

CLASS  
VIII

# Learning by Doing

Science Activity Book



CENTRAL BOARD OF SECONDARY EDUCATION

CLASS

viii

# Learning by Doing

## Science Activity Book



**CENTRAL BOARD OF SECONDARY EDUCATION**

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# Foreword

Science is being taught in school in a very mechanical way. Students are confined to their textbooks, the topics and contents included therein. They are hardly encouraged to observe, explore, look for patterns or analyse the everyday experience occurring around them. Mere rote memorization of concepts is leading children towards a stressful existence. NCF 2005 aptly says, "The fact that learning has become a source of burden and stress on children and their parents is an evidence of a deep distortion in educational aims and quality". To correct this, the NCF has proposed five guiding principles. Some of these are;

- i) connecting knowledge to life outside school
- ii) ensuring that learning shifts away from rote methods.

The present document "Learning by doing" is an effort by the Board to make Science learning more meaningful, interesting and joyful. This document is in continuity to our earlier documents for classes VI and VII brought out in preceding years. An effort has been made to include activities which are based on different content areas and concepts given in NCERT textbook in Science for class VIII. It is hoped that after performing these activities, students will be able to understand the concepts better, internalize them and will be motivated to create more such experiences. Wide variety of activities including observation, exploration, analysis, games, riddles, crossword puzzles etc. have been included to meet diverse needs of learners and help them appreciate and enjoy the learning experiences. The suggested activities have been so designed that they can be done easily without using expensive materials or equipment.

I take this opportunity to put on record my sincere and heartfelt thanks to all the members of the development and editorial team for sparing their valuable time and extending their expertise in finalization of this document. My deep appreciation and thanks are due to Smt. C. Gurumurthy, Director (Acad.), CBSE for providing guidelines and directions at different stages of preparation of this document. Dr. (Mrs.) Srijata Das, Education Officer, CBSE deserves special mention and appreciation for putting in her honest efforts in perceiving, coordinating and completing the documents in time.

It is hoped that all the schools and Science teachers would use this document in right spirit and encourage the students to perform these activities and learn by doing rather than rote memorization.

In its endeavour for continuous improvement the Board welcomes observations, comments and suggestions from the users.

Vineet Joshi  
*Chairman*

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# भारत का संविधान

## उद्देशिका

हम, भारत के लोग, भारत को एक [ सम्पूर्ण प्रभुत्व-संपन्न समाजवादी पंथनिरपेक्ष लोकतंत्रात्मक गणराज्य ] बनाने के लिए, तथा उसके समस्त नागरिकों को:

सामाजिक, आर्थिक और राजनैतिक न्याय,  
विचार, अभिव्यक्ति, विश्वास, धर्म  
और उपासना की स्वतंत्रता,  
प्रतिष्ठा और अवसर की समता

प्राप्त कराने के लिए, तथा उन सब में, व्यक्ति की गरिमा और [ राष्ट्र की एकता और अखण्डता ] सुनिश्चित करने वाली बंधुता बढ़ाने के लिए दृढ़संकल्प होकर अपनी इस संविधान सभा में आज तारीख 26 नवम्बर, 1949 ई० को एतद्वारा इस संविधान को अंगीकृत, अधिनियमित और आत्मार्पित करते हैं।

1. संविधान ( बयालीसवां संशोधन ) अधिनियम, 1976 की धारा 2 द्वारा ( 3.1.1977 ) से "प्रभुत्व-संपन्न लोकतंत्रात्मक गणराज्य" के स्थान पर प्रतिस्थापित।
2. संविधान ( बयालीसवां संशोधन ) अधिनियम, 1976 की धारा 2 द्वारा ( 3.1.1977 से ), "राष्ट्र की एकता" के स्थान पर प्रतिस्थापित।

## भाग 4 क

### मूल कर्तव्य

51 क. मूल कर्तव्य - भारत के प्रत्येक नागरिक का यह कर्तव्य होगा कि वह -

- ( क ) संविधान का पालन करे और उसके आदर्शों, संस्थाओं, राष्ट्रध्वज और राष्ट्रगान का आदर करे;
- ( ख ) स्वतंत्रता के लिए हमारे राष्ट्रीय आंदोलन को प्रेरित करने वाले उच्च आदर्शों को हृदय में संजोए रखे और उनका पालन करे;
- ( ग ) भारत की प्रभुता, एकता और अखंडता की रक्षा करे और उसे अक्षुण्ण रखे;
- ( घ ) देश की रक्षा करे और आह्वान किए जाने पर राष्ट्र की सेवा करे;
- ( ङ ) भारत के सभी लोगों में समरसता और समान भ्रातृत्व की भावना का निर्माण करे जो धर्म, भाषा और प्रदेश या वर्ग पर आधारित सभी भेदभाव से परे हों, ऐसी प्रथाओं का त्याग करे जो स्त्रियों के सम्मान के विरुद्ध हैं;
- ( च ) हमारी सामासिक संस्कृति की गौरवशाली परंपरा का महत्त्व समझे और उसका परीक्षण करे;
- ( छ ) प्राकृतिक पर्यावरण की जिसके अंतर्गत वन, झील, नदी, और वन्य जीव हैं, रक्षा करे और उसका संवर्धन करे तथा प्राणिमात्र के प्रति दयाभाव रखे;
- ( ज ) वैज्ञानिक दृष्टिकोण, मानववाद और ज्ञानार्जन तथा सुधार की भावना का विकास करे;
- ( झ ) सार्वजनिक संपत्ति को सुरक्षित रखे और हिंसा से दूर रहे;
- ( ञ ) व्यक्तिगत और सामूहिक गतिविधियों के सभी क्षेत्रों में उत्कर्ष की ओर बढ़ने का सतत प्रयास करे जिससे राष्ट्र निरंतर बढ़ते हुए प्रयत्न और उपलब्धि की नई उंचाइयों को छू ले।

# THE CONSTITUTION OF INDIA

## PREAMBLE

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC and to secure to all its citizens :

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity; and to promote among them all

FRATERNITY assuring the dignity of the individual and the <sup>2</sup> [unity and integrity of the Nation];

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949, do HEREBY TO OURSELVES THIS CONSTITUTION.

1. Subs, by the Constitution (Forty-Second Amendment) Act. 1976, sec. 2, for "Sovereign Democratic Republic (w.e.f. 3.1.1977)
2. Subs, by the Constitution (Forty-Second Amendment) Act. 1976, sec. 2, for "unity of the Nation (w.e.f. 3.1.1977)

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# THE CONSTITUTION OF INDIA

## Chapter IV A

### Fundamental Duties

#### ARTICLE 51A

Fundamental Duties - It shall be the duty of every citizen of India-

- (a) to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;
- (b) to cherish and follow the noble ideals which inspired our national struggle for freedom;
- (c) to uphold and protect the sovereignty, unity and integrity of India;
- (d) to defend the country and render national service when called upon to do so;
- (e) To promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women;
- (f) to value and preserve the rich heritage of our composite culture;
- (g) to protect and improve the natural environment including forests, lakes, rivers, wild life and to have compassion for living creatures;
- (h) to develop the scientific temper, humanism and the spirit of inquiry and reform;
- (i) to safeguard public property and to abjure violence;
- (j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement.

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# Introduction

Science is a dynamