts by talking to a friend next to you-

What are the similarities between the scientific research processes of Sir Isaac Newton and Haripada Kapali?	

Now read the part of scientific inquiry from your investigative study book. Discuss the steps of scientific inquiry with friends and the teacher. Read the story of Haripada Kapali's discovery again and see how he followed these steps in discovering his new variety of rice! Below are the steps of scientific inquiry. Discuss with your classmates what scientist Haripada Kapali has done at specific steps. Write your opinion in the blank space next to the steps-

Steps of scientific inquiry	What scientist Haripada Kapali has done in this step-
(1) To fix a problem or question which needs to be solved or answered	
(2) To know what research has been done in this regard	
(3) To make a possible explanation of the question	
(4) To check whether the possible explanation is true	
(5) To take a decision by analyzing the test results	
(6) To share the idea with others	

Session Three

- The previous day, there was a lot of discussion about how science works; we also saw that science helps us find answers to many questions. But have you ever wondered how science can be directly applied to our lives?
- Can you think of some examples of how we can make our daily lives easier by applying the knowledge of science?
- Write down immediately whatever comes to mind in the chart below!

In which areas of life do we directly meet our needs by applying the knowledge of science?

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- When the knowledge of science is used to meet one of the needs of our life, it is called technology. In the chart above you must have highlighted some of the technology! Even then, has something very common/conventional escaped your eyes? To understand this, compare the list above with a friend next to you. What is the similarity between the two lists? If there is any, what are they? Choose a technology that is on the list of the two of you, or that both of you are very interested to know.
- Now it is the responsibility of both of you to find out what is the role of science behind the technology that you have chosen. That is, what special knowledge of science is involved in this, how science has been applied in this case. Discuss among you, and note down the results of the discussion below-

Our favourite technology	
Knowledge of which field of science has been used here?	

The rest of the class must have written about their favourite technology! Talk to everyone and see if you can find out about any new technology!

Home Work

You have to do something before the next day's session. The following is a list to be made by you about the most common technologies used by family members, relatives, and friends in your home. As well as not forgetting to note what they use this technology! Also, don't forget to note down, for what they use this technology!

The name of the technology	What is it used for?
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Session Four

The previous day, your friends must have written a lot about different types of technology. First, divide into small groups and listen to everyone else. Also, share with others what you got!

Much work has been done on the use of technology in various aspects of daily life. But is technology just related with our daily lives, or does it have uses in other fields? Now let us work in a group to find out different aspects of science! Let us also find out what other examples of application of technology in other fields other than various aspects of daily life!

If you know of any new technology in the group discussion, write it down in the table below-

The name of the technology	What is it used for?
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- Make a list of all the information you have gathered and of all types of technology that have come up from the discussion with the rest of the group. Now take a closer look, among all these discussed technologies, which ones we really need? Which ones are totally unnecessary? Again, do people use all technologies for good works? We see a lot of technology being used for bad purposes! Again, there are many technologies that can be used for both good and bad purposes!

- Discuss all the technologies and their uses that have come up in your group list, and see which ones fall into which category! You can take the help of your investigative study book in this regard; read the technology part of the first chapter. Then, based on everyone's opinion, categorize the technologies in your list according to the table on the next page-

The name of the technology	Different uses of the technology	The results of using the technology are getting better or worse	Why are we saying good or bad?

As you can see, just as different technologies have made life much easier, so has the risk of misuse. Just think if we have anything to do with this! Going back home today, get the opinion of others in your home, and discuss with the rest of the group in the next session!

Session Five

After the previous session, sitting in your home, you must have thought a lot about the various uses of technology, and what we have to do in those cases! Now talk to the rest of the group and see what the rest of you think!

It will not be enough for you to ensure the use of technology yourself; you have to make others aware! You must have got a lot of good ideas about how to do that by discussing in the group! Note down the ideas based on your group discussions-

What can we do to increase the use of technology for good purposes?	What do we have to do to reduce the unnecessary use of technology, or the misuse of technology?
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

Now share your ideas with the rest of the class and see what others feel! In order to share with others, you can use posters, or draw pictures or any other way!

Everyone in your class is now very aware of the use of technology, but many

students in other classes of your school may not know these things or have never noticed! Is there anything you can do about it? Discuss with everyone in the class. If you want, you can arrange cartoon or poster exhibition, a seminar or discussion program etc.

Has everything gone according to plan? In doing so, has any new direction come to mind that you never thought before? Note down your feelings!

Retrospection

What was the plan of your team?

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.....

How was your experience in doing the job? What have you learnt or known?

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.....

Is there any question about science and technology in your mind that has not yet been answered? Write your question below, so that it is not lost! You will surely find the answer to these questions yourself anytime later!

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.....

.....

Picnic! Picnic!

Whenever you hear the word picnic or ‘Bonvojon’, surely your mind becomes refreshed? You're right, this time we're going to do it; but you have to take all the responsibility of organizing the picnic yourselves!

Session One

- Picnic means cooking, eating and drinking together, isn't it? First of all, you need to know what your favorite food is. Write down your favorite food items in a notebook! After writing, compare it with the friend next to you and see which of your favorite food item matches with him!

- Everyone in the class must have written their favorite food items! See which of these might be on your picnic menu? If you want, you can think of any other food. With the help of the teacher, make a list in the table below, mentioning which food items you want in the picnic menu!

- Can you prepare the food items that appear on the list? Do all of you know what it takes to cook? Is everything to be cooked or can they be prepared without cooking? At the very beginning, you have to make a plan with information from everyone in the class. So, first of all, everyone in the class should be divided into groups. Then choose the food to prepare for each group, and make a note of the necessary ingredients, the process of making them in the table below, or in a table of your choice.

Menu of the Picnic

1.

2.

3.

4.

5.

Name of the Food:	Process of Making
What materials are needed?	
How long will it take?	

If no one in the group knows recipes or how to make food, you can take the help of a teacher, or anyone else.

- When all the team work is done, share it among yourselves. Check the recipes yourself to see if they are correct. If necessary, you can take the help of a teacher or parents going back home. Now, let us discuss and finalize the picnic menu again! At the time of making the decision, keep in mind the ingredients, the time, as well as the risk of the recipe.!

Session Two

- The picnic menu is final, but all the plans are yet left! Choose a date in advance; it is better to select a holiday. But you will definitely need the help of a teacher to decide on this. Those of you who don't know how to cook have to learn to how cook. So have some time at your hand to prepare before the scheduled date for the picnic.
- Now all of your class plan together and distribute the responsibilities. While planning, the following questions should be kept in mind-
    - Will the cooking be organized in the school? Or do you want to cook and bring it from home?
    - How much of which ingredients do you need to organize for everyone in the class?
    - Do you have to bring the ingredients from home or buy from the market? How much will it cost per-head to buy the ingredients?
- Each group can take responsibility for one food item. Then sit in a group and discuss what to do to cook that item. It is also important to decide who will play which role in the team when cooking at school. And if you have to prepare it from home, decide each of the team will be responsible for preparing food per head for how many people.
- Does anyone on your team have previous experience? If there is anyone, you can learn the rest from him. Or if you don't have any experience, you can learn from home and share with your friends.

Homework

- Who mainly cooks the food in your home every day? How much do others in the house take part in the kitchen work? What are your responsibilities?
- Friends who have experience in helping in kitchen work will surely be ahead of the rest in organizing the picnic! Why will you be behind? Going back home today, try to make the food item which your team has the responsibility to prepare. If necessary, take the help of parents or elder brother or sister.

Sessions Three and Four

- Coming to class, talk to your teammates and see how they prepared food at their home. Have they done it alone or have they taken help of others at home?
- Let us go a little deeper into the process. Think about the ingredients that are used in this food. How was its colour-taste-smell before cooking or before food processing? How did it turn later? Discuss and note down all these changes in the notebook-

Name of the ingredient		Colour	Taste	Smell	Size
	Before cooking/ Before food processing				
	After cooking/ After food processing				

(Don't try to eat raw eggs-fish-meat or vegetables!! You do not need to taste all the ingredients in the raw state!!)

- Now think a while, can the existence of these ingredients in the prepared food be felt separately? How are the different colours-tastes-smells of the ingredients, and how are the different colours-tastes-smells of the food that comes together after cooking or processing? What would be the change in the characteristics of the food, if a single ingredient was not used?
- Once all the above observations of your team have been noted, read the part about the physical and chemical changes of matter from the science book. Then decide again in the group discussion, what kind of change of the ingredients of your food has taken place? You know, the last step in any scientific inquiry is to let everyone know the results of the inquiry. So come up with something out of the ordinary, and then they have to re-think their position. So, find out an idea of how to let everyone know all your results. A nice poster combined with drawings can be designed. Or you can do anything else if everyone on the team wants.
- All the teams must have done the same thing with the details of your assigned food! What if an exhibition is set up on a wall in the classroom with posters of all teams so that all the teams can share their ideas with everyone? If you want, you can find out any other idea. All of you discuss together!

Session Five

- Now it's time for picnic!!!
- Start working on preparation of the picnic according to the previous plan. Keep notes in your diary, so that you can manage better!
- Picnic begins ...

Sessions Six, Seven

You must have had a lot of fun in the picnic the previous day! The fun of cooking and eating yourselves is different, isn't it? However, the real taste of many food items cannot be found without eating hot. Have you ever wondered why it gets cold when you leave the food alone? Or why does the ice melt if you leave the iced 'Sherbet'? Discuss among your friends and see what they think about this!

- Let's do a little test. It doesn't take much for this test: a glass of water or 'Sherbet', two pieces of ice, and a thermometer.
- First take a glass of water or 'Sherbet' and measure temperature with a thermometer. You can take help of the part of temperature measurement in your book.
- Now put the ice cubes inside the glass and wait for a while to observe. The ice will soon start melting. Record the temperature of the glass again just before the ice melts and almost dissolves in the water.
- Now leave the glass for half an hour. At the end of the session, record the temperature of the glass again.

You can make a table like following table-

The time of recording temperature	Temperature (in Celsius scale)
Before putting ice	
Just before the ice melts and dissolves with the water	

Keep the glass for now. Rather, let us come back to the story of the picnic. Well, after eating in the picnic, you must have cleaned the dirty kitchenware or utensils! Would you be able to eat if you kept that day's food out of the fridge until today? Surely the food would be spoiled, rotten, and bad smell would come out? That's why we have to hold a handkerchief around our nose while passing by the dustbin!

- Well, can you tell how the stench or bad smell of rotten food or other garbage reaches our nose? Talk to a friend next to you about your idea? You can keep the following questions in mind-
  - How do we get smell? What is the matter with smell?
  - How does the smell reach our nose from a distance?
- After the discussion, read from your book about the properties of matter, especially the properties of gaseous substances. Then reconsider your ideas again and see if your opinion has changed? Discuss with the rest of the class too!
- Just think, getting smell from some garbage means that some particles of that garbage are actually getting into your nose!! What a terrible thing! Right?
- Hopefully none of you have any doubts about why dirty garbage should be dumped in certain places and why dustbins should be covered!
- We have just talked about the rotting of food. Is this change in food a physical or chemical change? You think a while! Discuss with the rest of the class and see what they think.
- Have you forgotten the glass you left to test at the beginning of the session? It must have been half an hour! Now add another row under the previous table with the temperature of the glass again-

Time of recording temperature	Temperature (in Celsius scale)
Before putting ice	
Just before the ice melts and dissolves with water	
After leaving the glass for half an hour	

- Now look at the table carefully. Compare the record that your team has kept with other teams! Is there any difference in results between your team and other teams? If so, how much?
- If the difference of results is greater, compare your process and the time of recording temperature. Is there any difference in the process? If so, decide which process is more logical. If necessary, you can change the process and record the temperature again.

Is the temperature of the glass still changing? Or is it the same? Why? What is the reason behind the record of fluctuations in the temperature of glass of water in your table? Do you see any connection between the cooked foods' getting cold and this incident? Discuss the whole thing in your own group and make a decision. Discuss with other groups to see what the rest of the teams think.

When you see ice melting into water in a glass, what kind of change is it, physical or chemical? Among the changes that we see in the various objects around us, can you tell which ones are physical changes and which are chemical changes? For example, we eat green banana (Kachkala) as a vegetable, but after ripening, it is a fun fruit - its taste, colour, smell all change then. What kind of change is that? Or the rust that gets stuck on the iron when the iron thing is left open for a long time- what kind of change is that? Discuss in group how many physical and chemical changes you can record from your own experience!

Physical change	Chemical change
1 । 2 । 3 ।	1 । 2 । 3 । ... ...

Fill in the Table-C at the end of the book for your feedback on the work of your classmates of your team at the end of the whole learning experience.

The Last Word

The picnic is over- Did you see, how fun it is to cook together? No one suffers too much when everyone works together. But if the responsibility of the whole picnic fell on you alone, what would have been the situation?

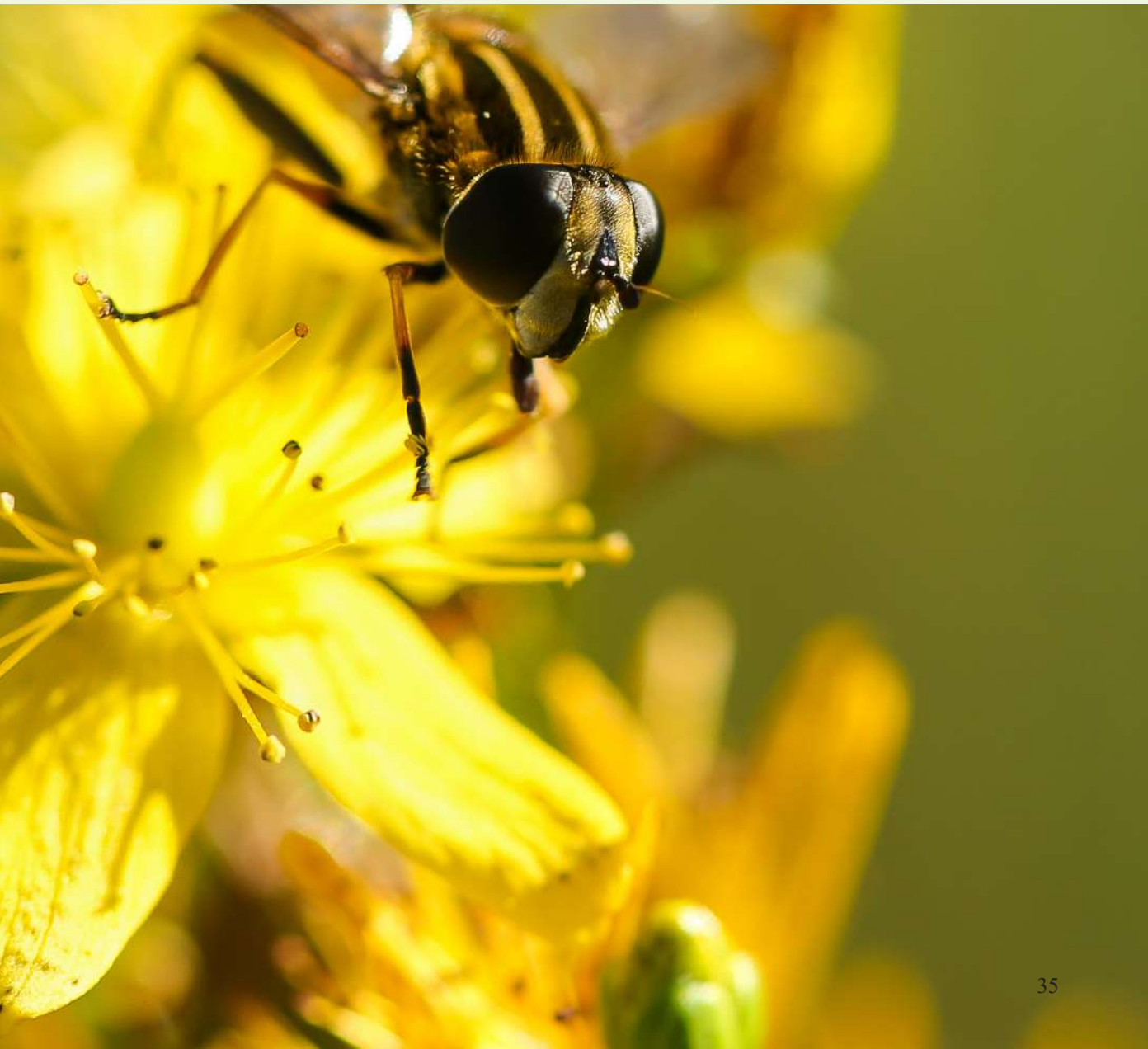
- Surely many of you help your parents with the kitchen work at home. They are far ahead of the rest of the people in an important matter like cooking! And those who have less experience in the kitchen before, surely, they need not to be told about this after today?

- Note down in the following table your own thoughts from the experience of the last few days. Think about the questions on the left side and put your answers on the right side.

Question	Your answer
Is there any change in your surroundings that you have never noticed before?	
Find out what other physical and chemical changes of various things are taking place in the kitchen of your home!	

Those Who Are Our Neighbours

Can you tell who our neighbours are? Don't you want to know about them? Not only human beings but also all kinds of trees, birds, animals, insects around us are also our neighbors! We also want to know about them! Now it's our turn to look for these neighbours!



Sessions One and Two

Have you ever noticed how many kinds of creatures there are in your home, at school, or in your neighbourhood? Let's just talk about birds, have you ever noticed how many kinds of birds are actually in your area? Just think a while! The same can be said for four-footed animals, insects, even for trees! Have you ever noticed how many flower plants can be found around you, how many vegetables are grown in your area?

Let us do this work at the beginning of this learning experience. What do you say? First, sitting in small groups, try to remember, how many kinds of creatures have you seen while moving around?

Now it's your turn to find yourselves! Now if everyone starts looking for all kinds of creatures, it will take a long time, right? It would be more convenient to do the work in groups. Divide into several groups with the help of the teacher. Each of the groups decides what kind of creature you will be looking for. A group might note just how many kinds of birds are in your area. Another group might list just how many insects there are. Let's start the work from the school boundary?

Choose a nice name before you start working! Suppose your group's job is to make a list of how many types of insects there are. What could be the name of the group? 'Grasshopper' or 'Ant'? Finalize a name through discussion among all!

Take 30 minutes to explore the area around the school and make a list. If you want, instead of whole team, you can go in pairs!

Have you finished your work? Then note down on the next page the names of all the creatures that your group has seen!

Name of the Group	
Type of Creature	Name of Creature
For example: (Tree)	For example: mango tree, plum tree, etc. ..
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	

If you just look around the school, you will not be able recognize all the neighbours! Now your job is to find out how many species live around each of your homes. For that, you can take the help of parents, or brothers and sisters!

Sessions Three and Four

Surely you want to know what creatures your friends found around their houses! Show them how many types of creatures you have seen. Then, discussing in group, make a table by gathering all the information obtained by all of you! Now you need to share the group work with the rest of the class! If possible, share your group's information with everyone on poster paper, or in any other way.

- After seeing the work of all the groups, many lists were found! Now, which is your favourite creature on this big list? Do you want to know more about this creature? Imagine, what will happen if everyone in the class chooses different creatures and finds out more about them! Most of the creatures in your area will be known to you then!
- Decide who will collect information about which creature or organism with the help of the teacher.
- Now talk to your friends to find out which information would be most useful to know about a creature or an organism? What kind of information can you find by observing? For example, the eating habits of an organism can be a feature of it. Make a list of all the features that you will see.
- Now take five or seven days to gather information about the creature you have chosen.

The name of the creature or organism			
Physical constitution	Food habits	Type of residence	Any special feature

Sessions Five and Six

- Since you have been observing your chosen organism for this week, let's utilize the time more! The smallest single unit is cell, some of you have probably already known. Take a week to develop an idea about the structure and function of cells, and how the cells of multicellular organisms form their properties. Also, on the basis of this discussion, look at the characteristics of the organism and how the classification of the organism is done.

Sessions Seven, Eight and Nine

- Whatever information you have got for a week, now share it with the rest of the team and see what others say. Compare the information you get with the information about other organisms collected by others in the group, what are the similarities and differences between the organisms.

- Now it is important to see the work of other groups. Through discussion in the class, find out about the organisms that they have gathered information from in class.
- Have you seen a wonderful thing? Gathering all the information from all of your class together gives a detailed picture of how many plants or animals there are in your area! What if, it could be shared with others? And if the class six students of all the schools do the same thing, then a lot of information about hundreds of plants and animals all over Bangladesh will be gathered!! Imagine what a wonderful job that would be!
- As a start to this work, you can take the initiative to make a catalog or information chart compiling all the information in your class. That's why, fist sitting in a group, read about how organisms are classified on the basis of different characteristics from your investigative investigative study book- from the chapter named 'Plants, Animals and Microorganisms'. Now decide how to create this catalog or information chart by discussing with all the classmates as well as teachers. A sample of how information about different organisms can be presented in your catalog is given in the next page, but this is not the way to do it. But this is not at all that you must do it like this. Follow the way you want to arrange the features of all the plants and animals on your list and present them. This is just a sample.

Name of the Organism:

Name and ID of the data collector:

Type of organism (plant / bird / insect / animal):

Physical structure:

Picture of Organism
(Hand drawing or Camera picture)

Food habit:

Type of residence:

Breeding:

Now think about how to show this catalog or information chart to everyone in the school. Decide together and work accordingly. If necessary, take the help of a teacher.

Retrospection

How have you considered this whole thing?

What new things have you learned that you didn't know before?

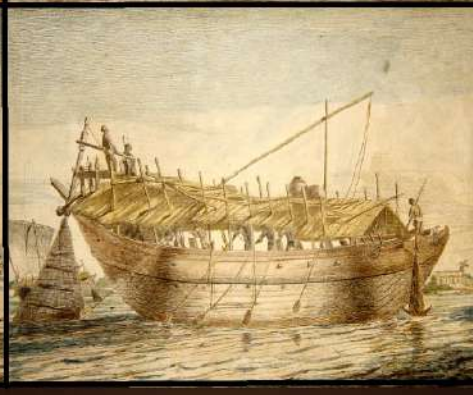


Let's make a boat!

There is no one among you who has not seen the boat! There are hardly any people in this country who have not made a paper boat and left it in the ditch on a rainy day! What if we repeat the techniques of making a boat together? But this time, let's not just make a paper boat, let's make a boat that can float in water with real weight. How do you feel?








Session One

- Bangladesh is a riverine country. Many rivers, canals, beels and haors of this country have spread in this country like a net. In the months of Ashar-Shravan, the canals, beels and rivers of Bangladesh are filled with water. Boats are, therefore, an ancient and urgent means of transport in riverine Bangladesh.
- Do you know that boats are still one of the most popular means of transport in many parts of the world, including Bangladesh? It is also important for transporting goods. Boats are widely used in Bangladesh during the rainy season. There are different types of boats in Bangladesh depending on the structure and transportation. These boats have funny names, such as- dingy, donga, kosha, sampan, bajra etc. and many more.
- Many of you must have funny experiences with boat trips. Talk to your classmates and you will see they have many stories about this boat and the river! If you remember any song or poem about river and boat, you can also perform it.
- Which of the following pictures of the boat on the other page are known to you? That is, you have ridden or seen. Write it down in the next table. Look carefully at the pictures again. With all the members of the team, think and try to answer which boats can be used for what purpose. Do the structures of the boats have any relation with their work?

Image Caption: From top, raft made of banana tree, kosha boat, rowing boat, bajra and sampan.

Table - 1

Name of boat	Ridden or seen	Not seen but heard of	Learned newly today	What is the boat used for and why?

- You must have made a paper boat and floated it in the ditch on a rainy day! Let's repeat the childhood skill now! Make a boat with a piece of paper and see how it is!
- Well, can a paper boat transport objects just like a real boat can transport people or goods from one place to another? Let's try. We can check it with the little things that are at hands in the class!
- Float everyone's boat in a big bowl or bucket one by one. Then put a small weight on top of it and see what happens! Notice well! Will the boat float like this for lifetime? Share the results you get with a friend near you and see what he thinks!
- Well, if you could make a real boat in place of a paper boat, what would it be like?
- Discuss in groups what materials can be used to make a boat. Keep in mind that the boat is durable and can carry a lot of weight.

Boat making materials-

☑	☑
☑	☑
☑	☑
☑	☑

Session Two

- You must have noticed that many objects float in the water and some of them sink. There are some objects which submerge some part of them under water and some part float above, when released into the water.
- It is very important to understand, how much the materials you have taken to make the boat will float on water.

All you need to do this experiment » Bucket or cistern, water, shola, jute stick, plastic bottle, marble, coin, nails, ice etc. small things.

Let's start the experiment now.

- First take water in a large container. Now leave the materials in the water one by one and observe - which one is sinking or which one is floating? Which one takes longer time and which one takes less time to sink? Notice which one is about to sink but is floating.
- What are the main differences between the objects quickly sinking into the water and the objects floating? Brainstorm yourselves and then discuss in groups.
- Now read the part the properties of matter from your investigative study book. Take note of the properties of matter, such as mass, volume, density, etc. Now measure the mass and volume of the objects in your experiments. Density can be easily calculated from there.
- Do you notice any easy difference considering the density?
- At the end of your observation, you will complete the picture of the pot below, drawing the pictures of the objects inside the pot. Put the sinking objects at the bottom, floating objects on top and place the objects that float in partially submerged state in the middle of the liquid's surface.
- Now, again look at the materials you have in mind for making the boat. Do you want to make any changes now?

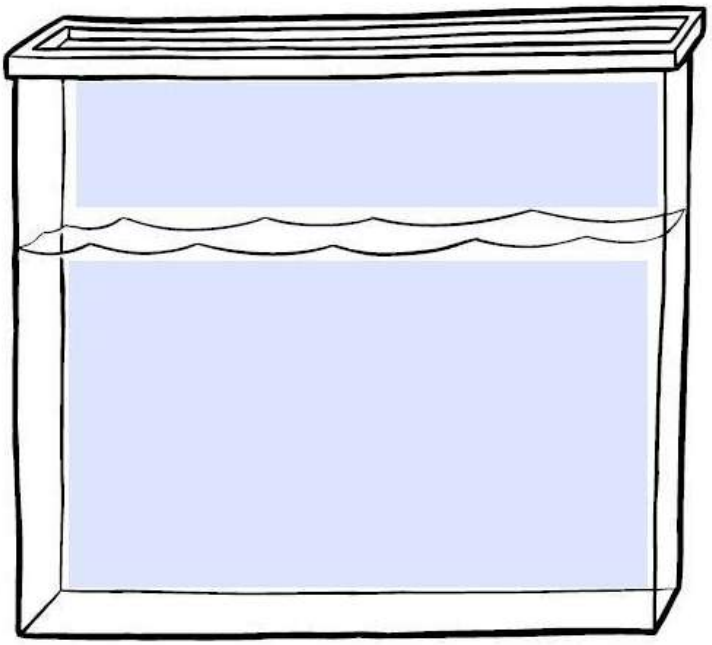


Image 1

Sessions Three and four

- In the previous session you have seen that all objects do not sink in water in the same way. But if you give oil or sherbet instead of water, will the same result come?

- You must have seen that oil and water never mix. Oil floats on water. And in different density what happens if you leave different types of objects in water? Let's do another experiment:

  - What things you need to do the experiment-
  - Glass or large test tube, honey, water, edible dye, edible oil, nail, raisin, plastic bottle cap, ping pong ball, 50 ml beaker for measuring volume of liquid.
  - Now divide into the team given by

your teacher and pour 2 drops of edible dye in 10 ml of water in a large glass jar or large test tube. Then pour 10 ml of honey on the water. What do you see? Is honey going under water or staying on top? Now carefully pour the same amount of edible oil and see what happens? Leave the pot like this for a while and draw a picture of it.

- Then carefully drop the screw or small nail first, then raisins, plastic bottle cap, ping pong ball into the container. Then observe which one is sinking or floating in the liquid of which density.
- At the end of the observation, in the table beside, draw the picture of the floating or sinking position of the objects and do the labeling.

Now read well the part of the relationship of density with floating and sinking in water from your investigative study book. Do you find any similarities with the group work you have done? Complete Table-2.

Table-2

Serial	Name of object	Floats on which liquid	Sinks on which liquids	Why floats or sink
1				
2				
3				
4				
5				

Sessions Five and Six

- You have understood the relation of density with sinking and floating of objects in water. Now surely you have to get less suffering than before to make the boat?
- Now let's start making the model of the boat?
- You can do this group work given by the teacher outside of school taking time. But for this you need proper planning and coordination of group work. So first you sit in the classroom and finalize - what materials will be used to make the model; what kind of model will you make etc.
- Record the ideas in the notebooks and collect the easily available materials. You will try to make the boat with waste materials.
- For the convenience of floating the model boats at a certain place, the limit of its area will be fixed. The teacher in the class will tell. An example may be of length 16 cm. and width10 cm.
- Different tasks have to be shared to ensure the participation of everyone in the group. Everyone in the group will discuss and decide who can easily get which material. Then in the notebook you will sketch the draft of how and which model you will make. Try to build the structure of the boat in such a way that it can float with more weight.
- There are many ways to make a boat. Now it's your turn to brainstorm. The teacher will give you some ideas. You can get help from other books or internet if you want.

Let's draw a sketch of our boat model--

Sessions Seven and Eight

- After listening to the experience of travelling by boat and at the end of the experiment on what objects float or sink on water and experiment on liquids of different density, you have made some excellent boat models in groups. At this stage, it is time for exhibition of the boats and for experimenting which of the boats can float with the heaviest weight.
- Arrange the boats of different groups that you have made for the exhibition nicely on the classroom benches or tables or on the veranda.
- With the help of the teacher, float the boats one by one in a large pot / bucket or cistern. Then place weights of different mass on the boats. Measure how much weight which boat can carry and note it down in Table-3.

Table-3

Group name	Member	Weight on the boat	Remarks

- In this way complete the observation table -4 based on the discussion on which team's boat floats with more weight. Then decide for which technical sides of those boats, the model they have built has been able to carry more weight than the other boats.

Table-4

Group name	What kind of technical strategy has been used?

At the end of the day's work complete the Table - C at the end of the book for your feedback on your classmates' work.

You all made paper planes, didn't you? If made well, it hangs in the air for quite some time even after it is thrown.

Do you find any similarity between this incident and the floating of the boat in the water?

Insolation, Water, Rain

How is the weather today? Is it sunny or rainy? What kind of weather do you like the most? Is our weather the same all year round? Again, is it as hot now as it was a few hundred years ago? Will it always be like this in the future? This time it is our task to find the answers to these questions

Session One

- How is the weather today? What do we mean by this question? How about the sun, rain, wind, etc.?Morning, afternoon, evening, night - is it always the same weather? What time of day do you like the sky the most? As the colour of the sky changes at different times of the day, what other changes do we see throughout the day?
- Which is your favourite day- Extremely hot, rainy, or a bit cloudy day? Talk to your friends and see if it matches. If you want, you can also show the picture of your favourite day by drawing!

Let's do the work of the next week at home

- Let's take a look for a week at how our weather keeps changing at different times of the day!
- Notice the weather at different times of the day for the next one week and make a note in the table below. Getting out of the house at certain times of the day, observe the weather in the open environment. Write down the time of observation, comments about the concept of temperature, how the feeling of sun, the condition of the sky, the possibility of rain, etc.

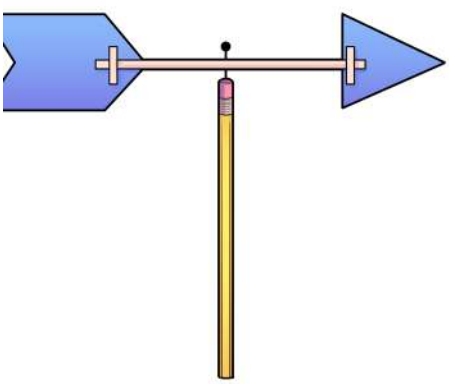
Date and Day	How we understand the weather, such as- colour of sky, sun, rain, heat, wind speed etc. Keep notes in the following times				
	Morning ---	Noon ---	Afternoon-	Evening --	Night ----

You must have heard the weather news on radio and television every day. Newspapers also have weather news. Collect information on weather for this week from radio bulletins, television news and magazines and note them in the table below-

Date and Day	Source of information Radio/ TV/ Newspaper information	Temperature	Humidity of air	Condition of sky	Possibility of Cyclone/ rainfall	Remarks

Sessions Two and Three

Keep notes of the weather, why don't we try to use this one week for other purposes! When looking for daily weather information from a magazine or TV, you will see some words every day, such as air temperature, air pressure, air humidity, amount of rainfall, direction of air flow, etc. We have heard these words, but can we understand the meaning of all of them? What is the way to measure these? In these three sessions, read these topics from the investigative study book and discuss in class. Take the help of the teacher. You can try to make a wind vane to experiment the direction of air flow in the class. Air pressure experiment can be done in class with very few materials. Details of these experiments are given in your investigative study book.



Sessions Four and Five

- Your friends must have done the above in the last one week! First of all, compare the above two tables and see what similarities the weather information taken from different media has with your own feelings! Now compare your information with your friends' information. How did they put notes in their tables?

- Take a closer look at the weather information of the last one week. How much difference do you see between the first day and the last day? Is the heat slowly increasing or decreasing? What about the amount of rainfall? Can you imagine what the weather will be like in the next one week if it continues like this? Discusses in groups and try to create a weather forecast for the next one week in groups by analysing the weather data of the previous one week or the previous two weeks with the help of the teacher. You can present your bulletin to the rest of the class in the same way that the weather bulletin is broadcast on TV. You can also make the presentation more interesting by using PowerPoint slides or hand-drawn posters!

- Make a note of the summary of the weather forecast made by your group in the table below-

Date and Day	Temperature	Humidity of air	Condition of sky	Possibility of Cyclone/ rainfall	Remarks

- Don't forget to check which group's weather forecast matched the most accurate weather at the end of the week!

Sessions Six, Seven and Eight

- While dealing with the weather, you must have understood one thing that the parameters by which we try to understand the weather change regularly. You have seen this change at different times of the day. Similarly, you have also noticed that the weather is not exactly the same at the same time every day. Even it is not the same hot or cold, not the same rainfall at all times of the year. However, we know in advance that it will be colder or rainier at which time of the year. That's why when the rainy season comes there is a rush to buy umbrellas starts. Again, before the winter comes, there is a rush to take down the blankets from the cupboards in the house and put them in the sun!

- We will discuss later why the weather is different in each of the seasons of the year. But it is clear that no matter how much we see the weather change at different times of the day or in different seasons of the year, there is a pattern of change. That is why we can predict the weather in advance and most of the time it also comes true!

- You have already known that all these elements of the weather (such as, air pressure, humidity, temperature, amount of rainfall, etc.) are the result of different interactions between the sun, the earth, and the atmosphere surrounding the earth. So, what does it mean? The changes we see in the normal eyes as a result of all these interactions also have a pattern. In other words, at a certain time of the year, the weather in a certain place is not exactly the same, but it is fairly close!

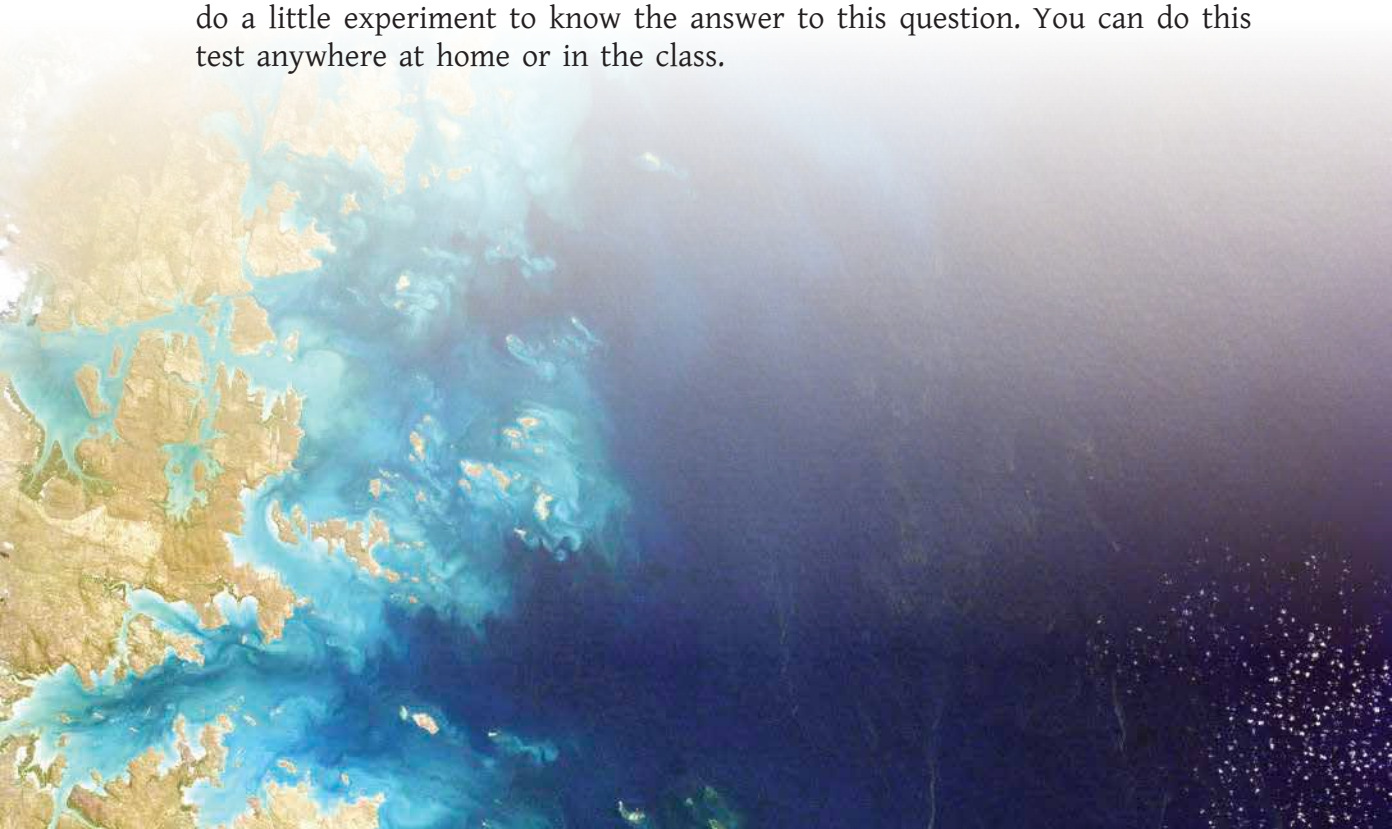
- From year to year we see the same season, and the same weather by turn. Is it always the same in the case of a long time? The table below shows the temperature of several countries of the world including Bangladesh after many years. Talk to your friends and see if there are any changes in the temperature of these countries over time. And do you find any similarities between these changes in different cities!

	Average temperature of five years on Celsius scale		
	At the beginning of the twentieth century	At the middle of the twentieth century	At the beginning of the twenty first century
Bangladesh	25.01 degree	25.17 degree	25.72 degree
Maldives	27.63 degree	27.54 degree	27.85 degree
Iceland	1.22 degree	1.72 degree	2.28 degree

- Note down on the Table of next page what you have found after thinking.

Is the climate of these three countries changing over time?	
Can you find any match in the change?	

- Share the results of your discussions with others in the class. See what others are saying. Now read the climate part from your investigative study book and join the discussion again.
- You can see, the weather seems to be repeating itself every year in different seasons, but in fact, over a long period of time, climate (you must know that in this case we will say climate not weather) is changing all over the world, and there is enough evidence for that.
- A big indicator of climate change is the change in temperature. Why is the temperature changing? How does the atmosphere preserve heat? You need to do a little experiment to know the answer to this question. You can do this test anywhere at home or in the class.



Materials: Glass jar/ three glass bottles with lids, three thermometers (thermometer should be inserted into the glass jar or glass bottle).

Perform the following tasks serially for the experiment –

- Clean three glass jars, keep them in an open place in the sun and measure the air temperature inside the jars with a thermometer (If necessary, you can see the process of measuring temperature from the investigative study book). Then note below the air temperature inside the three jars.

	Temperature
First jar	
Second jar	
Third jar	

- You must have got nearly the same temperature in three jars! Put the thermometers inside the jars.
- Now keep the mouth of the first jar open and close the mouths of the other two jars. Put a piece of wet cloth or tissue in the third jar before closing it.
- Leave all three jars in the sun for half an hour. After half an hour, record the temperature of the thermometer inside the three jars in the table below.

	Temperature after half an hour
First jar	
Second jar	
Third jar	

- Do you see any change in the temperature of the three jars? Why

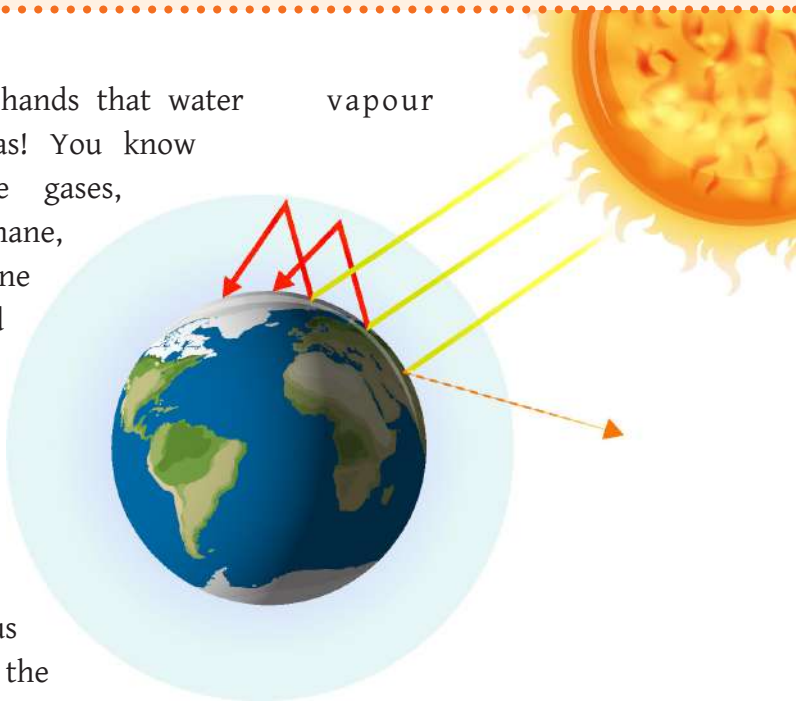
do you think change is happening? Discuss this with your friend and write your opinion below-

	Temperature after half an hour	If there is a change, what is the reason?
First jar		
Second jar		
Third jar		

➲ Now together you two friends read the part of the greenhouse effect from the investigative study book. Now take part in the discussion with the teacher and everyone else in the class. Do you find any similarity between this incident and the result of your experiment?

If the temperature in the jar with closed mouth is higher, you must have understood why it is higher! Well, did you find any difference in temperature between the second and third jars? What is the reason for this?
Talk to the rest of the class, including the teacher.

You have evidence in your hands that water vapour is a kind of greenhouse gas! You know about different greenhouse gases, including water vapour, methane, and carbon dioxide. Imagine what sufferings we would face if those gases were not present in the atmosphere! If the atmosphere could not hold the heat, we would die from shivering cold in winter! Why only us, all the numerous creatures around us that you know would all face the



same condition! And carbon dioxide is our most helpful friend, carbon dioxide is one of the main elements of the food that plants make!

Now think of the third jar a little differently. If we continue to increase greenhouse gases in the Earth's atmosphere instead of the glass jar, what kind of climate change will happen? Think, what are the activities of the people around you that increase greenhouse gases? On the way to and from school and home, observe the behaviour of others. Then keep a note of it in the space below. Listen to what others think in the next session!

What are we doing that increases the amount of greenhouse gases in the air?	What is the relationship between this work and the increase in greenhouse gases?
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Homework

In addition to the greenhouse effect, there are other causes of climate change. One of them is acid rain. When acid is mixed with water vapor in the air, it falls to the earth with rain. You may be wondering, what else is this? If the acid in the rain was harmful, we would all burn. We can see the effect for ourselves through a small work!

- Take two tree leaves at home. Put a few drops of water on the first leaf and a few drops of acid on the second leaf. Wondering where to get acid? Vinegar is used in cooking in almost all our homes, but it is also a kind of acid! If you can't find anything else, you can also use lemon juice. Lemon juice also contains a type of acid called citric acid.
- Take a good look at the two leaves after a few hours or a day. Do you see any change? Make below a note of what you see or draw a picture of what the leaf looks like.

Condition a few hours after giving the water drop	Condition a few hours after giving the drop of acid / vinegar / lemon juice

Session Nine

At the beginning of this session, discuss the experiment you did at home the previous day. Share with the friend beside you what changes you have seen in the leaves of the tree due to the acid. Share it with the rest of the class. Are all the results fairly similar?

Read the acid rain part from the investigative study book together with your friend beside you. Discuss with the teacher and others why acid rain occurs. You've already seen a small sample of the results of acid rain. You can imagine the impact on the biodiversity, including plants, if it happens for a long time. Take a look at the effects of this rain over a long period of time.

Do you have anything to do with this? Think about it!

- As mentioned in the previous session, you and your friends must have gathered enough information about our roles in increasing greenhouse gases! Now divide into a group and discuss what the rest of the thinks. Collect all the information and check all the reasons. Now identify the five most important factors that we can easily remedy if we want. Or even if we can't always do it ourselves, we can at least explain it to others so that everyone changes their behaviour from their own side. Everyone can come up with a plan, then write down your thoughts.

Five of our works that increase Greenhouse gases	How can this be solved?

- It will not do, if you just plan and sit idle, rather you have to do the tasks. Before that, share your plans with other groups in the class. Get everyone's opinion, maybe some great ideas from other people's opinions can be added to your plan!
- When all the group's plans have been shared, fix a time to implement the tasks. This time can be from 15 days to a month. Don't forget to share with others what your realisation is after implementation!

Has everything gone according to plan? Note down your feelings below

What was the plan of your group? How was your experience implementing the plan?

Have you faced any challenge? What initiatives has your group taken to address the challenge?

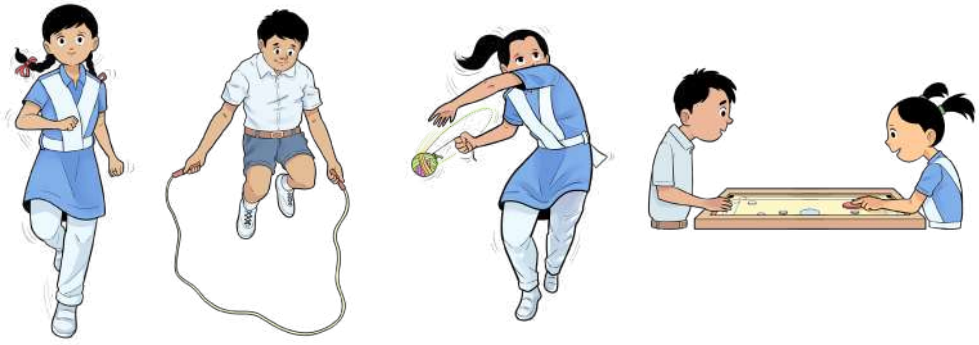
Have you noticed anything else that disturbs the balance of the climate? What do you think can be done to solve this?

The Motion Game

Who doesn't like to play! Many of you may have played in games competitions school, but what if you are to organize a game on your own? From fixing the date to organizing the game- if it can be done by sharing the whole task among you, then it is better! Let's see some of the familiar games from new angle in this event!

Sessions One, Two and Three

- In this learning experience, your whole class will organize a game. It's better to have a holiday to play, right? But if that is not possible, these tasks can be done in the science period of a few consecutive days.
- With the help of the teacher, see if you can find a small plain place in the school premises or in an open space.
- First, it's time for team distribution. Divide yourselves into teams with the help of the teacher. Each member of each team can participate in one game. There will be a team of at least 4 members for each of 4 games. Everyone in the team can discuss and decide who will participate in which game; in fact, everyone does not like to play the same game. More than one member of a team cannot participate in the same game. Here it should be remembered that the final result will be determined by the score of all the members of a team.



- Note the name of your team member participating in each game in the chart below, so that you don't forget later.

Table-1

Team:

Name of the member	Name of the game (tick the event a member will participate)			
	Race	Rope jump	Weight throw	Carrom

After the team distribution, it is time to organize the game. Through a discussion among you including the teacher, decide what will be the sequence of the games, what are the rules of the games, what works need to be done, etc. Also, everything necessary to organize the games should be gathered. Each team will be responsible for organizing any one of the games. This responsibility will be distributed by lottery. Write down which team is responsible for which game in the table below.

Table-2

Name of the Game	Which team will be responsible to organize

Now prepare the playground together to make it suitable for playing and do whatever is necessary, such as cleaning the field, leveling it, marking it with quick lime for playing, etc. As the saying goes, "We stand or fall together".

It will take quite a few more materials to organize the game, won't it? For example, quick lime or something to mark the field, measuring tape, rope, tennis ball, stop watch or clock, carrom board, disks and boric powder etc. Can you think how you would collect them? If you want, you can take the help of the teacher.

Then, with the help of the teacher, measure 100 metres from one end of the field to the other (If you do not get a whole 100 metre long area altogether, try to measure the maximum length you get) and mark it where the race will take place. Choose a plain place for rope jump. For weight throwing game, mark the spot from where it will be thrown and also mark the distance that you have to run by whirling the weight with quick lime. Carrom is best played if you find a shady spot on the side of the field where you can place a tool and raise the carom board or can also use your classroom bench-table for this purpose.

You know that all games have some rules. If you play without rules, there will be chaos. So, at the beginning everyone including the teacher should talk together

and fix some rules according to which the games will be conducted.

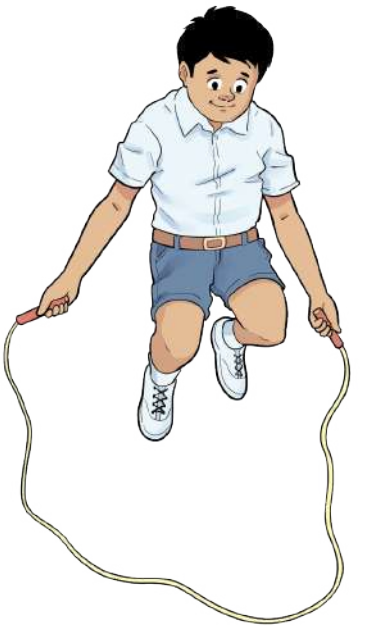
- The first event will be a race-
  - The selected members from each team will stand at the starting line of the race.
  - When the teacher blows the whistle, the race will start.
  - The teacher will note the time taken by a competitor to cover 100 metres (or the distance fixed) using a stopwatch. The teams in charge of organizing the game will also note the timing by using a stopwatch. Note in the table below by verifying with the teacher's observations.

Table-3

Name of Competitor	Distance (m)	Time (s)	Position (Serial)

Name of Competitor	Distance (m)	Time (s)	Position (Serial)

- Now it is the turn of rope jump-
  - In this game, the participants will stand in a circle.
  - As soon as the teacher blows the whistle, you will start playing. The winner is the one who can spin the rope over their heads and under their feet repeatedly for the longest time.



- Those of you who were watching the game, notice - does the rope go and come repeatedly in circle from one side to the opposite side?
- Count how many rounds the member of each team has completed, that is, how many rounds have been completed starting from behind, bringing forward and sending behind again. And keep record of how many rounds have been completed, how long it has been played until the rope is twisted. The teacher will help here keep track of timing with stopwatch. You will check the timing from the teacher later.
- Write down in Table-4 below how long the competitor of your team could play the rope jump without twisting the rope with his/her feet.

Table-4

Name of competitor	Number of completed rounds	Duration of playing (s)	Number of rounds per second	Position (Serial)

- On the other hand, the preparation for weight throwing is definitely over. Have you ever seen what professional athletes use for weight throwing? Really heavy, right? Rather, this game can be played by putting tennis ball or rubber ball inside a cloth bag. But if you have any other idea, you can also consider them!

- Put the ball in a cloth bag and tie its mouth with a rope. Cut the rope in such a way that there is at least 1-2 feet of extra rope for holding it. Holding this rope, you have to throw it forward.
- The thrower will grab the rope, and while whirling it forward, he/she will step to the starting line and try to throw as far as possible. Whoever will be able to throw the ball the farthest is the winner.
- Those who are throwing the weight, notice-
  - ➲ How do you feel when the bag with the ball is attached to the rope?
  - ➲ While you are pulling the rope, is the ball trying to run forward?
- Write down how far your team's competitor's ball stopped in Table-5 below.

Table-5

Name of competitor	Distance (m)	Position (Serial)

- Draw a picture of how the thrown weight of your team's competitor went up and came down during the weight throwing in the space below.

Why did the ball in your drawing curve downwards repeatedly instead of going straight? Note down your ideas below!

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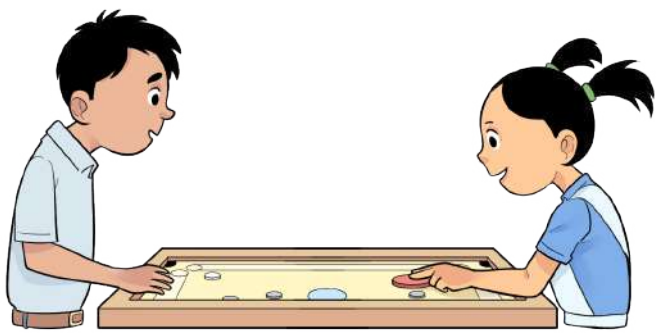
Now it's time to play carrom. You must have decided where to play carrom! The participating member of the team will be busy in the game, the job of the rest of the members is to keep an eye on the game as before. And if your team is in charge of managing the game, it's even more work!



Win-Loss will depend on the points against carrom disks. Ten points for pocketing a white disk; Five points for a black disk and 20 points for a red disk. However, just after pocketing the red disk, one has to pocket another disk in the next turn. Otherwise, the points of the red disk will not be added, and the red disk must be placed again in the middle.

During the game, everyone will notice carefully-

- How do the disks hit against each other and run back and forth?
- Does the path of a particular disk stay in a certain direction or does it change, if it does not collide with another disk on the way?
- How and in what direction does it change the path after collision?

Write the score of your team's competitor in Table-6.

Table-6

Member	White disk (10)	Black disk (5)	Red disk (20)	Total point	Position

- Does the path of the striker change, after the striker collides with the carrom disk? Draw a picture below and show it! Then think and say- why is the direction of the motion of the disks changing?
- Well, do you remember the boric powder that was applied to the carrom board?

Why is boric powder used? What happens if it isn't used? Write your answer in the blank space below.

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It has been a lot of games! The winning team can be determined later by counting who won which game. Before that, how about a closer look at these games?

Home Work

The games in which you took part today were all about motion. Read the section on different types of motion from the investigative study book and see if you can find any similarity between these motion types and your games in Table-7 below! If you find a similarity, you can put a tick in the specific column.

Table-7

Name of Game	Rectilinear Motion	Curvilinear Motion	Rotatory Motion	Simple Harmonic Motion

Sessions Four and Five

Sitting at home, you have learned a little about different types of motion from your science book. Now sit and discuss with your friends and see what they think, whether they find any similarity with your games. Do you see any difference in your perceptions?

Now discuss with your peer in which cases these different types of motion below are found and write down in Table-8.

Table-8

Different types of motion	Example
Rectilinear motion	
Curvilinear motion	
Rotatory motion	
Simple harmonic motion	

You must have noticed that when the race was held, each one covered the distance at different timings. Some did very quickly, some a little slowly. That means everyone's motion was not the same. It was more or less.

Let’s now learn how to measure motion. It is very easy to calculate. The distance covered by the competitors every 1 second is their respective velocity. That is, dividing the total distance by the time calculates the velocity.

From Table-3, calculate, in the blank space on the next page, the velocity of the

race in which your team member took part.

- If this motion decreases or increases, what is it called in scientific terms? If you don't know, take a look at the book.
- Now let's come to another topic. Visualize again the experience of you and your friend after participating in the race. Could you stop just at the end of the race? Or you had to stop a few steps ahead?
- As you already know, an object does not change its motion, or bend its path, unless a force is applied. That's why if something is pushed, it continues to move in a straight line until it stops. Again, the object thrown upward rightly turns in the curve and comes down; one type of force is also responsible for this - the force of attraction of the earth towards itself. We call it the gravitational force. Objects at rest or objects in motion, everyone wants to stay the way they are. But is it really so? What is your own experience? Again, think about the carrom game experience!
- If you hit gently while playing carrom, doesn't the disk stop after proceeding a little further? Why does it happen? Does adding boric powder change the motion of the disks?
- Discuss among yourselves and verify what others feel. Now read the section on the concept of force and different types of force from your investigative study book. Do you find any similarity with your ideas? Discuss with friends.

- Now let's discuss another issue. Have you noticed while playing carrom that the harder a disk hits another disk, the faster it bounces? What is the reason for this? That means the disk's motion is creating a kind of energy, the higher the motion, the more energy it creates. Similarly, can energy be stored in objects at rest?

- Read the section on energy from your science book and discuss it with everyone in the group. Now think and answer a question. Suppose, a ball is falling from above. Will the ball fall faster if it falls from farther above? Or will it fall with the same force whatever the height it falls from? Answer the questions discussing among all. Do not forget to write the reasons for your answer!

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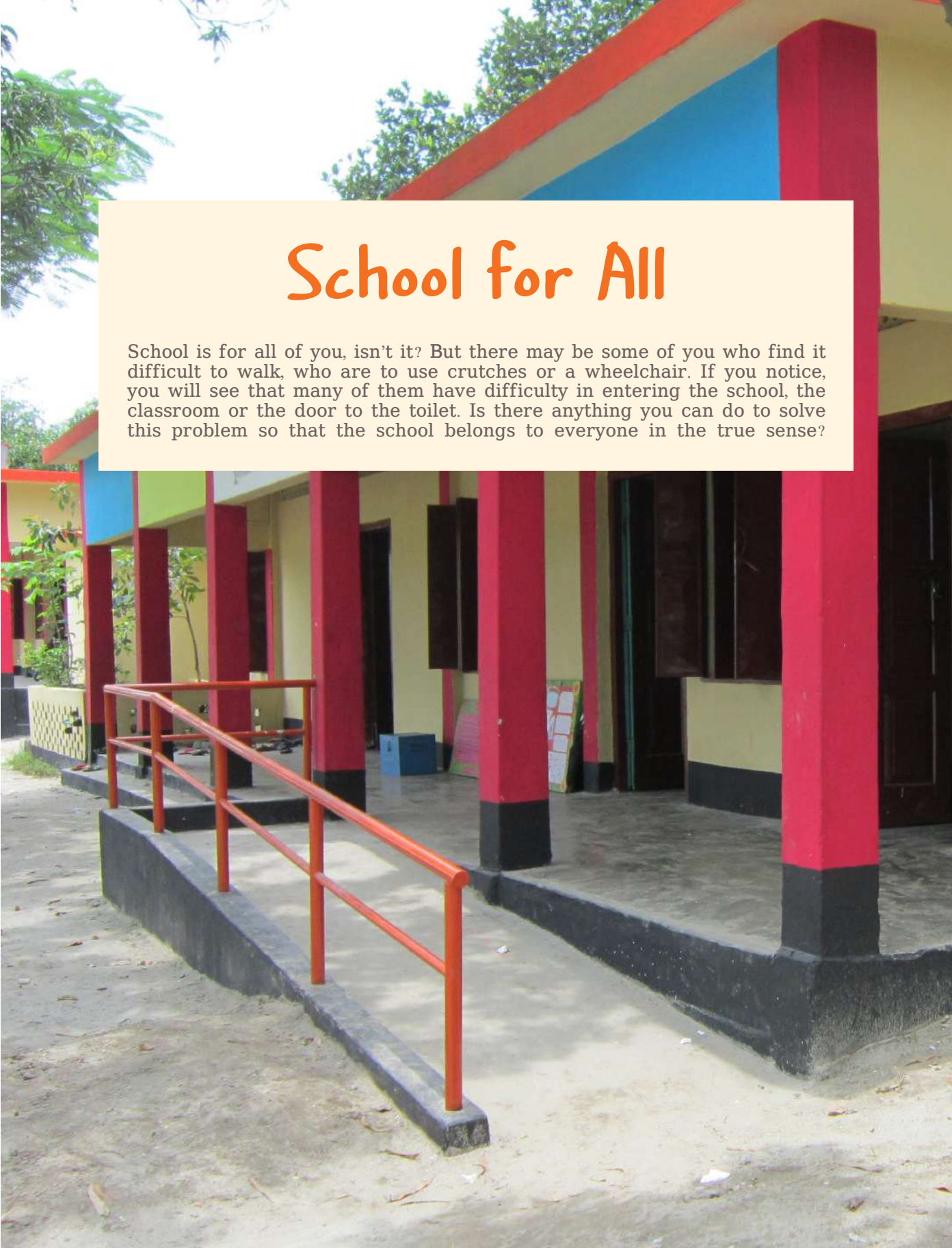
- Now let's check if your guess is correct. This can be tested in many ways. If you drop a duster from a little above the table, then some sound will be heard. If you drop it from a little more height, will the sound be louder or softer? It will be easier to do the test in water. If a stone or pebble is dropped from a short distance from the water, will it fall faster than if it is dropped from a greater height? You can easily check it- you can understand clearly by looking at the water splash.

- The game is done, from the game we learned about different types of motion. But one big task still remains, and that is to make the gift which everyone has to make together.

- It was decided earlier that you yourselves will make the prize for the winning team in this game. Prizes can be anything handmade. Such as greeting cards, paper flowers, birds or trophy (cup) models etc. You discuss and decide on your own what to make, then make them after class or bring from home.

- Now it's time to announce the winning team. The team that gets the highest score across all four sporting events is the winner. One thing to say quietly here - it is true that all other teams will hand over gifts to the winning team, but the winning team will also have to feed chocolate to everyone else! So, losing is not a bad thing, what do you say?



School for All

School is for all of you, isn't it? But there may be some of you who find it difficult to walk, who are to use crutches or a wheelchair. If you notice, you will see that many of them have difficulty in entering the school, the classroom or the door to the toilet. Is there anything you can do to solve this problem so that the school belongs to everyone in the true sense?

Session One

School is for all of you, isn't it? When there is good news about the school, everyone feels good. When something bad happens, everyone feels sad. All the students of the school have the same rights over the school, right? But have you ever wondered if all of you have the same opportunities in this school? Can everyone move the same way to all places of the school? For example, you may have friends who have trouble in walking, or are in wheelchairs. Are they able to enter the school or classroom as easily as you do? Or do they have to take help from others?

This question can best be answered if your school has a student who needs a wheelchair to move. You can take opinion from him/her. Or discuss it yourselves, if necessary, you can visit the whole school. Find out the places like school entrances, toilet doors, classroom doors, etc., where wheelchairs may have difficulty in moving, and note them below.

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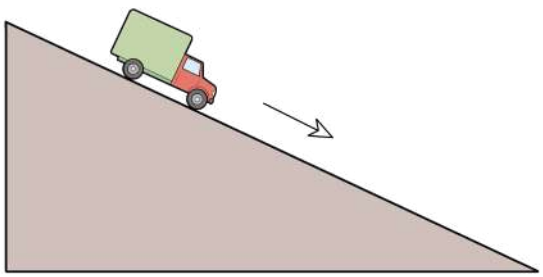
Now, what is the solution? Have you ever noticed what kind of technology is used to cross a high place with wheels? Even if you have not seen the path for wheelchair, many of you might have seen the slope at the entrance to the car garage! (This slope is called ramp, many of you might have heard of the term!)



Think about it, if you have to lift a heavy object on the ramp, will it be less difficult or more difficult? It will be easier for you to understand if someone has the experience of climbing a hill or such slope to a higher place. Will climbing a sloping hill be less difficult or more difficult than climbing a steep hill?

Let us do a little experiment. Arrange the books one by one on your bench to create a high place. Now place a steel ruler, board or any other long and flat object leaning on the books as shown in the picture. Tie a bottle filled with water or any other heavy object with something and try to drag it up the slope. Now reduce the height of the slope by reducing the height of the books, or increase the length of the slope with a slightly longer board. Now try to pull the heavy object again in the same way. Do you feel lessor more weight than before? Discuss with your friends and take notes below-

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- Would it be more difficult, that is, more force would have to be applied, if the slope on which you are pulling something were rough or bumpy or less difficult? Check it out.
- Think about what other experiments like this can be done using other objects at home!

Session Two

- In the previous session, you learned about the slope or inclined plane which is used to pull something up. To make work easier we use many such simple devices that are often used in our daily life. Have you ever noticed how the wheels of wheelchair work? If you do not have a wheelchair at hand, check out the wheels of a rickshaw or bicycle- how do the wheels actually work

on these devices? Together with your friends, observe a bicycle carefully and draw the part of the wheel below-

- Six types of simple machines are described in the chapter 'Simple Machines' in your science investigative study book. Divide into groups and read a little about these six types of simple machines, then discuss among yourselves.
- You noticed the wheelchair or bicycle wheels before, discussed about the ramp. Now think about it- do you see the use of any kind of simple device in these two cases? Talk to everyone in the group and write down your ideas in the table below-

	How does it work?	What kind of simple machine has been used here? Why do you think so?
Wheels of a wheelchair or bicycle		
Ramp		

Do you find any use of other simple machines that you read about in your daily life? Discuss again among yourselves. Then choose which of these are used in which technologies, and take note in the table below-

Type of simple machine	In which every day used technology, there is the use of it?
Lever	
Inclined plane	
Screw	
Wheel and axle	
Pulley	
Wedge	

In the next session, your work begins! Certainly, you haven't forgotten to make a ramp while reading about so many devices?

Session Three

Now it is time to make a ramp. Look at the list of the first session to see which places of the school have problems with wheelchair movement. Now you have to decide where the ramp is needed most.

Divide into groups. The number of groups will be the number of places where ramps appear in the new list. Now decide by lottery, which team will build the ramp in which place.

Now it is time to design the ramp. Talk to your team about what materials will be needed, how much the budget will be, and thus make a plan. Remember, the lower the cost the better! Therefore, try to use materials that are easily available around you.

Specific location of the ramp:		
Name of the team: Names of the members:	Materials to be used:	Reasons for choosing these materials:
Calculation of costs:	Design of ramp:	

Show your team's design to other teams. See their designs also. If you get a good idea, you can use it too. Besides, find out what materials others are planning to use. If you find a way to make your ramp stronger, more durable, and more affordable, why not to accept it? If you have a good idea, do not forget to help others too!

Session Four

This time choose any of the holidays. At the very beginning, distribute the work among all of the team members. Taking decision from all of you, choose one of the team members whose job will be to manage the whole management issues. That means, to finish the work in time keeping in mind the distributed responsibilities, and to coordinate everyone's work etc. Another one should take responsibility of keeping a written record of the entire work. All of you should fix that and assign responsibility to one person. If you yourself are in charge of one of these, you can use a separate notebook to manage the entire task in an organized way.Write down the names of everyone in your team and their responsibilities below-

Names of team members	Assigned responsibilities

Now let us start working according to the plan, what do you say? Oh, one more thing- note down in small sentences below what you did after every step. Later, whenever you see this writing, it will remind you exactly how you did it!

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Session Five

You must have done an amazing job even before this session started! Your school is now literally 'School for All'! Even a few days ago, it had been difficult for students in wheelchairs to go so some places. But now these friends of yours can easily move to those places with the help of the ramp made by you!

Well, you must have used a hammer, knife, scissors, or some other tools to make the ramp. We often have to use these tools or materials to cut or break something, to pull forward something heavy, or to lift something up. Write down what everyone in your team used to do this task-

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Now discuss among the team members. Earlier you have known about six types of simple machines. The use of which type of simple machine do you find in the above list?

What machines were used to make the ramp?	What kind of simple machines are used in this machine or materials?

Talk to other groups and see what they have used? You can also discuss how various simple machines have made your work easier.

After the complete learning experience, go to the Table 3 at the end of the book in order to give your opinion about the activities of your friends.

The Course of the Moon and the Sun

It is hard to find anyone who has not been overwhelmed by the moonlight on a full moon. Almost everyone has experienced a full moon or a new moon (Amabasya in Bangla), but have anyone of you ever seen a lunar or solar eclipse? From the ancient times, people have seen these strange phenomena; have searched for the reasons for them; have come up with various rational and irrational explanations; have been in danger due to misunderstandings. In this learning experience, you will get some acquaintance with the experience of the ancient people, but you will also search for the scientific explanation of these events yourselves.

Sessions One and Two

Let us read a story at the beginning of this learning experience. Calling it a story might not be right as the incident is true, taken from the pages of history.

The Cursed Moon

One evening in February 1504, the indigenous or native people of Jamaica were horrified to discover that the full moon was engulfed in darkness. So, was God's wrath really coming down on them?

The beginning of the incident started several months ago. Many of you might have heard one of the characters of the incident whose name is Christopher Columbus. Yes, we know that the famous Spanish explorer Columbus was the first white man to set foot on the soil of America.

The fleet of Columbus anchored off Jamaican beaches in the middle of 1503. The native people of Jamaica were absolutely harmless and peaceful, and they gave a warm welcome to these foreign sailors. Therefore, Columbus did not face any difficulty to get food and other supplies from them in exchange for only a few things.

The problem started six months later. The native people were naturally getting a little annoyed at this regular supply of food to them month after month. Moreover, the people with Columbus were arrogant. They started chaos in the area. The indigenous people were very annoyed and made it clear that they would not help any of them. The foreigners needed to arrange their food supply themselves.

Columbus fell into a great trouble. Because there was no way for them to leave the area before the rescue ship from Spain would arrive. There were only two ships in his fleet, the rest of the ships had already been abandoned. The bigger danger was that there was no food on the ship. These indigenous people had been the last hope; but they were not any more ready to supply their food. Finally cunning Columbus desperately made a strange trick!

Columbus called the leader of the indigenous natives! Upon his arrival, Columbus solemnly stated that the white men's God was very angry with the natives for not helping his people with supplies. Now the people there would face the consequences of that anger. Three days from that day, the full moon supposed to be in the sky, would be swallowed by the dark power, and the great disaster will descend on the indigenous people!

Naturally, the local leader did not pay much attention to his threats. Three days

passed. That evening, the natives of Jamaica discovered with surprise and horror that the moon of that night was no longer the same as other nights. It was as if some evil force was swallowing the full moon; darkness was slowly covering the moon's light. All the simple natives came running to Columbus in fear and panic. They apologized with folded hands, held hands and feet so that Columbus would convince his God to withdraw that curse! In return, they would not mind providing the supplies for that whole team for as long as they needed!

Columbus was waiting for it. He closed the door of his cabin to talk to God in private. Hour after hour went by, while the moon was almost engulfed by black darkness, everyone's fear was at its peak! After much time, the door of the cabin opened, and Columbus came out with good news. God calmed down, he agreed to lift his curse. It indeed happened so. Within short time, the darkness on the moon began to disappear. That previous bright moon slowly returned to the sky. The people of the area breathed free. After that incident, Columbus had to stay in this area with the team for a few more months, but their supply crisis never happened again!

- Some of you must have already understood what really happened that night. You guessed it right, there was a lunar eclipse that night and Columbus was aware of it. Using this information, he came up with the idea of cheating the simple natives there. He was helped in that work by a calendar prepared by a famous German astronomer, in which the course of the moon and the sun was calculated for several years. In those days, the only way to keep a ship's course on a voyage was the movement of the moon, stars, and sun in the sky. Sailors used to keep such calendars with them. And it was no problem for Columbus to find out the exact date of the lunar eclipse by using this calendar. He also knew how long the lunar eclipse would take place, so he sat in the cabin and closed the door the whole time!

- How did this whole story come to light? Columbus was accompanied on this expedition by his own son - Ferdinand. This strange story is known later in the essay written by him.

- Although Columbus did not use the knowledge of astronomy for a very good purpose, it is not the fault of science! The astronomer who made this calendar had to calculate the date of the lunar eclipse by doing a lot of calculations.

Even if we do not get into that difficult calculation, can you tell what exactly happens during a lunar eclipse?

Divide yourselves into small groups and discuss on your own. Based on the discussion, write or draw below your explanation of how lunar eclipses occur

Now you can share your ideas with other groups. However, it is necessary to check how correct your explanation is. The best way to check is to make models yourselves. We all know that the earth revolves around the sun and the moon revolves around the earth. Besides, you all know that the moon's light is not its own but borrowed from the sun. By making a model of the orbits of the moon, sun, and earth, you can prove that a lunar eclipse will occur if the sun, moon, and earth are in some specific position. You already know that no object in the space, including the sun, is completely static. However, since we do not have to worry about any object outside the solar system at the moment, it is convenient to make the model by assuming the sun to be fixed for the time being.

Discuss among your group mates how you want to build the model. Since you need to observe where and how the sunlight is falling, it is useful to assume one of the light sources as the sun. It can be a candle light or a lamp- think about what to use. Again, to make the Moon and the Earth, you can use an object like a round ball- you can paint a light ping pong ball, or make a ball

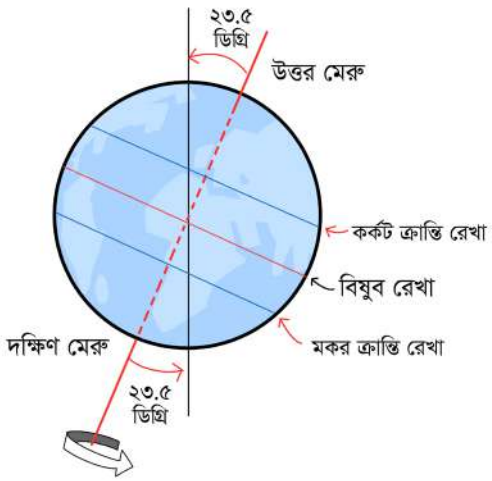
with cork sheet. Apart from this, a thousand ideas can come, you think and decide which one to apply. In order to know when the lunar eclipse will be visible from which area, it is necessary to observe where and when the light will fall on the surface of the earth. That is why you can draw the continents on the model of the earth by observing a globe. But before that, draw the geographical lines.

At the very beginning, fix the positions of north pole and south pole. Now at the globe, observe the north and south sides of the equator and place the continents. It is even more fun if you can identify a few countries on the model of the earth. For example, countries like Bangladesh, America, Australia, England and Brazil can be marked with the locations of the countries. Then you can easily understand when the sun and moon will be seen in which positions from which country.

The Earth's orbit around the sun and the moon's orbit around the earth can be hung with strings to show. If you want, you can find other ideas. The model is expected to be ready before the next session.

Geographical line

In order to analyze the geographical position of the earth, some lines are imagined on it. The most important line of these is called the equator and it runs east-west right along the belly of the earth. The equator divides the earth into northern and southern hemispheres.



The next two important lines are Tropic of Cancer and Tropic of Capricorn. Tropic of Cancer lies 23.5 degrees north of the equator and Tropic of Capricorn 23.5 degrees south and is extended east-west.

Session Three

All teams must have brought their own models to today's session. At the end of making your model, set different positions of the earth and the moon to show where and how the sunlight is falling. Before going to the explanation of the lunar eclipse, let us revise the knowledge learnt earlier in today's session, what do you say?

- In the previous class, you studied the earth's rotation/diurnal motion and annual motion. You have also seen why there is a difference between day and night. Can you show in your model the rotation of the earth around the sun, when it is day and when it is night?

- Here is a short question- if it remains the way that you just showed it, will the length of day and night be the same anywhere in the world? Choose a place and observe it well. Think about it now, what does our real experiences say? Does the Sun set at the same time throughout the year? Write down your experience-

  - ➲ Is the length of day longer or shorter than the length of night in winter? .....
  - ➲ Is the length of day longer or shorter than the length of night in summer?.....

- Now read the section on earth's rotation/diurnal motion and annual motion from Chapter 9 of your investigative study book and discuss it with the rest of the class. You can surely understand why the length of day and night is different? Is the earth tilted at an angle of 23.5 degrees in your model? If not, fix it now.

- Now let us talk about the change of season. You have studied it too in the previous class. Yet, let us revise it a little further. Do you remember the countries that you marked while creating the model? Now again in your model, rotate the earth around the sun and note how the sunlight falls on a country. Then note down which country will be cold and which country will be hot on the following dates. But before that, you can read the section on 'Seasons' and 'Differences of Weather in Different Regions of the Earth' from your investigative study book and discuss it in groups.

Name of Country	Feelings of temperature at certain times of the year (cold/hot/ between cold and hot)			
	21 June	23 September	22 December	21 March
Bangladesh				
Australia				
America				
Brazil				
England				

Sessions Four and Five

We have talked plenty about the sun and the earth. Now let us pay attention to the moon. The discussion started with lunar eclipse, and we will go back to that. But before that, let us visualize two of our most familiar experiences about the moon. All of you must have seen full moon and new moon; maybe many of you know why they happen. You can set the positions of the sun, moon and earth in your model to show when the full moon and new moon occur? All the team members try together.

Now draw in the blank space below how the full moon and new moon occur according to your explanation - Now read the section on Crescent from your investigative study book and match it with your ideas.

Full moon

Dark fortnight

Now read the Crescent section from your investigative study book and match it with your ideas

Home Work

- Since you have known about crescent, look up at the sky tonight to see what the moon looks like. Draw a picture of today's moon in the blank space beside.
- Can you understand by looking at the size of the moon whether it is now bright fortnight (শুক্লপক্ষ) or dark fortnight (কৃষ্ণপক্ষ). Write down your ideas and compare them later-

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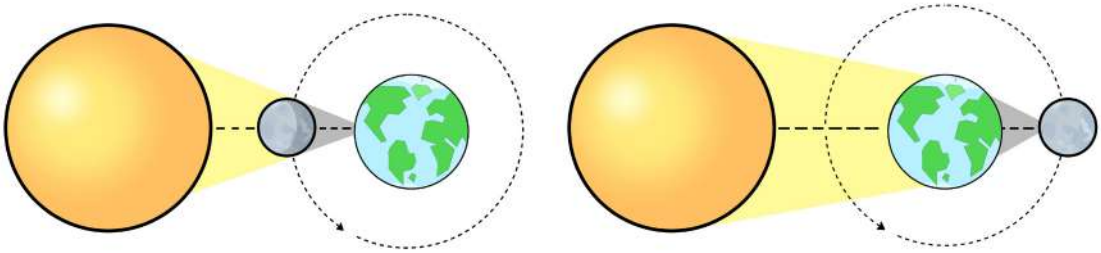
- Now let us go back to the lunar eclipse. From the explanation that you gave in the first session, show in the model how the positions of the earth, the sun, and the moon will cause a lunar eclipse? Can you also figure out when the solar eclipse will occur? Show this explanation from your model to others, you also see other's models.
- In simple terms, many of you might have said that a lunar eclipse occurs when the earth's shadow falls on the moon. That is, when the sun's light is intercepted by the earth midway before it falls on the moon. Among the earth, the moon, and the sun, the sun is the only one that has its own light, and it is because that light is reflected off the back of the Moon. So, we see the light of a full moon. Thus, whenever the Earth rotates and comes between the sun and the moon, the earth's shadow falls on the moon. From the earth we see the moon as if it is being swallowed by a thick darkness; we call this event lunar eclipse. Similarly, if the moon comes between the earth and the sun during its rotation, it covers the light of the sun. This is the shadow we



see on the sun from earth, and this event is called a solar eclipse.

Think about it now and see if you have any doubt. Do you find any similarity between the explanations of full moon and lunar eclipse? Compare the positions of the Earth, Sun and Moon in these two events. Write your thoughts below-

If these two events are similar, think about it now, why don't we see a lunar eclipse every full moon? Similarly, why doesn't a solar eclipse occur in every new moon? Discuss among yourselves and see what others think. Now sit in groups and read the lunar eclipse section from your investigative study book and join the discussion with the whole class.

By now you must have understood that the earth revolves around the sun,

and the moon revolves around the earth-the surface of these two circular paths is not the same. Does your model need to be revised? Discuss how to do it. If necessary, you can do corrections even after the session.

- Now let us come to another new topic. You already know that everything in the universe attracts each other. The heavier the objects and the closer they are to each other, the stronger is this attraction. Since the moon is closer to the earth, the moon's attraction on the Earth is much greater, and because of this, some of very strange phenomena occur.

- If any of you have visited Cox's Bazar, you might have seen that red flags fly on the beach at low tide, and people are warned not to go too far into the water. During low tide, the water in the sea decreases, and during high tide, it increases. The main reason for this phenomenon is the attraction of the moon towards the earth. But can you guess how this happens?

- Discuss with friends and try to guess. Then read from your investigative study book the explanation of tides, spring tide-neap tide and join the discussion with the rest of the class including the teacher.

- Find out the date of the next lunar eclipse from the Internet or any other means, then you can witness this great phenomenon yourselves!

- Can a lunar eclipse be seen from anywhere in the world? What do you think? Try to understand from your moon-sun-earth model, you can also discuss among your friends. After the discussion, write down what you think, do not forget to write arguments for your opinion!

Laboratory in the Kitchen!

We use thousands of different things in our daily work. Different things are needed for each of the works. For cooking, we need so many things! The very kitchen is like a huge science laboratory. Let us see how the kitchen can be used for scientific research!

Before we start the session...

- Since you have to take a closer look at your own home kitchen in this learning experience, how about making some primary observations before the first session begins? That is why you have to do some work at home. At the very beginning, make a list with pictures of all the utensils, pots, spoons, etc. that are used for cooking in your home, in Table-1.

- Among these materials, do you know which one is made of what? If you do not know, you can know from your parents at home. At the same time, observe carefully the shapes and other characteristics of these utensils.

- Observe, which ones glitter when they are kept in the light? Which ones make a jingling sound when they are hit with something else? Again, which ones are fragile, if they fall out of hand? With these data, record the characteristics of all the materials of Table-1 in Table-2.

Table 1

Table-2

Name of utensil	What is it made of?	Does it glitter in the light?	Does it jingle when hit?	Is there any fear of breaking, if it falls?

Name of utensil	What is it made of?	Does it glitter in the light?	Does it jingle when hit?	Is there any fear of breaking, if it falls?

- In the same way, think about it- what are the external characteristics of the materials that are used in the connection cables of electrical appliances in your home? Do they glitter?
- Participate in the first session of this learning experience after writing down your observations.

Session One

- Like you, your friends have also come up with information about kitchen utensils in their own homes. At the very beginning of this session, sit with friends and share the information obtained by observing your own home kitchen. See what kind of utensils are used in cooking at other's homes.
- Looking at the information collected by all of you, you can understand that there is a fear of the breaking of things made of some specific materials; For example, earthenware or glassware. Again, when some things fall out of the hand, they do not break easily; rather bend, produce jingling sound; For example, pots and pans made of copper, steel or aluminum.
- Now let us do a little experiment.

Materials Required:

Aluminum or any metal rod or wire, pliers, pieces of cloth, firebox, candle or spirit lamp.

What to do:

- First, bend the metal rod or wire into an L shape with pliers. (As shown in picture) Now twist the cloth at one end leaving the other end open.
- Light a candle or a spirit lamp and place the L-shaped wire connection on the flame and observe for a while.
- At the end of the observation, fill in Table-3.

Caution: Be careful while using fire. Do the experiments very carefully so that you don't feel too hot on your hands!

Table-3

Which end was hot to touch with hand?	Which end was not hot to touch with hand?

What do you think about the above table? What is the thermal conductivity of copper and cloth? Write your answer below.

Does heat conduct through copper?

.....

Does heat conduct through cloth?

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At this stage, from the chapter 'Properties of Matter and its External Effects' of your investigative study book, you along with your friends read some properties of matter like- 'Density', 'Solubility', 'Solidity and flexibility', 'Thermal and electrical conductivity', 'Magnetism', and 'Identification of matters by properties'.

Now think a bit about it - why is plastic used as a lid or spoon handle? If there is no plastic handle, why is the cloth twisted? Why is the burner of a gas stove made of cast iron or brass but the switch is made of plastic? Write your opinion below.

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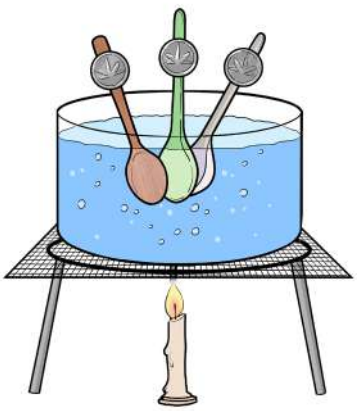
Session Two

In the previous session, you have examined that the thermal conductivity of all materials is not the same. You have found objects made of many other elements in the kitchen. Can they be distinguished on the basis of thermal conductivity? Another experiment can be done to observe the thermal conductivity of different materials.

Materials Required:

A wooden spoon, a plastic spoon, a steel or aluminum spoonof the same size, three one-taka coins, a pot for heating water, a glass of water, a candle or something else for heating, wax, firebox and any clock for measuring time.



What to Do:

Soften the wax with a little heat. Apply a small amount of soft wax to the handle of all spoons. Now place the coins on the spoon by pressing them on the wax in such a way that the coins stick to the wax.

- Now dip the spoons into the pot in such a way that the coins are above the top of the pot. Then keep heating the pot with a candle or something else.
- Now observe the condition of the coins stuck to the spoons. Are the coins separated? If so, which one has been separated first? How long has it taken to separate? How long have the other ones taken to separate? Write the information in the table below.

Spoon	Which one was separated first?	How long did it take to separate?
Wooden spoon		
Plastic spoon		
Metal spoon		

- Have you thought why the coin was separated from the metal spoon first? Which of the three materials has higher thermal conductivity?
- Read this section of experiment in the investigative study carefully and find the answer.

Home Work

- Think about it - why are tea cups usually made of glass or ceramic instead of metal. On the other hand, why are cooking pots made of metal instead of plastic?
- Write your thoughts below-

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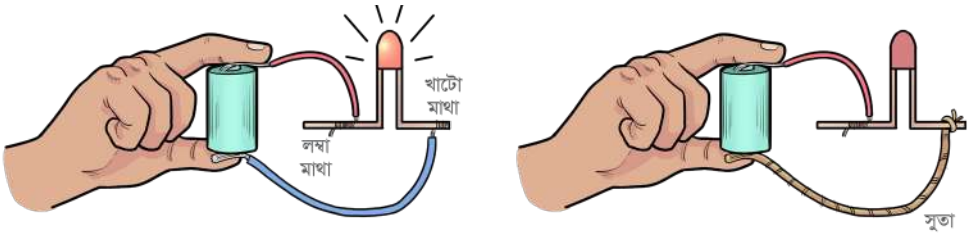
Session Three

This time we will cause a Torit Tandob (তড়িৎ-তাণ্ডব). The experiment is very easy and does not take much to do!

Materials Required:

A battery, some copper wire and a diode. (You can also use a torch light bulb instead of a diode if you wish, but nowadays coloured diodes are very easily available in cheap rate), pieces of wood, plastic, rubber and paper. Well, with these few materials you can do the fun experiment.

What to Do:



- Attaching one end of the battery to the wire, connect it to the bulb as shown in the image beside. Take another piece of wire from the other end of the battery and attach it to the other end of the bulb. See if the bulb lights up?
- After disconnecting the wire, place plastic, rubber, galvanized wire, yarn, nail, paper, coal etc. one by one between the wire and the bulb, and observe if the bulb lights up.
- Fill up the table below.

Materials used in the connection	Give (✓) whether the bulb lighted up.	
	Lighting up	Not lighting up
Copper wire		
Rubber		
Plastic		
Paper		
Galvanized wire		
Yarn		
Nail		
Coal		

You must have realized by now, the bulb lights up because electricity can flow through copper, galvanized wire and nail. On the other hand, because the electricity could not pass through the others, the bulb did not light up. Then surely you can also tell why electrical cables or components are covered with plastic or rubber over copper wires. Write it down quickly.

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You have already known many properties of metals and non-metals. Now you can also separate them. But if force is applied to metals and non-metals, what changes do they have? Let us do another experiment.

Materials Required:

An aluminum plate and a piece of coal are required for this experiment. You can bring them from your home. If you want to bring it from parents, it is better to bring old, unused plates. Why? See it a little later!

What to Do:

Now put them on the floor and hit them with a hammer. Write in the table below if there is any change in it.

Material	Does it jingle?	Does it break into pieces?	Does not break easily or fragile?
Aluminum plate			
Pieces of coal			

And is it possible to change the shape of metals and non-metals in some other way?

(Now do you understand why it was said to bring the old plate? What danger would it be if the new plate was hammered and bent and taken back home?)

Home Work

Leave a nail in a beaker full of water for 7 days and see what happens. After observing the nail after 7 days, draw the picture in the table below and write down the changes in the nail.

Image of nail before placing in water	Image of nail after 7 days in water

What changes do you see? Write below-

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Session Four

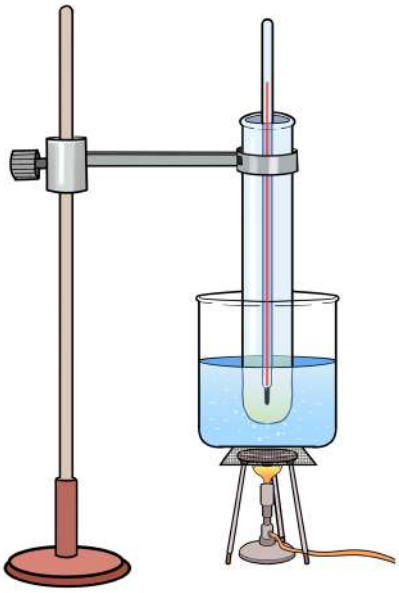
You already know that when heat is applied, solids turn into liquids and liquids turn into gases. But do all solids melt at the same temperature? Again, do all liquids become gaseous at the same temperature? Let us do an experiment-

Materials Required:

Test tube, some small pieces of wax, beaker or any pot for heating water, water, candle or spirit lamp, thermometer, wire mesh (তারজালি) or tall stand etc.

What to Do:

- Take some small pieces of wax in the test tube. Take water in the beaker and place it on the spirit lamp.
- Immerse the test tube and thermometer in the beaker which is to be attached with the stand as shown in the image so that none of them touch the bottom of the beaker.
- Heat the bottom of the beaker with a spirit lamp.
- Pay attention to the thermometer and the wax kept in the test tube. Is the temperature rising in the thermometer? Is there any change in the condition of wax? Take a temperature reading on the thermometer when the wax starts to melt. This reading is the melting point of the wax.



- Now observe water. If the temperature rises, the water will start boiling at some point.
- When the temperature on the thermometer is 95 degrees Celsius, carefully look at the boiling water and the thermometer.
- Take the reading of the temperature on the thermometer at which water begins to boil. This reading is the boiling point of water.
- Now remove the water beaker, wire mesh and lamp from the bottom of the test tube.
- Note the temperature at which wax will begin to freeze is the freezing point of wax.

The temperature at which wax has melted (melting point)	
The temperature at which water has boiled (boiling point)	
The temperature at which water has frozen (freezing point)	

Restrospection

Think a little and write the answers to the following questions-

- If we used a pot with a low melting point for cooking, would it be possible to cook? Think about it, why is it convenient to cook in metal pot?

- Why is cooking faster in a closed pot or in a pressure cooker than in an open or lidless pot?

- Will you use metal or clay or plastic pots to keep food hot longer?

Mechanism of Body Clock

The job of science is to look into everything, from the structure of the vast universe to how a tiny wristwatch informs the time by ticking, and we have no end of questions. But have we ever wondered how the machine called our body works? Let us turn our eyes a little and try to understand this strange machine called human body!

Sessions One and Two

Coming to study science, so many things we have known and seen, haven't we? In the last few months, from the galaxy of the universe to tiny ants on the wall - you have brainstormed on so many things! But have you ever taken a good look at yourself in the crowd of so many things? Have you ever wondered how the mechanisms of this incredible machine called the human body work? In this learning experience, we will take a closer look at this device.

First of all, think about the parts of your own body that you can see with bare eyes from outside. If you notice carefully, you will see that these organs are of some use to us; For example, we see with our eyes, we hear with our ears. In this way, think a little more about what other external organs are useful for us. Take notes of what you have got in the table below-

The parts of the body that can be seen from outside	Why you need these

Now let us come to the internal mechanisms of the body. For example, our hands or feet can be seen from the outside, but can we see the very important brain inside our head from the outside?

There are many other parts of our body that we do not see from outside, but if they do not work properly, we will be immobilized! As before, now remember the organs inside the body, put them in the following table. Besides, do not forget to write what these organs do!

The organs that are inside the body	The functions that they do

Talking to the friend next to you, see what organs he has written about. Has he written about any important organ that you missed?

Discuss with the rest of the class including the teacher. Surely all of you have written about various organs, all of which do all the important works of our body. Heart, lungs, brain, stomach, all these organs may have been discussed.

Now we will play a fun game! First, divide the class into six groups. Now write these six names on a small piece of paper and fold them - heart, lungs, brain, stomach, kidney, and bone or skeleton. Now do a lottery and pick one piece for each group.

Your team's name is the organ name that has come to your team's fate. What is the name of your team?

Now you have to organize a debate competition. You can also call it acting rather than debate. Because each of you will act as that organ. Each group must explain to others why they are the most important organ or system in

the body! For example, the brain group will argue why it (that is, the brain) is the most important part of the human body! Again, the stomach group will argue that there is nothing more important than the stomach in the human body!

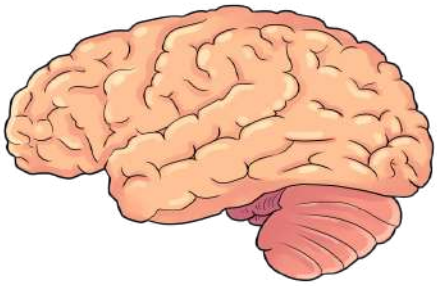
Don't you need a bit of preparation before you organize your team's arguments? If you do not know well about the organs in the human body, it will be difficult to argue! That's why, everyone in the group can read the chapter 'Human Body' (Chapter Eleven) in your science investigative study. You will get in this chapter the discussion how different organs are formed in our body, how they work. If there is a problem in understanding something, you can talk in groups, and you can also take the help of the teacher.

Sessions Three and Four

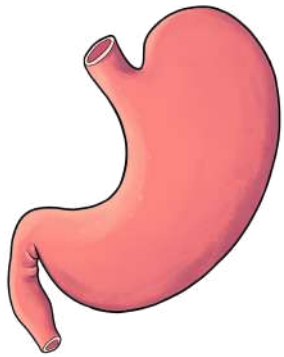
Debate competition will be held in this session. So, get all the preparations of your team before the session starts. Arrange the arguments of your team-how to make others understand that you are the most important part of the whole human body!

Write down your team's name and other information in the table below so that you do not lose the arguments later.

Name of Group:	
Description of the prescribed organ:	
Part of which system? What does this system do in the body?	
Why is it the most useful organ?	

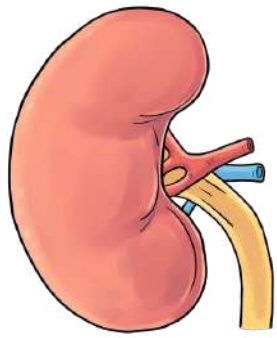


The brain

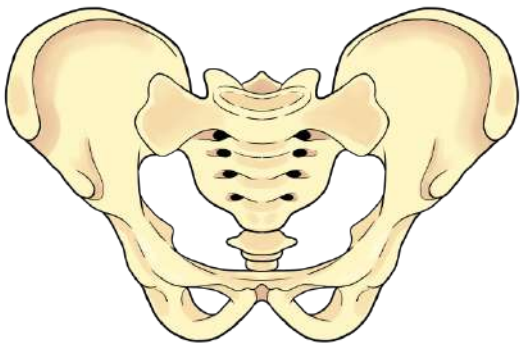


The Stomach

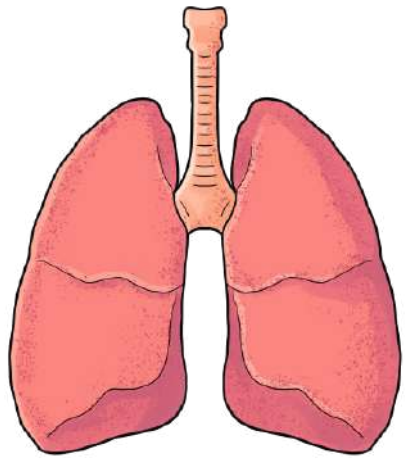
The Heart



The Kidney



Bones



Lungs

- Is the preparation over? Now it is time to debate. On the next page, there are pictures of these six organs, if you want you can draw on paper, or use poster paper to design a picture, logo, or symbol of your team. Thus, just seeing you, everyone will understand what organ your team represents! (These pictures are given like this for the convenience of drawing. How big is the real lung or kidney, where is it in the body — you will know more details about these issues in higher classes.)

- In the debate, each team will have five minutes to present their arguments. Your job is to score the other team during their debate. Again, while you are presenting, the other teams will also mark you in the same way. But no one can give marks to their own team!

- Marking will be done keeping in mind three things: presentation, use of information and argumentation. If you want, you can evaluate each team within the total of 30 marks by taking 10 marks in each of these three subjects. Thus-

Name of the Team		
Issues to consider	Total marks	Marks obtained
Presentation	10	
Use of information	10	
Argumentation	10	
Total marks obtained by the team =		

- Who won the debate? Write down the name of the winning team here, ...

Session Five and Six

- Here is a quick quiz - the six organs that you argued about are directly involved in the work of the six systems. But beyond these, there are three other systems which do some very important work. You must have come to know about them from the investigative study. Write the names of those three systems in the table of the next page, and then write their functions in very few words, in two or three lines in your own language. If you want, you can look at the book again and discuss it with your friends.

Name of System	Function

Someone must have won the debate! Those who won must be very happy! And others may have been a little bit upset! But now think about one thing with a cool head. Although the winning team won by arguing that their organ is the most important in the body, what would happen if the other organs stopped working in the body? If there was a real competition among the body parts like your class groups, and everyone thought of everyone as a rival, what would happen- think about it!

- You can understand if you consider the body as a running system, the system runs not through competition among its different parts, but through cooperation. We go around, return, eat, do our daily work, enjoy - if any part of the body is damaged, the joy is far away and the daily life seems full of trouble. So, to be healthy, you have to take care of this entire body system so that all the systems can work together.(Since the competition itself is quite ridiculous, there is no prize involved. Rather, the winning team can feed everyone a piece of chocolate for this occasion, what do you say?)

- Since the topic of body care has come in discussion, what do you say if we make some plans for our own body care at this time? Discuss among friends- how to do that, what will keep all the systems of this incredibly complex machine called the body working properly and keep you healthy. If you want, you can also take the help of the investigative study.

- Better to know a little more about yourself before planning your own care. You are teenagers now, just a few days ago you were children. Now in this adolescence, all humans have to go through some strange experiences, as a result of which we grow up slowly. If you do not know about them well, there may be lack of taking care of your body and mind, and on the other hand, many misconceptions or superstitions may enter your mind.

- Read the Adolescence section of Human Body chapter from your science investigative study book and discuss among yourselves, so that no misconception can get rooted in your mind.

- You must have known how important it is to eat well, sleep timely, and stay clean. Now your task is to create a short routine for yourself. Eating, showering, studying, exercising, hanging out with friends, reading story books, painting or any other hobby can all come into the routine. It may seem difficult to follow minutely every day, but what is the harm in trying?

- The table on the next page provides a draft of a weekly routine with possible tasks (for example, a daily routine is also timed. You decide the time and tasks at your convenience). Apart from this, if you want to keep your other work, you can put it in the empty space of the table. There is no obligation to do all the work every day. Set the day of the week, when, what work you will do at your convenience.

	Time Distribution							
Task	Sunday (Example)	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Waking up	Morning 6:30							
Breakfast	Morning 7:30							
School time	Morning 8:00-2:00							
Shower	Noon 2:15							
Lunch	Noon 2:30							
Reading story book/ drawing/ gossiping with family members	Noon 3:00- 4:00							
Exercise/ Playing	Afternoon 4:30-6:00							
Afternoon snacks	Evening 6:15							
Chatting with friends	During the school tiffin time							
Study	Evening 6:30-8:00							

Task	Time Distribution							
	Sunday (Example)	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dinner	Night 08:00							
Going to sleep	Night 09:00							

This routine is solely for your own use, not to be held accountable to anyone by the clock. But it is not a problem to share with everyone, right? You can share this routine with your friends, or teacher if you want. But do not forget to share your feelings after following the routine!

At the end of the entire learning experience, complete Table-3 at the end of the book for your feedback on the work of your group mates.

Friendship with Water

Water is the closest friend of all creatures including humans in the world. We cannot live a single day without water. But is the amount of water on earth limitless? Or can this water run out sometime? Aren't we risking our own life by our random use of water?

Let's inquire about this from the closest friend of ours.

Before the session starts...

- Can you name a thing without which we cannot do at all? If you make a list of things after thinking about for a minute, probably a name will come up in everyone's list. That's water! No human being- no, it would be wrong to mention only human beings. To be honest, no animals on earth can do without water!
- Water is very essential for survival. Where is the source of this water? Where does the water used in your homes or elsewhere come from? What is the use of this water?
- Talk to everyone in the house and fill out the table below-

Table -1

Serial	Name of the source	Underground or surface source?	Natural or man-made source?
1.			
2.			
3.			
4.			
5.			

- Now, think what kind of work or purpose the water coming from the sources you have mentioned in Table-1is used for and write down in Table-2. At the same time, put a tick mark in the third column of Table-2 if the water obtained from these sources is safe to drink.

Table-2

Serial	Source of water	What are they used for?	Safe to drink or not?
1.			
2.			

Serial	Source of water	What are they used for?	Safe to drink or not?
3.			
4.			
5.			

You have talked about various sources of water. Do you directly use the water brought from these sources without purification? You can also collect this information by talking to others at home. Based on what you have known, write down the information in the table below.

Table -3

Serial	Name of the source	Water of which source is used for which work	The way of purifying water	How water is preserved
1.				
2.				
3.				
4.				
5.				

Session One

- Everyone in your class has brought the collected information. Now discuss together how much underground water we use in our daily work and how much water from different surface water bodies we use.

- Is groundwater unlimited? Is the surface water? Read about water cycle and water pollution from your science book and talk about them with your friends. Now, review your own information.

- Think for a while and discuss with your friends and answer the following questions-

  Which kind of source is more available for water between underground and surface sources?

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  Water of which source is safe to drink?

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- What did the rest of the class write in answer to the above questions? Discuss it with the rest including the teacher.

- Now think about it - we use underground water for most of our daily work. But if you notice, you will understand that ground water is not so cheap! While reading about the water cycle, you saw that water comes back to the ground from the atmosphere through rain or any other means. But that water is initially stored in different reservoirs including rivers and canals, that is, in different surface sources. No matter where you live in a country like Bangladesh, there is no shortage of water bodies including rivers, canals, ponds, canals, beels and haors. It is advisable to use groundwater for drinking or food as there is a possibility of various germs in surface water. But the water of these reservoirs can easily be used for the tasks like cleaning the house or watering the garden. However, since the water in these reservoirs contains various substances, it has to be cleaned before use, hasn't it?

- Well, can you make something so that we can take water from this huge amount of surface water sources and use it for everyday use? For this, you need to create a water purification model. Besides, you may think of a system to preserve rainwater.

- Choose a water body anywhere in your area where the water is relatively clear. Now think about it, how is it possible to purify the water here and make it usable? For what purposes can this clean water be used?

Session Two

- Can you get half litre of water from the water body you chose? Then, bring it before coming to this session. If you want, you can also take the advice or help of the teacher.
- Complete Table-4 with your observation of the water body and collected water.

Table-4

Type of water body		
Do people use the water of the water body?	Yes	No
For what purpose do they use it?		
What are there around the water body?		
Are there fishes, snakes, frogs etc. living beings in the water body? What living beings are there?		
How is the colour of the water body?		
Does the water have bad smell?	Yes	No
Is there any floating/dissolved dirt/waste in the water?	Yes	No
What type dirt/waste?		

- On the basis of Table 4, discuss among you what are the main causes of water pollution in this water body? What kind of material / waste gets mixed in the water as a result of this pollution?

Table -5

Causes of water pollution	Types of garbage

Session Three

- Water contains a mixture of different things; sometimes it is easy to separate them, sometimes it is very difficult. In order to separate unwanted substances from water and purify it, it is necessary to know about mixture and solution first.
- Let's study a little more about the matter of mixture at the beginning! For now, you need water, sugar, and salt.
- Take a glass, salt, a spoon, and a spoonful of Panchphoron.
- Take some water in a glass and put one teaspoon of salt in it. Then stir the water with a spoon and observe it. See if there is any grain of salt in the solution and whether all the ingredients of spices in the Panchphoron of each group are equal.
- Now read the solution, mixture, homogeneous-heterogeneous mixture parts well from the investigative study book. Do you remember any other example of homogeneous and heterogeneous mixture? After thinking for a while or talking to friends, write down in the following table all the examples of these two types of mixture that come to your mind.

Table -6

Homogeneous	Heterogeneous
Example-	Example-

- Read the solution, solvent and solute part from the investigative study book

carefully. Can you identify the solvent, solute and solution in sugar and water solution? Fill in the blanks below as per your idea.

- Sugar + water = sherbet
- [ ] + [ ] = [ ]
- What kind of mixture is saline and hodge-podge (khichuri)? Which is the solvent and solute in case of saline?
- You must now know what solvent and solute are. The concentration of the solution depends on the amount of solvent and solute. Simply saying, you must know, of the two glasses of the same size with the same quantity of water which one will be sweeter if you mix 1 teaspoon of sugar in one glass and 3 teaspoons of sugar in the other. Surely, the glass in which three teaspoons of sugar was given will be sweeter. To get a clearer idea, read the portion of solution with different concentrations from your investigative study book.
- In the experience of 'Let's make a boat', you have learned about the relation between floating, sinking and concentration. Let's make that clearer by doing a fun experiment.

- With the same amount of water in two equal sized glasses, put 1 spoon of salt in one glass and stir the water well to dissolve the salt.
- In another glass, put several spoons of salt by 1, 2, 3 ..., and stir it until the salt is dissolved in the water. If you continue adding salt, at one point the salt will not dissolve in the water and the salt sediment will appear at the bottom of the glass.
- Now, drop two chicken eggs in the two glasses and see in which glass the egg floats and in which glass the egg sinks.
- Why is the egg floating in one glass? Why is the egg sinking in the other glass? Write down the reasons in your own words in the following space.

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- You must have understood that the solution of the glass with more salt is dark and the solution of the glass with less salt is light. Well, can you make the solution dark and light any other way? Or can you tell which solution is dark or dilute? Write down your thoughts immediately.

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- While dissolving salt in the second glass of water, you must have noticed that the first teaspoon of salt easily dissolved in water. But later, the salt had to be dissolved by stirring. At one point, when the salt was no longer dissolving in the water, it formed as sediment at the bottom of the glass. You must be wondering why the added salt was no longer dissolving in the water. To know the reason, read the saturated and unsaturated solution part from the investigative study book carefully.

Home Task

- As you did in the classroom, make a saturated solution of salt-water in a small glass or cup at home. Then pour the solution into a pot and keep stirring it applying heat on it in the stove. See what happens? Has the salt dissolved or remained in the bottom as sediment like the previous time?
- Pour the solution from the pot into the glass again. Now in the way shown in the picture, tie a string with a pen or pencil and place it horizontally on the glass. Then, carefully dip the other end of the string into the glass and leave it to cool very slowly. After a few days, pick up the string along with the pen or pencil and observe it.
- At the end of the observation read the part of preparing crystal from solution and draw a picture of the crystal of salt in your science book according to the experiment.

Session Four

- Have you ever thought which objects decompose and get mixed with water and which objects do not? That is, which objects can water dissolve? Let's do an experiment.
- Divide yourselves in groups under the supervision of your teacher. Take lemon juice, copper sulphate, spirit, glucose, milk, potassium permanganate, atta, chalk powder, hand sanitizer etc. in a few test-tubes or glasses/cups in every group and add water with them. Then, stir them well and observe.
- Write down which objects are dissolving and which objects are not in Table – 7.

Table – 7

Solute	Dissolves in water (√) Does not dissolve (×)

- Read the universal solvent portion from the investigative study book and tell where else among different household items is water used to dissolve?
- If you shake the mixture of chalk powder and water, it looks like milk, doesn't it? If you leave it for a while, you will surely notice that there is a little bit of water on the top of the pot and chalk powder remains as sediment at the bottom. If the water you collected during the observation of the water body in your area was mixed with mud, did the same thing happen there?
- To know more about such a mixture, read the suspension part of the investigative study book.
- Now tell why 'shake well before using' is written on the bottle of sauce or medicine. Write down your answer in the blank space on the next page.

- In case of the suspension, you have noticed that if the particles of the solution are stable for a while, they accumulate in the bottom of the pot. You also may have noticed that if the particles are very tiny, it takes a long time for them to settle down. Then naturally the question must have arisen in your mind, can the particles be so tiny that they will not dissolve properly, and even if left in a stable state, they will never accumulate as sediment like the suspension?
- Let's do another experiment to know the answer. Take sugar-water solution in one glass and only milk in another glass. Now pass light through a torch in the two glasses and see if you notice anything special.
- As the ray of light is radiating from the tiny particles of milk, it can be seen inside the milk. But that will not happen in solution. Isn't that weird? So, what kind of mixture would you call milk? There is no sediment like any suspension. It does not also match with ordinary solution!
- Discuss with friends and read the colloid part of the investigative study book. Do you find any similarities with the properties of colloid?
- You have known a lot about solubility. Have you ever wondered if solution can be possible with anything other than water? Truly speaking, you have seen many solutions that are not dissolved in water. Think a bit!
- Read the waterless solution part of the science book again and join in the discussion with friends.
- Liquids, solids and even gases are used as solute in solutions. Depending on the type of material used to make the solution, there can be liquid-liquid solution, liquid-solid solution, liquid-gas solutions. Even solid-solid solution is possible. Can you give an example of such a variety of solutions? Read the different solutions part from the investigative study book and match it with your thoughts.

Session Five

- You have worked with mixture and solution to make a model of water purification. Then, just understanding different types of mixtures will not work. Rather, you need to know how to separate different objects from the mixture.

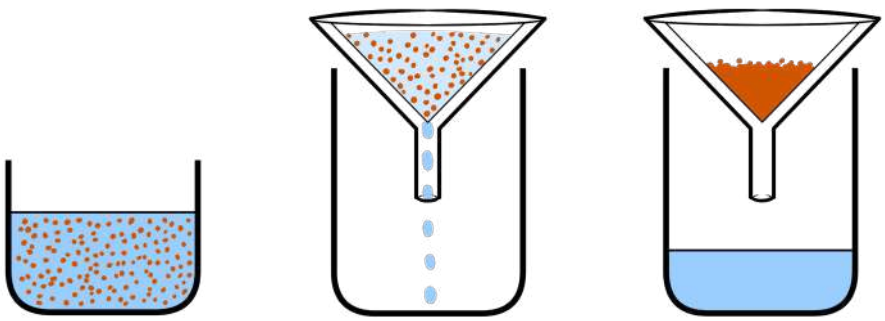
- Since our work is with water, let's work with water solution. Various types of substances are mixed in the water. For the test, add some solids including salt, sand, etc. to the water as you wish. Now it's time to separate them again.

- Leave the pot of your group for a while. You will see sediment has accumulated at the bottom of the pot. The water in the upper part is clearer than before. It is called sedimentation. Then carefully pour the clean water from the top into another container through a glass bar so that the sand or sediment that has accumulated on the floor does not move. Only sand will remain at the bottom of the pot when all the water is transferred. This method is called decantation. Read the decontamination part from the investigative study book to make the idea clearer.

- Then fold a filter paper in a funnel and place it on top of the beaker. Gently pour the sample water into the funnel over the filter paper.

- If you do not have a filter paper, you can use a thin cotton cloth. And instead of a funnel, you can cut a plastic bottle and use it.

- You will see that the impurities floating in the water cannot pass through the filter paper or cotton cloth. So, the waste mixed in the water can be separated. This method is called filtration.



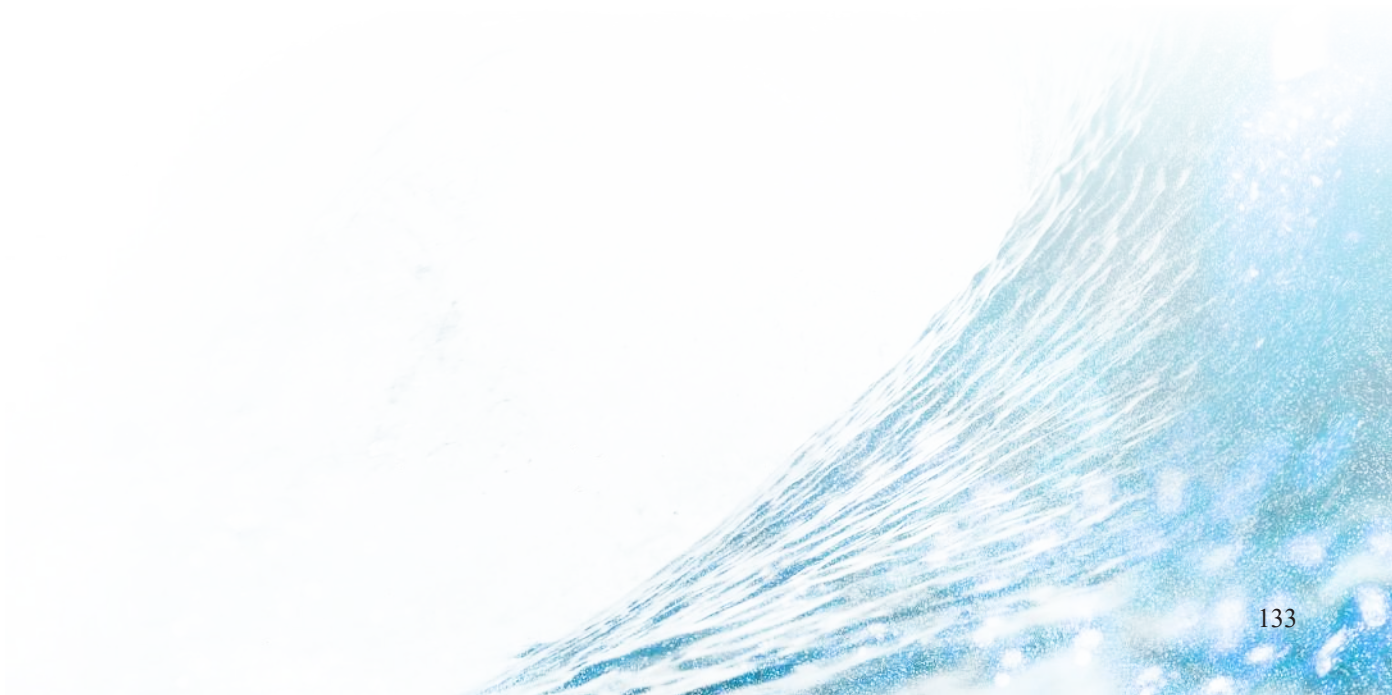
- The best-known method for separating insoluble solid particles from the solution is filtration. We are all familiar with the filtration process. We use a strainer to separate the tea leaves from the tea.

- Two of the three components of the mixture given by the teacher have been separated. Now you have clear but salty water. Earlier you separated pure salt from the salt-water solution involved in the crystallization process. Crystallization is a process of purifying solid substances.
- Now you will learn to separate salt and water from saturated solution through evaporation and distillation.
- Pour the salt-water solution into a beaker and place it on the wire-mesh to heat from the bottom with the help of a spirit lamp. (Take 50 ml solution to save time)
- Place a steel lid or watch glass over the beaker while heating the beaker. You will see the particles of evaporated water cool down and accumulate in the lid or watch glass. This water in droplets is pure distilled water.
- Continue to heat in this way until the water in the beaker dries. Once all the water in the pot has evaporated with the heat, only salt will remain at the bottom of the pot. In this process of evaporation, a solute can be separated.
- Now, you have learnt how to separate different types of objects from the mixture. Now let's use these strategies and think about what your own project will be like!
- Think again about the water of which surface source can be purified and used safely (excluding for drinking or cooking). Choose a water body from your area. Now, identify the substances mixed in the water of this water body. how to separate them to purify the water.
- Write down or draw your plan in the blanks on the next page. If you want, you can talk to your friends.

Session Six

- Show your plans to friends. Did you find anything in the plans of others that did not come to your mind?
- Let's do a fun thing. You can make your own model at home by using your own plan, you can also purify water. But before that, let's make a very simple and well-known model to purify water.
- This model of water purification can be made using all the materials available at hand. All you need for this is an empty two-liter or two-and-a-half-liter plastic bottle, knife, beaker, cotton or cotton cloth, coal, fine sand and coarse sand, some pebbles and contaminated water mixed with mud-sand.
- First, cut the bottom part of the bottle with a knife. Then open the mouth or cork of the bottle and put inside or tie the cotton or cotton cloth in that part as shown in the picture.
- Now hold the bottom part of the bottle vertically and first put the piece of coal, a layer of coarse sand, a layer of fine sand and a layer of some pebbles on it.

- Again place the bottle on the beaker and slowly pour contaminated water.
- After waiting for a while, you will see that relatively clear water is accumulating in the beaker. This water is not drinkable right now, but you have made a model of pure water. Congratulations to you for that.
- Boil the water well and cool it down. Now, preserve the safe drinking water. (You can boil water by using water purification tablets or alum.)
- You have developed a model of purifying water for use other than drinking. It should be known to others, shouldn't it? Others should also know that groundwater is limited and that we are rapidly damaging this water level. You can make one or more fact charts about all this and display them in a place where everyone in the school can see. Or if you want, you can find out any other idea. Think about what you want to do. Draw or write down the idea of your group's fact chart.



Lives All Over The World

How do you like to read story books or watch dramas? What if characters in the drama are something other than human beings? What if the story is your own? Let's see-

Session One

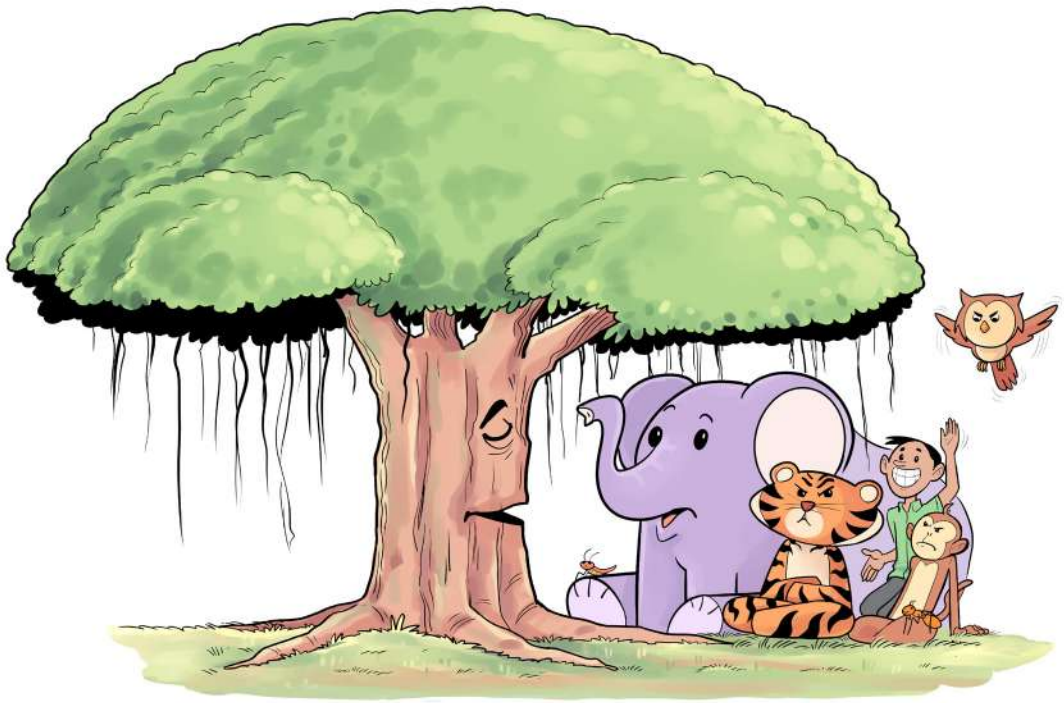
- A few days ago, you found out all the neighbours in your area (you must remember the learning experience of 'our neighbours)! Some of these neighbours live inside your own homes (e.g. small but hard-working ants), some live in nests on tree branches (e.g. crows with a hoarse voice but very intelligent birds), and others spend their lives sitting at one place spreading their roots in the posture of meditation (e.g. huge banyan tree near the school). Now think if there are any neighbours whom we don't see? Take for example, numerous microorganisms live around us, even in our bodies, which are almost invisible! We can't even see them with our naked eyes.

- Let's make the list of neighbours a little longer by including all those we see or don't see. What do you say? No, don't be afraid! You don't have to observe the invisible viruses or bacteria for a week! Instead, let's do a fun thing together.

- Here is a story for you (Leader of the Living Beings). But the characters in this story are not just human rather you can find some of your neighbours in this story. There's a surprise at the end of the story, but I'm not saying that right now! For now, everyone in the class should be divided into a few groups. Then read the story together in the group!

Leader of the Living Beings

Muhammad Zafar Iqbal



With a coughing sound, the old banyan tree started talking, “Friends! Today we are all here for a special purpose.”

Those who had been very impatient for so long became silent. All the living creatures of the world were called to today's meeting with a very urgent notice. From viruses, bacteria to plants, spiders, elephants and rhinos all are present. However, no one knows why everyone has been called.

The banyan tree says, “Friends, there is extreme chaos among our living creatures. There is extreme violence among one another. There is no love and coordination among us. The climate has changed so much that at some point the earth's fauna could become extinct. We have to decide how to protect ourselves..”

The elephant says, “No use of it. No one will listen. Everyone will continue to quarrel among themselves.”

"We really need a leader," the cockroach says, “Then everyone will listen to that leader.”

The monkey says, "It's true. We monkeys are the most intelligent, we should be the leader! What is the importance of so much discussion about this?”

The man at the meeting stands up and says, "But I knew we humans were the most intelligent."

As soon as the man finishes speaking, everyone from all around protests by chirping, squeaking, rumbling, cawing, barking, mewing. Everyone keeps saying, “What did you say? Are people intelligent? People are the most foolish. This state of the environment is due to their stupidity; because of them the world is in such a catastrophe today!”

That's right. So, the man quickly sits down with his head down.

The monkey says, "Yes, what I was saying is that only we, as truly intelligent creatures, have the ability to be the leader."

The tiger grits his teeth and says, "If you become a leader, there will be no more law and order in the forest!"

The banyan tree looks at the others and says, “Oh! I say, stop the quarrel. Let me listen to others.”

Suddenly a soft voice is heard, "I want to talk a bit ..."

Everyone looks left and right, but there is no one! "You won't see me," says the soft voice. “I'm a virus! We are the only ones to compare to ourselves. So, we should be the leader! We survive like an inanimate object, but who stops us if only one of us can enter your body? Then we capture the cells one by one like a living creature! Humans also become overwhelmed by our fear! A few days ago, our Corona brothers hit the humans very hard. Have you forgotten that?”

As soon as everyone starts shouting, another invisible voice stops everyone and continues, “There is no point in shouting. The virus did not say anything wrong! What does it matter though the animals are big in size; everyone is a coward inside! If you see something bigger than you in size, you just run away. And think of a bacterium like me! Our brothers and sisters are inside all animals. They live even inside people's stomachs, inside their mouths, under their skin, as if they made a colony there. But no animals can even feel it! From that point of view, you all should accept us the bacteria as the leader!”

"Stop arguing so much!" The tiger says in an annoyed voice, “The tiger was the king of the forest all his life, now I see that everyone wishes to be a leader! If you can, come and fight with me! Let's see who wins!”

There was a hushed buzz in the meeting, but everyone becomes a little scared and silent when they hear the tiger.

“Now, listen to us ---,” says an ant from the branch of a tree. “This is a problem for all of you! Only quarrels and quarrels! How much work do we ants do together! If you learn a little by watching it! Humans are so proud of themselves, but we are much more industrious than humans. The tiger is so fond of being a leader. When there are a few tigers in an area, they start fighting. And we live in a family of hundreds of ants together. The way we build a city under the ground

will make everyone's eyes glaze over!"

The owl had been trying to sleep in the hollow of the banyan tree for a long time. Unable to tolerate the sound of talking, he comes out and with a yawning he says, "Look, a lot has happened! Now stop for a moment and listen to me. Whatever you are saying, there is logic in everyone's words. But one thing is for sure, you observe everything standing on the ground. You don't even come to know if the enemy does not come very close to you! But the birds see everything from above. Especially the owls like us — we roam in the night sky in complete silence, no one knows more than us where what is happening. That is why we should be the leader; we will be the first to know when there is any danger."

As soon as the owl's talk is over, uproar starts again in the meeting. The banyan tree tries to calm everyone down clearing his throat but is in vain. In a frustrated voice, the banyan tree then begins to say to itself, "Stop it all! The tigers, the ants, the owls have all been talking so much for so long, none of them can even make their own food! They have to kill and eat other creatures. It's a little embarrassing to speak for ourselves, but I am to speak now. Like you all, we do not live by eating other creatures, but when we get a little sunlight, water and air, we make our own food. So, if there is a leader, then there should be someone from among the trees ..."

Before the banyan tree could finish speaking, all the creatures start shouting, "Autocratic decision! We don't accept it! We will not accept it!" There is a lot of noise and chaos in the meeting. Then the man stands up in fear and says, "If you allow me, I can say something."

The frog says, "Say quickly whatever you want."

The man says, "We humans do a job to select the leader. That is called election. The best will be if everyone chooses a leader with a secret ballot."

The lizard says, "All right!"

The frog says, "We want an election! Election!"

All the other animals say, "Yes, yes. We will decide our leader by election."

Then there is a great excitement about the election among living beings. Meetings, processions are all around. Pastors, festoons and banners have covered everything. No one can sleep at night at the sound of slogans.

One day the election was held with great fanfare. Waking up at night, everyone started counting the votes together. There is excitement inside everyone, who will be the winner? Who will be the leader of the living beings?

Once the vote counting is over. It is found that the winner is .....

(You can see the story doesn't end here. What will happen next? Who will win the election? And what will happen then? You will decide what will happen in the next part of this story!)

Have you finished reading? Then you have known the first surprise! Yes, this story is unfinished; you will decide the end of the story! But before that, think of the characters in the story. As per your opinion, who will win the election? What kind of living being is he? What does he eat? Where does he live? Think and immediately write down your thoughts in the blank space below. If you don't know the answer to any question, don't worry, for now you can write by guessing. Check later whether your guess is correct-

Who will win the election?	
What kind of living being is he?	
What do you know about him? What does he eat or where does he live?	
Why do you think this character will win?	

The end of the story can be thought of later. Let's see if your thoughts match with your friends'. Let's talk a little about the story with the rest of the group.

Sessions Two, Three and Four

In the previous session, you talked about the story. Now let's take a closer look at all the characters in the story. Write down the main characters of the previous story and what kind of creatures (plants/ animals /microorganisms) below —

Name of the character	What kind of living being

Name of the character	What kind of living being

- Now let's know a little more about them. You have already read about the plants and animals part of the fourth chapter of your science book. Now have a look there again.

- Now we need to read the microorganism part of the same chapter. By microorganisms we promptly refer to viruses or bacteria, but you can't imagine how many kinds of microorganisms there are in nature. In this chapter you will find all the interesting information about them. Everyone in the group sit together and read these parts by yourselves, or if you don't understand, take the help of others. If someone in the group has problem understanding somewhere, you can help. And if it is more difficult to understand something anywhere, your teacher is there!

- You have learned a lot of information about animals, plants, microorganisms! But everyone in the story was arguing about who survives by eating what, who can make their own food - all of this. So, before you finish the story, it's important to study a little bit about how these different kinds of animals eat, isn't it? There is a detailed discussion on this subject in the thirteenth chapter 'Nutrition and Metabolism of Organisms' of your book. Let's read that chapter giving a bit more time! Teachers will help if there is any problem understanding somewhere.

- There has been a lot of study. Let's go back to the story. Everyone in the group discuss how the story can end. Talk about all the ideas that come to everyone's mind and draft the end of the story.

- The beginning of the story is the same but as each group has finished the story from their own ideas, in the end the story of each group will be completely different, won't it? Think how new stories have been written!

- Now the second surprise— How about doing a drama with the story? Talk about who will play which character in your group. This discussion can be done outside the class. Again, it is necessary that everyone in the group has to

act. Everyone will discuss but someone has to write the dialogues of the next part of the play. Again, someone has to design the clothes of those who will take part in different characters. Thinking about clothes? This is very easy! All you have to do is paint on the paper or use poster paper to draw or make all the characters and put them on the actors!

Remember, since many groups will perform, do not take too much time! Each group will stage a play of five to seven minutes, so get ready accordingly.

Session Five

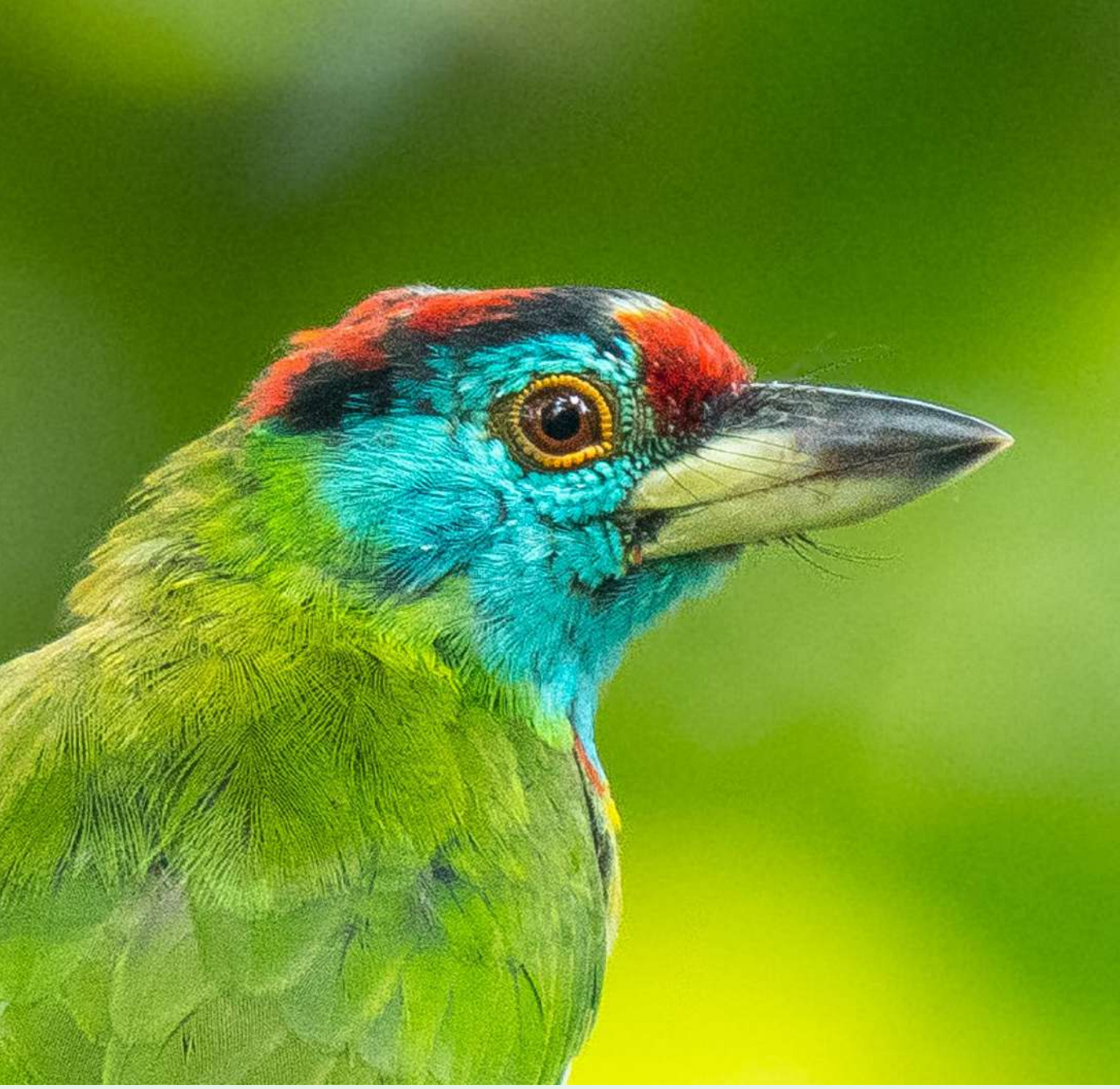
Everyone must have come to school with a lot of preparation for the drama at home! In today's session, dramas of all the groups will be staged one by one. Write down what role you played in your team. Don't forget to write the names of not only actors, but also those who have done everything from writing dialogues to writing.

Names of group members	The role played in the group drama (Write with the name of the character played)

Retrospection

You have watched the dramas of all the groups. Which story do you like best? Why?

Whose performance was the most beautiful? Write down your feelings about today's event-



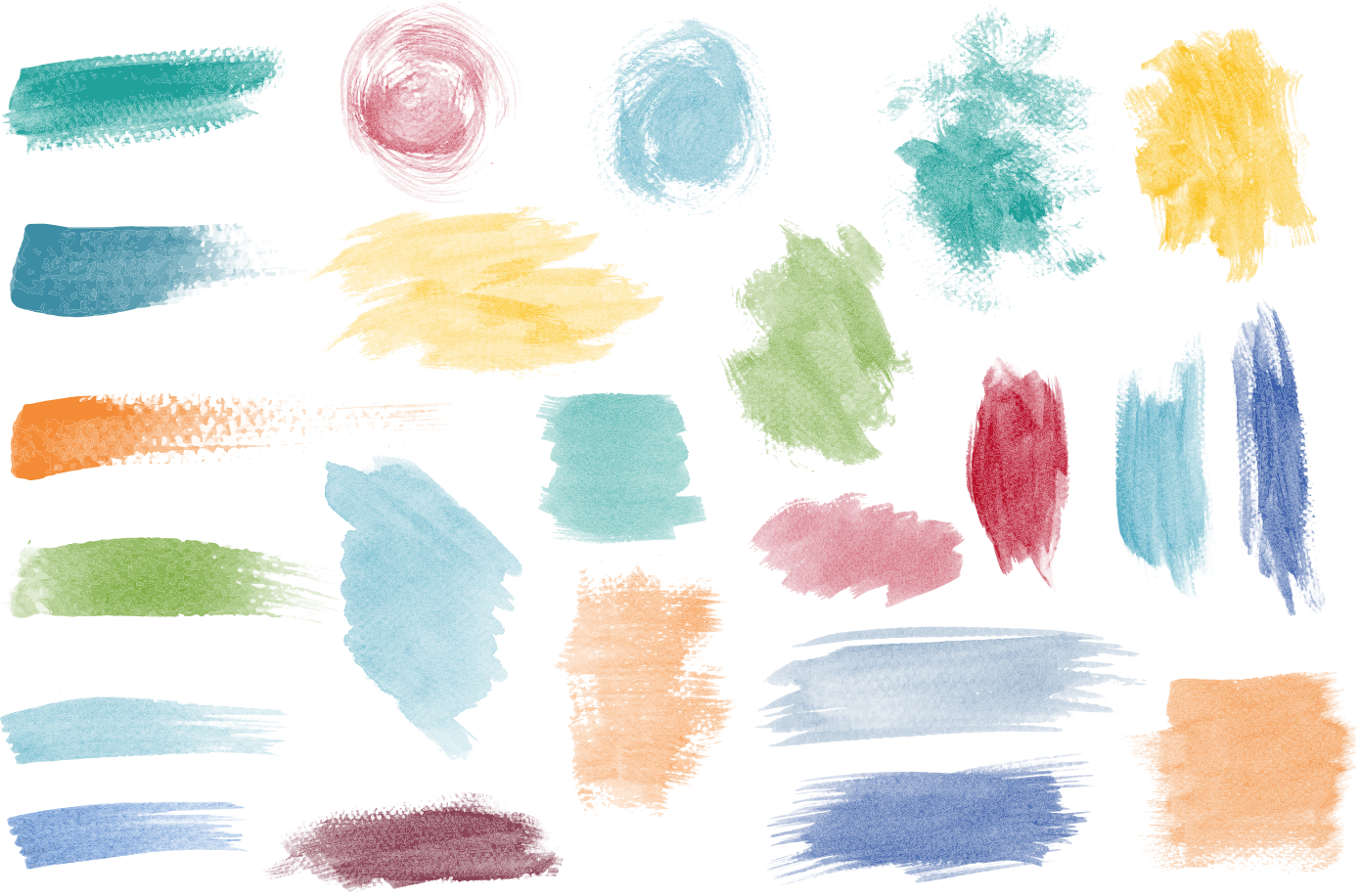
The World of Colour

As we open our eyes, we see the show of countless colours in this colourful world! But why do we see red rose as red, and why the green leaves are green? Again, why don't we see the colour in ordinary water, glass or air? Have you ever thought about that? This time your job is to solve all the mysteries of the colours of this colourful world!

Session One

When we match the eyes, we see many colours are around us! The sky above the head looks blue in the morning, again in the evening the same sky becomes pinkish! Not only the sky, but also we see many trees, flowers, vines, leaves in the surrounding nature. Even if you look inside your classroom, you will see many colourful things, which you have never noticed before! But do you know a funny thing? There are probably some people in your class who look at the colours in a completely different way. When you say green, the color that comes in your eyes may be completely different in another person's eye! There are even many famous people in the world who have never seen some colours! The list ranges from the famous scientist John Dalton (in the upper class you can find out how important a scientist he was) to the famous writer Mark Twain, and even the founder of Facebook, Mark Zuckerberg! Most of them do not see the difference between red and green. Again, there are many of us who cannot see at all. But in many cases their other senses are sharper than those of ordinary sighted people.

How about doing one thing? Find out what colours you have in the classroom, around the school, at home, on the way to school. With the help of pastel or colour pencil you can note down the colours by making small lines in the empty space below.

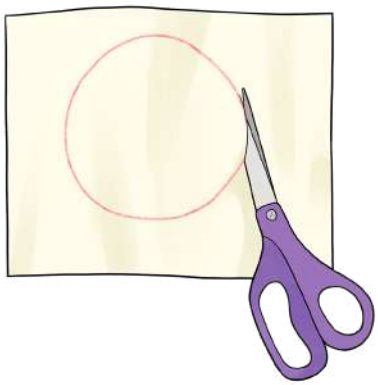


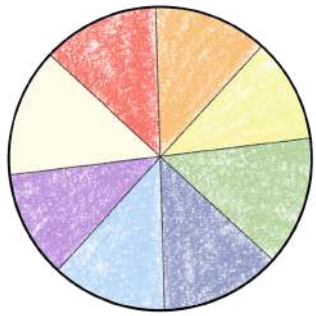
- Talk to your friends; did they find any such colored things that you didn't notice? Now, notice the above colours well. Can you tell how many shades of colour there are in total? For example, there are many shades of green - yellowish green, olive green, dark green, bluish green. If you take a good look at all these colours, you will see that all the colours here are in fact different shades of a few colours. Can you distinguish the original colours? You discuss it with your friends too. One colour is mixed with another colour to create new colours. But what is the colour if all the colours we see are mixed into one?

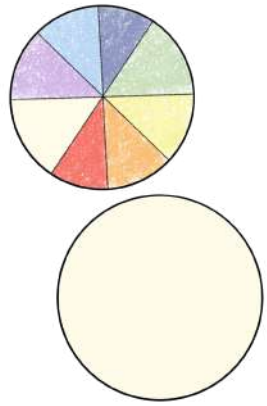
- Now let's try to understand the matter of colour better by doing an experiment. Scientist Newton was the first to perform this experiment. You can do this with a friend beside you. If you want, three friends can do it together.

  - Draw a circle on a piece of paper as shown in the picture in the next page. Cut a piece of thin cardboard or a piece of sponge into circles in the same size.

  - Now divide the paper into eight equal parts by drawing lines as shown in the picture. In the eight parts, paint these seven colours respectively







- violet, indigo, blue, green, yellow, orange, red (you have got it right, the seven colours of the rainbow!). Leave the eighth part white.

➲ Now paste the paper on the piece of cardboard or sponge with glue. Right in the middle of it, that means near the center of the circle, make two holes side by side. Insert two thick strings through the holes and place the circle in the middle of the string like a colourful wheel. Now, it has to be spun very fast. How can that be done?

➲ One way is – spin the wheel while holding the string on both sides (almost the same way as the rope is spun in Jumping Rope). At a point of spinning, when the two strings are twisted many times, the hold the two ends of the string tight. You will see that the wheel will continue to spin in the opposite direction at a high speed (if you want, you can also find out other ideas of spinning the wheel).

➲ Now notice, when the wheel of seven colours is spinning very fast, can all the colours be separated? If not, what colour can you see? Write down your observations below –

What colors do you see?

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What is the reason for this? Guess it.

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- Match your group's observations with those of other groups. What did they see? If the wheel spins fast enough, then the only colour you should see is white. But what is the reason for it?
- The small experiment that all these colours V-I-B-G-Y-O-R mix up and produce white colour has been done! This means that even if you see the light of the sun white during the day, there are many colours in it.
- (One thing has to be mentioned here. If you try to mix these seven colours by rubbing with watercolor or pastel, you will get black instead of white. Can you say why? There is no problem you do not know the answer, keep the question. Think about it later.)
- Well, think of a matter. Do you see any colour in the dark? Of course not, we see different colours when we are in the light only. That can be accepted, but why do we see the China Rose (joba flower) red and its leaf green? If you see a green leaf in red light, will you see the leaf green? Those who have seen the yellow light of the sodium lamp must have noticed that, at night, many of the colours in this yellow light look completely different. What does that mean? The colour we see on an object depends not only on that object, but also on the light in which we see that object.
- Now let's do another experiment. If you want, you can do this experiment at home. But do not forget to discuss it with everyone the next day!

  Take water in a glass or transparent polybag and mix a little red colour (water colour, food colour, or any colour that dissolves in water) in it and try to see what is on the other side through it. Do you see the original colour of different things on the other side of the glass, or does

it look different? Try to see any green leaf through this red colour.

Write down your observations below-

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Have you seen green leaves green? If not, why? Discuss your explanation with friends and see what they think. To know more about this, read the paragraph 'Colours of Light' at the beginning of the chapter 'Light' in your science investigative study book.

Session Two

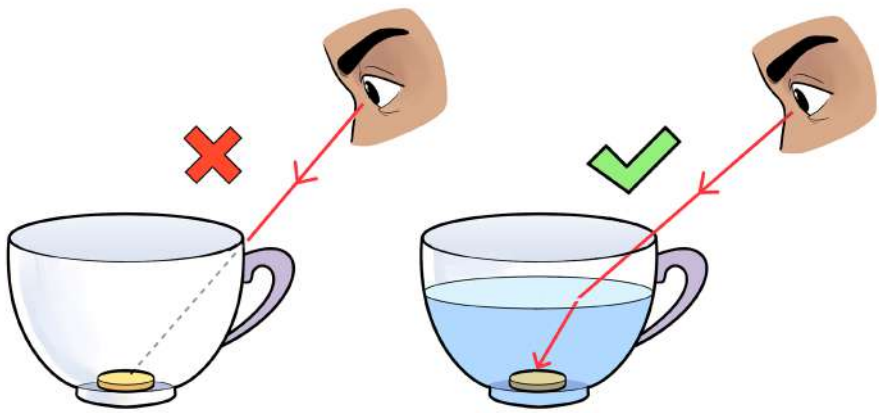
There are many such things whose colour we don't see even in bright light. For example, water or air. Think yourselves why there is no colour of water? In the meantime, many may have guessed that the water has no colour, because the water is clear and all the colours go through it. So is glass. So, through the glass windows we can clearly see the colour of everything outside!

Now let's do a small task. Fill a glass fully with water and keep it at a place where the sunlight directly enters the house through an open window or door. Notice what is happening. Do you see the following events happening? Write down on the right side-

Possible events	Your observations
Sunlight is reflected from the surface of the water and falls on the roof of the house	
The sunlight has entered the glass through water	

Did your observations match with the above events? Leave the glass like this till the end of this session.

- You already know about the reflection of light. We only see the colour that is reflected in all the colours of light - we know it. Now let's discuss another context and that is the refraction of light.
- You have seen in the above experiment that light went straight through the glass of water. Now the question is, what actually happens during this 'going through inside'. Let's do another experiment - put a coin in an empty cup so that you can see the coin. As light goes in a straight line, it can be said that now the coin and your eyes are in a straight line. Now, move your head back slowly so that the coin is no longer visible.
- Now, keep pouring water on the cup. What's going on? Can you see the coin again? I don't think so. Doesn't it look like the coin has come up? How do you think it happened? After discussing with your friends, write down your guess-



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According to science, the cause of the above incident is the refraction of light. A very interesting incident takes place during the refraction of light and that is the path of the light bends. Look at the picture beside. The coin is actually in its place. You can see it because the light has bended and is coming to your eyes.

To know more details on when and how the refraction of light occurs, read the 'Reflection, Refraction and Absorption of Light' section from your investigative study book.

Now let's give some food for thought! Did you notice that everything looks crooked when you look through high power glasses? Can you guess why it happens? Discuss among friends and write down your opinion-

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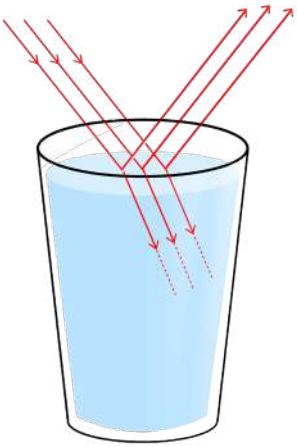
Do you remember you left a glass of water in the sun a while ago? Now take the glass in hand and if it feels a little warm. Write down your observations on the right side-

Possible event	Your observation
After leaving the water in glass in the sun for a long time, it is seen that the water has become a little warm.	



You already know that in addition to reflection and refraction, water also absorbs light to some extent. Can you tell where this absorbed light went? Whatever you think is right! Light energy is converted into heat energy and makes the glass a little warm!

Session Three

We started the discussion about colour, so let's go back to it. When it comes to color, the word rainbow comes to our mind. After the rain, many of you must have seen the rainbow of seven colours curved like a bow in the sky!

There is a science comic about rainbows in your book. Together with a friend next to you, read the comic in the meantime. Don't forget to let everyone know how it felt!

After you finish reading, discuss with everyone in the class, including the teacher, how is the rainbow formed? Do the events of reflection and refraction have any role in creating a rainbow? Keep notes of your thoughts-

Like the boys and girls in the story, you are also scientists, aren't you? Now how about making a rainbow? You can make a rainbow if you want, just as it is said in the comic! Give it a try!

Draw in the notebook how the rainbow made by you looks like. If you want, you can make it by cutting poster papers and sticking them with glue. In that case, you can cut the papers gradually thicker to thinner from violet to red and paste them so that even if you move your hand with your eyes closed, you can understand which one is which colour.

Conclusion

In the first session of this learning experience, it was said that if you try to rub and mix the colours on the paper, all the colours will turn into a blackish colour instead of white. Many of you must have tried! But has anyone ever figured out why this happens? You will find the answer to this riddle in the 'How We See and Types of Colours' paragraph in the 'Light' chapter of your investigative study book.

Retrospection

- The reflection of light is a very familiar matter to us. We see our face in the mirror every day! One thing we have noticed all the time while looking at our own appearance in the mirror, is that the right and left in the reflected appearance always interchange. Have you ever wondered why this happens? Can you make a mirror where we can see that our right and left have not interchanged?

- The task is not difficult. As shown in the picture, place two mirrors are at a 90-degree angle. You will see that there is no inter change in your appearance. If you raise your right hand, the reflected appearance will also raise the right hand! Can you tell why it happens? Write down your explanation below-

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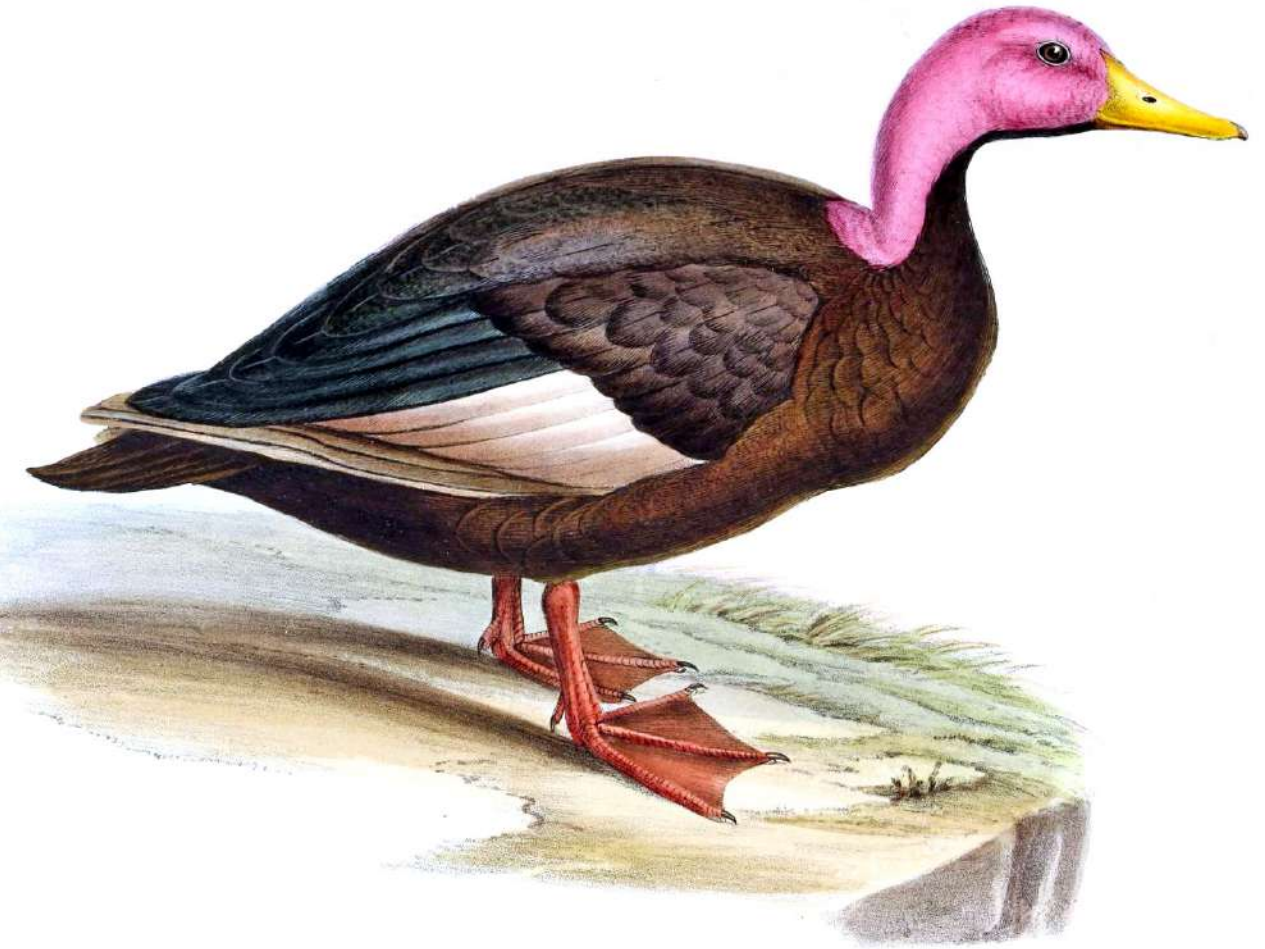


Those who are Lost

You've already found out your neighbours. But if you look a little further, you will see that there were many more neighbours in your area who have been lost over time. Our job this time is to find out those lost neighbours-

Session One

- Has it ever happened that a next-door friend of yours has changed his residence and moved to another city, whom you will never meet again? Isn't it hard to think? Now, imagine, 'though not right next door', there were probably a lot of neighbours around us who got lost over time. You already know that neighbours do not refer to only people. You yourselves have already found out the neighbours around you (learning experience 'our neighbours').

- Can you see the picture of a duck with a pink head on the previous page? Once upon a time, this strangely beautiful bird could be seen in Bangladesh and India. It has not been seen anywhere else in the last few decades. It is thought that this bird has become extinct from the earth forever.

- Now it is your job to find the neighbours who were once in your area, near your house. But now they are no longer seen. Maybe it's a tree, the flowers of which you have never seen! Again, it may be a strange insect, a small bird, a snake, a fox or a wild cat!

- These neighbours were lost long ago. So, you must have never seen them! Now, can you tell how you can know about them? You're right; those who are older than you may have seen many of them. Those of you who have grandparents in your house can ask them. You can even ask your parents, teachers, neighbours, relatives if they know about any creatures that used to be seen in your area but now they are no longer seen. Write it down below what you have known after talking to different people before the session starts or during the session-

Name of the lost creature	Description of the lost creature	Was seen how many days ago	From whom you got the information

Name of the lost creature	Description of the lost creature	Was seen how many days ago	From whom you got the information

- Everyone in the class divide into small groups. Show the other friends in your group what you have known. Surely they have also written the names of many creatures that you may not know!
- Now discuss what the reason for the loss or extinction of these creatures is? Listen to the opinion of everyone in your group, what do you think? Now, choose any plant/animal from your list, you want to find out the cause of its extinction. The rest of the group will also choose a creature as they wish.
- Write the name of the creature you have chosen here- ……
- Now think, exactly at what point of time this creature disappeared from your region. What happened in the environment of this region at that time that caused a creature to become extinct? To know that, first you have to know what the eating habit of this creature was. Where was its place of residence? Did the change in the environment in this region cause the lack of food or a place to live? Or have humans or other animals killed them? To get this information, you have to go to those who are older than you. During the session, you can get information from schoolteachers or other adults who are there. And after the session, you can get information from the older members of the family or from the neighbours.

After getting the information, write it down in the table below-

Name of extinct creature:	
Eating habit, habitat, and other features	Reason for extinction (environmental or any other reason)

Session Two

In today's session, share the information you got with the rest of your group. What are the reasons for the loss of the creature you have chosen? Let them know about that too. The information obtained by your friends can also be useful to you.

Now, all the members of your group together, read the chapter "Interdependence of living things and sustainable environment" in your investigative study book well. With the help of the teacher, join in the discussion with all the other groups in the class.

Now look at the previous table again. You have known what kind of changes in the environment can cause a creature to be lost forever. Now, see which environmental and man-made disasters have relation with the reasons you found out about the extinction of the creature you chose.

Session Three

You have known the cause of extinction of many animals or plants lost at different times in the past. Now think about it, even now we are going through a lot of environmental or man-made changes. Is there s as much jungle in your area as before? Again, are the bushes, ditches, ponds in this area the same as you saw when you were younger, or are they changing year after year? When an old house is demolished, the forest is cleared and a multi-storied building is built, there is a crisis in the habitat of various species of insects, birds or rats living in that forest, isn't there?

It is not possible to bring back previously lost creatures even if you want. But now it is your responsibility to ensure that you don't create such a threat of extinction of those who are your neighbours. Now think a little what kind of changes are taking place in the environment around you at the moment for which plants or animals in the environment are in danger of being lost in the near future? After thinking for a while, note it down in the table below-

Creatures that are at risk of extinction	Reasons for being at risk

You have known the reasons of the fear of losing these creatures. So, you can now work to reduce the risk of their danger if you want. You can also make others aware. Sit down with your group and make some plans on how to save these neighbours from extinction. Note down the three ideas that seem most important during the discussion –

1 ।

2 ।

3 ।

Now, everyone in the group can design some awareness pastors or leaflets, so that you can spread your ideas among others. Posters of all groups can be hung inside the classroom or on the front wall so that others in the school become aware of this.

Vaccinate Your Child

We all are familiar with the word vaccine, aren't we? Have you even seen children to be vaccinated in your area? But what is this vaccine? Why is it to be taken? What is the result of taking vaccines? Let's start the work of finding out the scientific answers to these questions.

Before the session starts

Before starting this learning experience, you have to do a small task. You have to collect the information about the vaccines that are given to children (or in some cases to adults).Which vaccines are to be taken for which diseases? What age are vaccines to be taken at? Collect the information and write in the list below. If necessary, seek the help of teachers and others such as parents, elder brothers and sisters, neighbours.

Serial no.	Vaccine	For the disease	Age of vaccination

You will read out this list to everyone at home. If anyone has a different view or opinion about the list, write it in the box below. Is that okay?

Box of different opinions

Session One

Take out the list you made at home. If there is something written in the box of different opinion, discuss it with the classmate next to you.

Now take the vaccines from the vaccine list made by you and fill in the vaccine and “For the disease” column in the table below.

In the "Responsible for the disease" column, write which of the viruses/ bacteria you think is correct. During this work, you can take the help of ‘Nutrition and Metabolism of Organisms’ chapter and the ‘Interdependence of the Living Creatures’ section of the chapter ‘Interdependence of Organisms and Sustainable Environment’ of your resource book. You can make a decision after discussing with your classmate.

Serial No	Vaccine	For the disease	Responsible for the disease

Serial No	Vaccine	For the disease	Responsible for the disease

- Now pen through the unnecessary or wrong portion of the following sentences and make the correct sentence. You can take the help of the chapter 'Nutrition and Metabolism of Organisms' in your science book. You can also discuss among each other.
- Let's make the following sentences right:
  - Virus is a type of microorganism/ parasite/ plant /animal and they are autotroph/ heterotroph.
  - Bacteria is a type of microorganism/ parasite/ plant /animal and they are autotroph / heterotroph.
  - Fungia is type of microorganism/ parasite/ plant /animal and they are autotroph / heterotroph.

Session Two

- So far, we have identified viruses and bacteria as the cause of various rages. We have learned about vaccines to prevent them. But are only they the cause of diseases? Do we have to stay away from them all the time? In today's session, we will start looking for answers to these questions. Our investigative study book will be our best associate in this endeavor. Let's get started.
- "Absorption of Nutrients in Microorganisms" section of the 'Nutrition and

Metabolism of Organisms' and 'Interdependence of the Living World' section from the beginning of the chapter 'Interdependence of Organisms and Sustainable Environment' will help you to complete the following paragraph. Besides, there is no restriction to discuss in the group.

Challenge paragraph

After an organism is born, _____ substance from the environment is stored in the body of that organism and the physical development of the organism takes place. After death, those organic and inorganic elements return to the environment. Later, again they remain inside the organism in the environment until _____ as organic and non-living elements.

Until reaching the host body, _____ are like a kind of non-living substance. But outside the host body, _____ are not. Their _____ is simple in nature. Often, the nutrients penetrate the cell membrane directly from the environment and enter the microbial cells. Many times, the nutrients from the environment directly penetrate the cell membrane and enter the cells of the microorganism. Sometimes some of the carriers of the cell membrane help to take the nutrients from the environment into the cell.

There are many microorganisms that benefit us. With yogurt, we eat some _____ that are beneficial for our body. Some fungi are a source of antibiotics in our _____._____ against various deadly diseases is done through using viruses. Vaccines against polio disease are made using _____.

There is a type of bacteria that helps plants to _____ from the environment. Scientists have also found a variety of microorganisms in the leaves and stems of jute, which help in the growth and survival of jute. Microorganisms receive _____ from both plants and animals. In addition, after the death of plants and animals, they give them different elements back to nature _____.

- You now know that all living beings are important in the natural environment. But people need to fight many germs to prevent various diseases. So, vaccine is an important weapon for this.

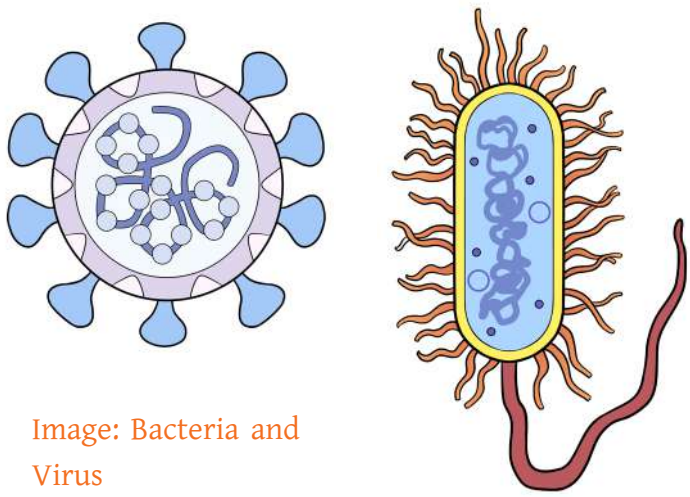
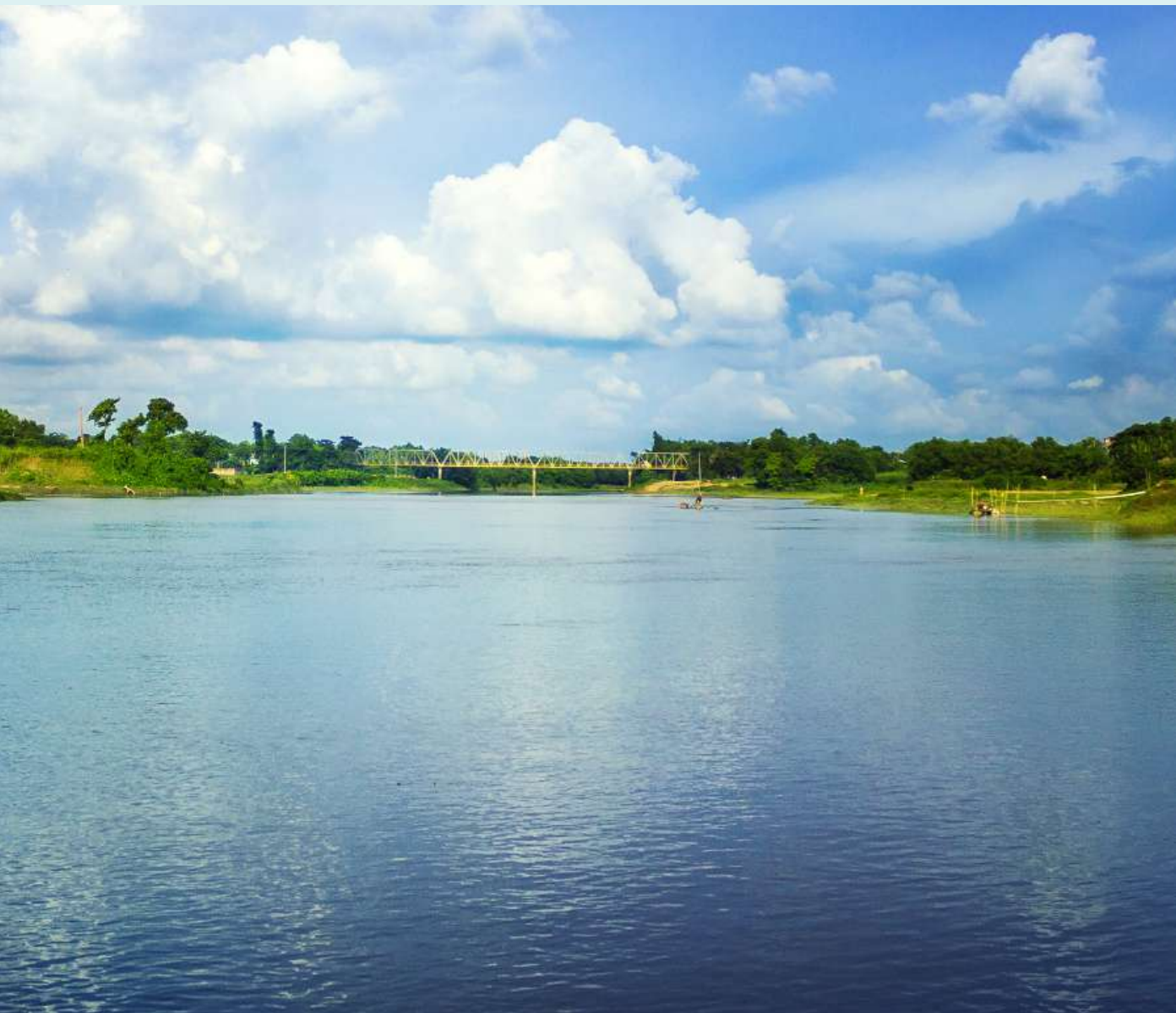


Image: Bacteria and Virus

- You know about the immunization (vaccination) program. Now, plan how to make the immunization program stronger in your community. If possible, you can volunteer for the vaccination program, or you can take steps to popularize the vaccination program. Plan it in groups and share it in the class. The next time, implement your plan and don't forget to share your experience in the class.

Rivers Will Live, If They Have Life

If you look at our country from the above, you will see that the whole country is surrounded by innumerable rivers like a net. The relationship of the people of this country with the river is very deep. Our innumerable folk songs, poems, stories focus on the river. Not only the human beings, but a large part of the biodiversity of this country revolves around the river. Through this learning experience, let's try to get to know this part of our lives- river a little more deeply. How do you feel?



Session One

আমাদের ছোটো নদী চলে বাঁকে বাঁকে
বৈশাখ মাসে তার হাঁটু জল থাকে।
পার হয়ে যায় গোরু, পার হয় গাড়ি,
দুই ধার উঁচু তার, ঢালু তার পাড়ি।

Surely, there is no one who has not read the lines of the above poem written by Rabindranath Tagore! To be honest undoubtedly there is not a single poet in Bangladesh who did not write about rivers. Poetry and literature about rivers have no limits, just as there is no end to songs about rivers. The people of this country have a connection to rivers in their joys, sorrows, festivals and everything else. So, in literature, songs, pictures, the topic of the river is very relevant! And, the names of our rivers are also wonderful - Padma, Meghna, Jamuna, Surma, Kushiyara, Dhaleshwari, Brahmaputra, Kirtankhola, Karatoya, Turag and there are so many more such names! Surely, you also know many famous songs or poems about rivers. Divide into small groups and discuss with the friends of the group to see which poems or songs are your favourites. If you want, one from each group can recite or sing a rhyme / poem / song in the class.

Now think, which river is closest to your area? Even if there is no river in your village or town, there must be beel, haor, baor! Have you ever been there? Now draw your river (or the beel / haor / baor whatever it is) in the space below-

(You may write a few lines of poems instead of drawing a picture if you want; whatever you like!)

আত্রাই বা কাঁকড়া আত্রাই বা গুড় আত্রাখালি আন্ধারমানিক আফ্রা আবুয়া বা নান্দিয়া গাং আমনদামন আমরি খাল আর্সি-নালিয়া আলাই আলাইকুমারী আস্তাইল ইছামতি ইছামতি-কালিন্দি ইছামতী-কালিন্দী ইরামতি ইলিশমারী ইসদার খাল-বারভাঙ্গা ঈদগাও উপদাখালী উমিয়াম এলংজানী কচা কপোতাক্ষ কম্পো কয়রা করতোয়া করিস করুলিয়া কর্ণ-বালজা কর্ণঝরা কর্ণফুলি কাঁচামাটিয়া কাওরাইদ কাকড়ি কাকরাই-ডাকাতিয়া কাকশিয়ালী কাগেশ্বরী কাচমতি কাজীপুর কাজীবাছা কাটাখাল কাটাখালি কাটাখালী কাপনা কামারখাল কামারখালী কালদাহার-কানিয়াকুল কালনী কালা কালাপানি কালাপানিঝরা কালিগঙ্গা কালিন্দী কালীগঙ্গা কালুদাহা কাসালং কাস্তি কীর্তনখোলা কুমলাল-নাউতারা কুমার কুমার আপার কুমার লোয়ার কুরুম কুলিক কুলিক বা কোকিল কুশিয়ারা কোরাঙ্গী খড়খড়িয়া-তিলাই খাজাচিং খাড়িয়া খায়রাবাদ খালসিডিঙ্গি খাসিমারা খিরো খেপা খোয়াই খোয়াথল্যাংতুইপুই খালপেটুয়া গঙ্গা গড়াই গদাই গন্দর গভেশ্বরী গলঘেসিয়া গাংডুবি গাংনাই গাজীখালী গিদারী গিরাই গুকসী গুনাখালি গুমাই গুমানি গুলিশাখালী গোবরা গোমতী গোল্লার গোহালা ঘড়িয়া খাল ঘাগটিয়া ঘাঘট ঘাঘর ঘানুরা-বগালা ঘাসিয়াখালী ঘিরনাই ঘুংঘুর ঘোড়াউত্রা ঘোড়ামারা চত্রা চন্দনা-বারাশিয়া চাওয়াই চাটখালী চাতাল চাপাই চামতি চিকনাই চিকলী চিড়ি চিতলখালী চিত্রা চিরি চিলাই চিল্লাখালি চুঙ্গাভাঙ্গা চুনকুড়ি চেঙ্গি চেলা চোরখাই ছাতনাই ছোট ঢেপা ছোট ফেনী ছোট যমুনা ছোট সেনুয়া জয়পাড়া খাল জলঢাকা জাদুকাটা-রক্তি জাফলং-ডাউকি জালিয়া ছড়া জালুখালি জিঞ্জিরাম জুরি জুরী ঝপঝপিয়া ঝারকাটা ঝিনাই টংকি টঙ্গী টর্কি ঢাংগন টাঙ্গন টিয়াখালি ডলু-টংকাবতী ডাউকা ডাকাতিয়া ডাসাডিয়া ডাহুক ঢাকি ঢেপা তালতলা তালমা তিতাস তিস্তা তীরনই তুরাগ তুলসীখালী তুলসীগঙ্গা তেঁতুলিয়া তেতুলিয়া তেলিগঙ্গা-ঘেংরাইল তৈনগাঙ থেগা থড়াটানা-পয়লাহারা দাড়ির গাঙ দামালিয়া/যালুখালী দিওনাই-যমুনেশ্বরী দুধকুমার দুধদা দেওনাই-চাড়ালকাটা-যমুনেশ্বরী দলুতি দোলতা ধনাগোদা ধনু ধরলা ধলা ধলাই ধলাই-বিসনাই ধলেশ্বরী ধাইজান ধানখালী ধানসিঁড়ি ধুম ধকলা-সুন্দ্রাকাশি নড়িয়া নবগঙ্গা নয়া গাং নয়াগাং নয়াগাঙ নরসুন্দা নর্ত নলজুর নলশীসা নলেয়া নাংলী নাগদা নাগর নাগর আপার নাগর লোয়ার নাগেশ্বরী নাঙ্গলা নাফ নারোদ নালজুরি নিতাই নীলগঞ্জ নুন্দা-উত্রা নহালগঞ্জ-রঙমাটিয়া পঞ্চবেণী পটুয়াখালী পদ্মা পলিমারি পশুর পাগলা পাগারিয়া-শিলা পাটনাই-পাইকারতলা পাগুব পাথরঘাটা পাথরাজ পানগুছি পাবিজুড়ি-কুশি গাঙ-কুশিয়া পারুলি খাল পালং পাহাড়িয়া পিয়াইন পুংলী পুটিমারি পুনর্ভবা পুরনো তিতাস পুরনো ধলেশ্বরী পুরনো সুরমা পুরাতন পশুর পুরাতন ব্রহ্মপুত্র পেটকী পোড়া খাল-খাইয়া প্রাণসায়র ফকিরনী ফটকি ফটিকছড়ি ফুলকুমার ফেনী বংশী বগী বটরখাল বড় গাং বড়াল আপার বড়াল লোয়ার বরাক বলেশ্বর বাঁকখালি বাউলাই বাকসাতরা বাঙালি বাজ্জা-মেধুয়া বাথাইল বাদাই বাদুড়গাছা বানার আপার বানার লোয়ার বান্দসা বান্নী বার্নাই বালই বালু বিজনা-গুঙ্গাইজুরি বিজনী বিজলি বিবিয়ানা বিশখালী বিশারকন্দা-বাগদা বিষ্ণু-কুমারখালি বুড়া মাতামুহুরী বুড়ি বুড়ি তিস্তা বুড়িখোড়া বুড়িগঙ্গা বুড়িতিস্তা বুড়িশ্বর-পায়রা বুড়ো গৌরাঙ্গ বুরাইল বুল্লাই বেকরা বেগবতী বেতনা বেতনা-কোদালিয়া বেতৈর বেদুরি বেরং বেলান বেলুয়া বেসানী বৈরান বোরকা বোশখালীর ব্রহ্মপুত্র ব্রহ্মপুত্র-যমুনা ভদ্রা ভাদাই ভাবনা-বাঁশিয়া-বহিয়া ভারুয়াখালি ভুবনেশ্বর ভুলুয়া ভুল্লী ভেরসা ভৈরব ভৈরব-কপোতাক্ষ ভোগাই ভোগাই-কংস ভোলা ভোলাখাল মংলা মগড়া মধুমতি মনু ময়ুর মরা জিঞ্জিরাম মরা সুরমা মরিচ্চাপ-লবঙ্গবতী মহানন্দা মহানন্দা আপার মহানন্দা লোয়ার মহারশি মহাসিং মাইনী মাইলা মাতামুহুরী মাথাভাঙ্গা মাদারগাঙ মাদারীপুর বিলরুট মানস মালঞ্চ মালদাহা মালিজি মাহারি মিনহাজ মিনিখালী মিরগী মুক্তেশ্বরী টেকা মুসাখান মুহুরী মেঘনা আপার মেঘনা লোয়ার যমুনা যাদুকাটা রতনাই রহমত খালি রাংখাইন রাক্ষসিনী-তেঁতুলিয়া রাবনাবাদ রামচণ্ডি রায়ডাক রায়মঙ্গল রূপসা লংগন বলভদ্রা লংলা লঙ্গাই লহর লাইন লাউরানজানি লাবুদ্ধা লুভা লেংগা লোনা লোহালিয়া লৌহজং শাকবাড়িয়া শাতলা-হারতা-নাথারকান্দা শারি-গোয়াইন শালদহ শিব শিবসা শীতলক্ষ্যা শুক শোলমারি সতী-স্বর্ণামতি-ভাটেশ্বরী সন্ধ্যা সয়া-হাড়িভাঙ্গা সাংগু সাইদুলি-বারনি সাঙ্গু সাতারখালী সাপমারা-হাবড়া সারি গোয়াইন সালতা সালদা সিংগিমারী সিঙ্গুয়া সিনাই সিমলাজান সিরাজপুর হাওর সিরামাখালী খাল সিলোনিয়া সুই সুগন্ধা সুতাং সুতিয়া সুতী সুরমা সেনুয়া সেলোনিয়া সোনাই সোনাই-বরদাল সোনাই-বারদল সোনাখালী সোমেশ্বরী সোয়াই হরবাংছড়া হরি হরিণঘাটা হরিহর হাই হাওড়া হাড়িদোয়া হাড়িয়া হাড়িয়াভাঙা হাপরখালী হাবরখালী হামকুড়া হারাবতী হালদা হিশনা-ঝাঞ্চা হুড়াসাগর হেরাচামতি

In the picture above, you can see the names of many rivers in Bangladesh? Jadukata, Karnaphuli, Kushiyara, Someshwari, Dudhkumar, Bhubaneswar, Andharamanik — all nice names, aren't they?

Which of these names in the picture have you heard before? Talk to your friends and check who already knew the names of how many rivers.

Do you know that a great decision was made in Bangladesh a few years ago? According to that decision, the river has been given the status of a living entity. This means that just as humans or other animals, rivers also have their basic rights. If someone harms people, he is to face the court with a case. Similarly even if anyone harms the river, he will face the same fate! Can you think what could be the reason for comparing the river with such living creatures? Talk to others in your group and write down your thoughts below-

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- Match your answer with the answer of others. Join in the discussion with everyone including the teacher. If something new comes to your mind while doing the next tasks, note it down in the exercise book.

- The funny thing about rivers is that none of us ever see the same river more than once! It may be a surprise to hear that. But think about it, even though the river looks still, it is always flowing. The waves of the river that you see every moment were not there even a moment ago. She or her ancestors may have been born on any mountain and has been carrying water year after year. Let's talk about the Brahmaputra, a big river in Bangladesh. The river was born in the Himalayas in Tibet. From that distant Himalayas, the Brahmaputra merges with the Meghna River in Bangladesh through India. There are hundreds of rivers in the world, each of which has such a birth history.

- If the river has a birth, can it die too? Think of it.

- Let us come to another topic. The river is not only metaphorically considered a living entity; rather the survival of countless creatures depends on the river. Speaking of people, in ancient times all civilizations started from the banks of rivers somewhere. Today, in many parts of the world, people's lives and livelihoods are centered on rivers. This is the story of the humans. The life of many other living beings besides man is based on the river and the environment around the river. You can find it out for yourself. But for that, you need to know a little more about her own rivers, not only the river itself, but also all the lives that surround the rivers.

- We will only talk about rivers in describing this search. But those who do not have a river very close to them have nothing to worry about. You can search in the same way at the nearest beel, haor, baor, or at least pond.

- Before the next session, your task is to observe the river together in groups. For this, all the members of the group can go for a tour one day. For the convenience of the work, everyone in the group can divide the work based on who will find what kind of information.

- This is the information that you can bring after your observation-

- The story of a river

  (How big is the river? How old is it? You can find out the history of this river or any special information or story about the river. You can ask the local people in the area for this information. Older people in the area may be able to say well about it. You can also ask the teachers).

- What kind of living things are found in the river and near the river?

  To find the answer to this question, you have to look closely at the area around your river. You will need information about what kind of plants grow, what kind of insects, animals or birds can be seen there. It would be better if you could gather information about what kind of fish is found in the river, what kind of aquatic creatures other than fish live in the river. It may be difficult to find so much information on your own. You can get help from the people around you if need.

- What kind of changes have taken place in the river and in the environment around the river over time?

  (What kind of fish used to be found in your river but which can no longer be seen now? Or, have you heard of any plant or animal that used to live near the river but it is no more found now? Earlier, in your learning experience ‘Those who are lost’, you searched for lost or

extinct creatures around you. Now you can bring information about the creatures that have been extinct in the river or around the river. Or the other changes in the river - for example, the river that used to be fast flowing, now it may have dried up; this is also a big change. Older people in the area can help you find answers to these questions.)

Session Two

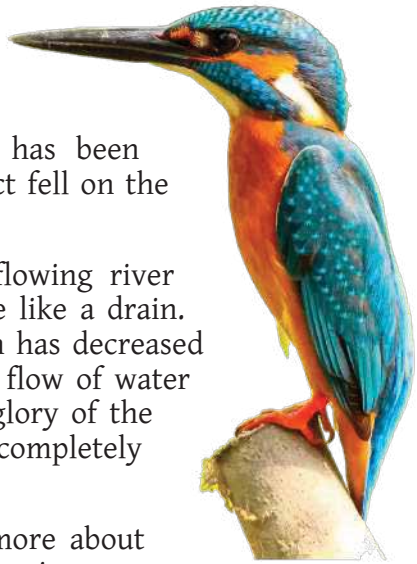
Surely, everyone has got a lot of information about the river? After discussing with everyone in the group, take notes in the table below –

Story of a river	

What kind of creatures are found in the river and near the river?	.....
What changes have occurred over time in the river and the nearby environment?	.....

- Now think about it. What is the reason for the loss of the living things in some places, or the changes in the river and the environment around the river over time? Can you figure out the natural reasons behind it? Also think what the effects are of various human activities. Talk to one another in the group and write down the important reasons. When the writing is over, talk to the other groups and see what reasons they have written about.
- In order to think a bit deeper, choose one or two changes. See whether the reasons behind this change can be put together in one single form. What elements of the environment are directly affected by the factors you are talking about?
- An example would clear the point. Think, at one time dolphins could be seen in the river, but now they are no more seen. While searching for the cause, it may have been seen that at one time people hunted a lot of dolphins, as a result of which their numbers decreased and they disappeared from the area. In this case, the living world, a major element of the environment of the river, has changed directly due to humans. It may also happen that

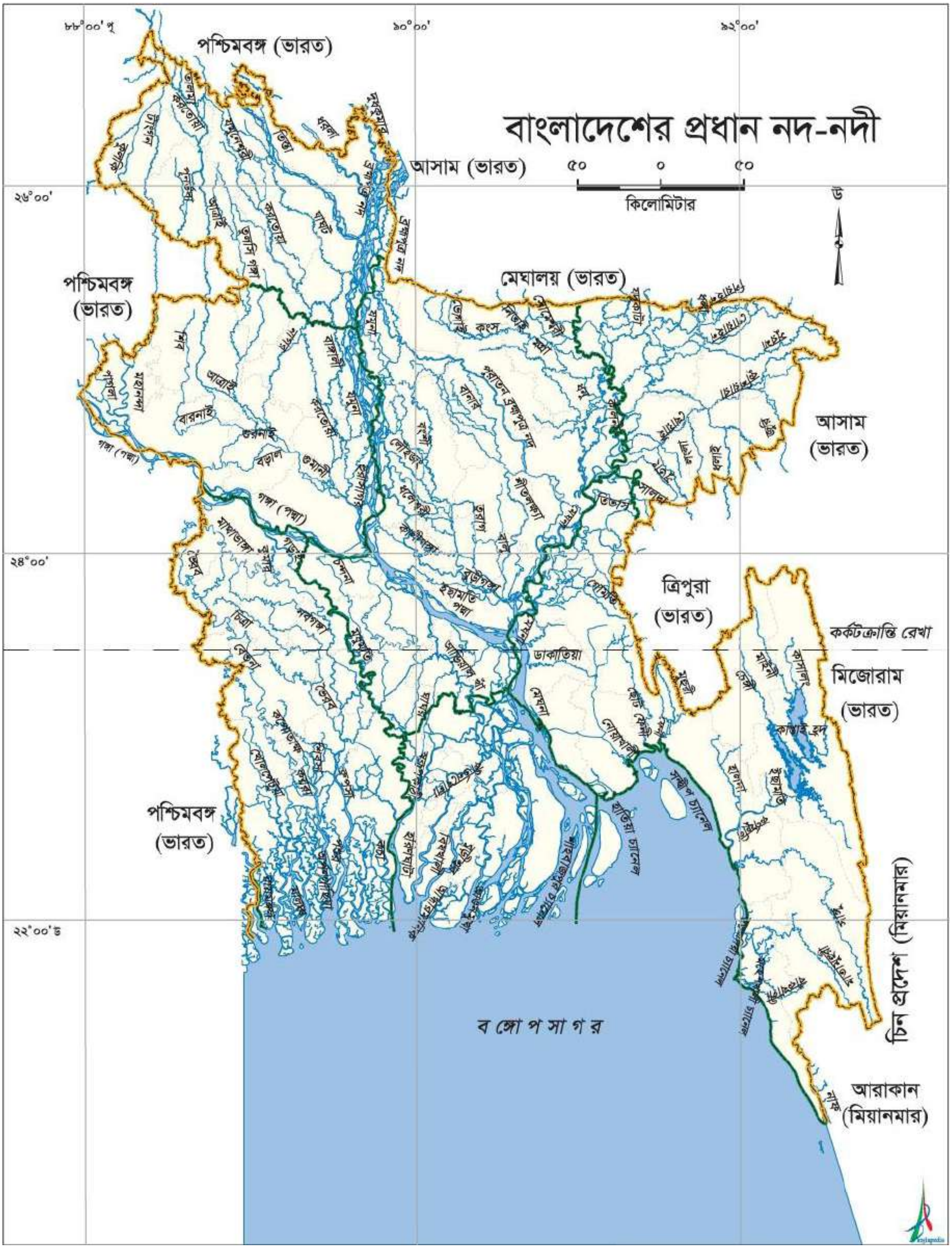
the water has become contaminated due to some reason (such as factory waste) - that the creatures like dolphins have lost their ability to survive there. In this case, people did not hunt dolphins directly, but another major element of the environment (water) has been polluted due to human activities and its impact fell on the living world.



- Let's give another example. Suppose a fast-flowing river of the past now has dried up and has become like a drain. What is the reason for this? May be the depth has decreased a lot due to siltation under the river and the flow of water has also decreased. As a result, the previous glory of the river has been lost! In this case, the reason is completely natural.

- Your job will be easier if you know a little more about the elements of the environment will. Sit down in a group and carefully read the environment and four main elements of the environment from the fifteenth chapter "Environment and landforms" from your science investigative study book.

- If you have finished reading, let's go back to the previous question. Arrange the reasons for the change in the biodiversity of the rivers and the surrounding areas that you have discovered in the table below –


বাংলাদেশের প্রধান নদ-নদী
পশ্চিমবঙ্গ (ভারত)
আসাম (ভারত)
মেঘালয় (ভারত)
পশ্চিমবঙ্গ
(ভারত)
আসাম
(ভারত)
ত্রিপুরা
(ভারত)
মিজোরাম
(ভারত)
কর্কটক্রান্তি রেখা
পশ্চিমবঙ্গ
(ভারত)
চিন প্রদেশ (মিয়ানমার)
আরাকান
(মিয়ানমার)
ব ঙ্গো প সা গ র
কিলোমিটার
৫০ ০ ৫০
উ
২৬°০০'
২৪°০০'
২২°০০'উ
৮৮°০০'পূ
৯০°০০'
৯২°০০'
ডাকাতিয়া
মেঘনা
গঙ্গা (পদ্মা)
পদ্মা
ইছামতি

Changes in the river and the environment around the river	The element of the environment that has changed (soil/ water/ air/ living world).	What are the causes of this change?	
		Natural causes	Man-made causes
....	....	....	....

Now let's make our vision a bit wider. What do you say? So far we have been talking only about the rivers near our house and calculated the damage to our own rivers. If we consider entire Bangladesh this time, then we need to first understand why so much of Bangladesh's environment is related to rivers in one way or another. If you look at the map of the rivers of Bangladesh on the previous page, you can understand how many rivers are flowing through this country. It is not a mistake to say that rivers are the lifeblood of this country!

From the map, can you guess where your village/city is? If you want, with the help of the teacher, you can put a small mark in the approximate place. Now find the nearest river on the map. See where it was born, and where it went to be merged!

How about playing a fun game? In a note, write the names of all the rivers given on the map. Now you have to fold the note and do the lottery. Whoever gets the name of the river will have to find that river on the map. Let's see who of your group can find the most rivers in the shortest time!

Sessions Three and Four

- You have understood that country is almost entirely river washed. It is a blessing for Bangladesh, you can say. Many countries in the world do not even have half the number of our rivers. To understand the life of a river, one must not only understand the river, but also the features of the land area. Because you already know that all the elements of the environment are interconnected, and each element affects the other.

- Sit in groups and take the idea of landform from the same chapter. Then, take a look at the landform of Bangladesh. What are the main types of landforms in Bangladesh and how these landforms were created and changed? Read these and discuss yourselves. Now read the 'Natural diversity in different parts of Bangladesh' section and discuss in groups again. Then, an overall idea about the nature of the region will be formed.

- Have you finished reading? Did you notice one thing? We consider floods as natural disasters for very reasonable causes. We are afraid of floods. It is not unusual be afraid, because this flood is the cause of many people's suffering. But notice that eighty percent (80%) of the land in this country is made up of silt that is carried away during floods. That means, flooding is a very normal natural process, and since ancient times all living things, including humans, have adapted to it. Danger occurs when for various reasons this system suddenly changes, with which the elements of the environment cannot adapt. For example, due to construction of dams in different parts of the river untimely flooding occurs and there are many cases of river drying up.

- In order to maintain the balance of this system of nature, it is important for everyone to play their roles. In order to clarify the concepts of preserving the environment and maintaining the natural balance, you have already read the chapter of this name in the science book. Take a look around again. Do you find any similarity between what is written about the changes in the local

natural environment due to man-made causes and the information that you have collected?

- Now look again at the information that your group has found. Surely now you are thinking about what should be done to keep the river alive. In the last few sessions, you must have realized that it is very difficult to save the river if all do not try together. Therefore, it is important to do something about this not only in your class, but also outside the class. It may be started from your school!

- But before that, it is important to decide what the people of your area should actually do based on the information you have obtained by observing the environment of your river. You may not be able to do much with the natural causes. But at least think of how you can reduce the man-made causes that are affecting the environment of your river.

Talk to the group and write down all the solutions that come to your minds-

Based on the information obtained earlier, the man-made causes of endangering the environment of your river	Its solutions may be -
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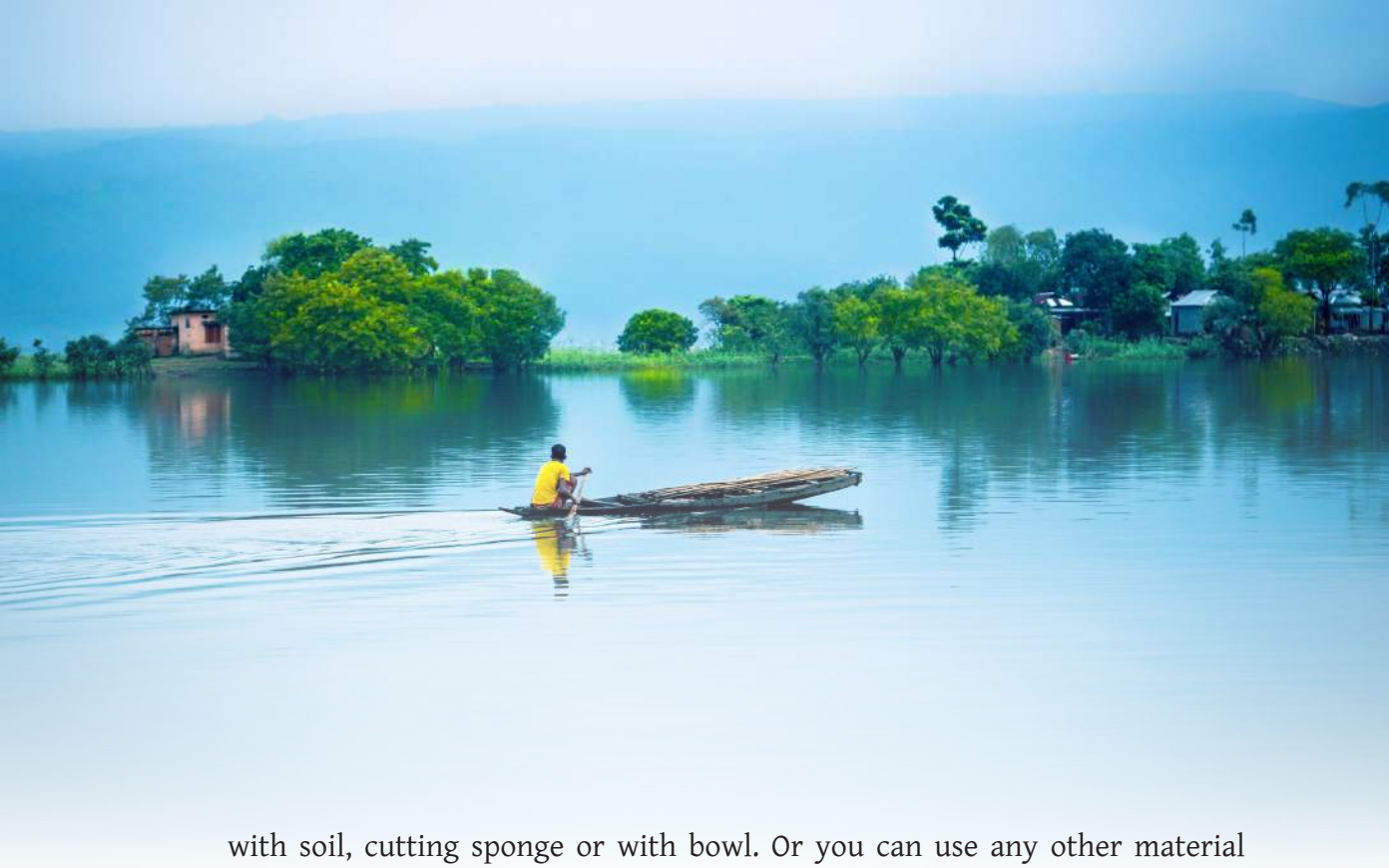
There are two things you can do to implement these solutions:

1. You have the information about how many types of life survive centering round the river. On the basis of this, you can make a model of the ecology of your river and show it to everyone. It may make everyone feel that this seemingly stagnant river actually helps to survive many species of life. You can make models using real water by showing the structure of the river



with soil, cutting sponge or with bowl. Or you can use any other material from your own ideas. To show different living creatures, you can draw on paper, paint and stick to the model with sticks. Decide how to do it. If you can prepare for this work outside the session, you will save a lot of time.

2. By making some plans to save the river and preserve the nature around it, you can run a campaign in order to make it known to everyone. It could be titled "Save the River" (or any other name you like); it could be a play or a poster or a leaflet or an exhibition of pictures. Discuss and decide yourselves what you want to do with your group. Also decide what materials are needed so that you can implement these plans in the next session.

Session Five

All the groups must have finished their preparation! Now everyone in the class discuss together how all the group activities will be displayed. You can arrange the ecosystem models on benches outside the classroom so that students in other classes can see them. And discuss with the teacher how to arrange for others to see what the different groups have planned under the title 'Save the River'.

Retrospection

Which group's activity do you like most? Why?

Did you face any challenge to implement your plan? Would it be better if you made some changes in your plan?

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Did you get anything new from any of the groups that your group did not notice?

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At the end of the full learning experience, fill in Table 3 at the end of the book for your opinion on the work of your classmates.

Appendix

Give Your Opinion

Learners, you do a lot of work with your classmates at different times every day in and out of your school like sports, education or any adventure. What if you are asked to comment on how your classmates participate in different activities? The method for how you will give your opinion is given in the following two tables (1.1 and 1.2).Using this you will give feedback in Table-3. Let Table- 2 be a mystery to you now. As you grow older, you will discover it for yourself.

Table-1: Your classmate working in groups or in pairs

1.1: What your classmates do in group or in pair work

	A	B	C	D	E
What he does or has done	He did it as the teacher told him.	He did it as the teacher told him. He said what he thought.	He did it as the teacher told him. He said what he thought. He listened attentively to what we said.	He did it as the teacher told him. He said what he thought. He listened attentively to what we said. He asked questions.	He did it as the teacher told him. He said what he thought. He listened attentively to what we said. He asked questions. He answered my or our questions.

1.2: Your classmate's work sharing in groups or in pairs

	A	B	C	D	E
What he does or has done	He did his part properly	He did his part properly. He has done the work sharing with me and all of us.	He did his part properly. He has done the work sharing with me and all of us. If I or we told him of his mistake, he has admitted it.	He did his part properly. He has done the work sharing with me and all of us. If I or we told him of his mistake, he has admitted it. If someone else made a mistake, he stated it well.	He did his part properly. He has done the work sharing with me and all of us. If I or we told him of his mistake, he has admitted it. If someone else made a mistake, he stated it well. He explained well why he or others did something wrong.

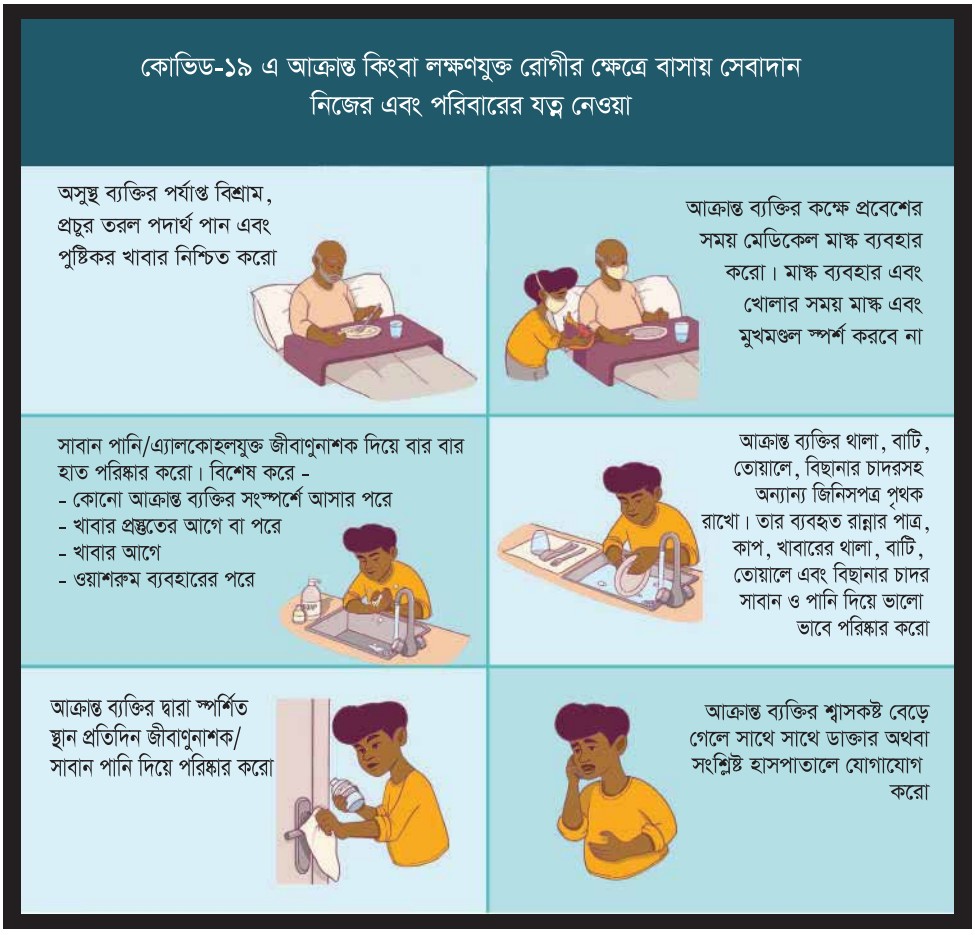
It is very easy to complete Table-3:

First write down the roll number of the person you want to comment on. Then write down the date you want to give feedback for the work. Now look or think of his works. As you can see from the 1.1 table above, there are several options 'A', 'B', 'C', 'D', and 'E' to understand the role of the pair or the group. Think about what your classmate's role was in this case, and decide which of the five options would work best for him or her.

In column 1.1 of Table 3, place your opinion along the roll number of your classmate, i.e. which one of 'A', 'B', 'C', 'D', 'E' seems to be correct. In the same way, decide on how your classmate has worked in a group or a pair according to your decision from Table 1.2 and place it along the roll number in column 1.2.It is up to you to decide whether you will show your opinion to your classmate or not. Can you do it right?

Table-3: Your opinion about the role of your classmate in different tasks

Classmate's roll number	Date	Look at Tables 1.1 and 1.2 and give your opinion accordingly ('A', 'B', 'C', 'D', Or 'E')	
		1.1	1.2



কোভিড-১৯ এ আক্রান্ত অসুস্থ ব্যক্তির করণীয়

Academic Year 2023

Class Six Science

সমৃদ্ধ বাংলাদেশ গড়ে তোলার জন্য যোগ্যতা অর্জন কর

– মাননীয় প্রধানমন্ত্রী শেখ হাসিনা

মিতব্যয়ী হওয়া ভালো

তথ্য, সেবা ও সামাজিক সমস্যা প্রতিকারের জন্য **'৩৩৩'** কলসেন্টারে ফোন করুন

নারী ও শিশু নির্যাতনের ঘটনা ঘটলে প্রতিকার ও প্রতিরোধের জন্য ন্যাশনাল হেল্পলাইন সেন্টারে **১০৯** নম্বর-এ (টোল ফ্রি, ২৪ ঘণ্টা সার্ভিস) ফোন করুন

Ministry of Education

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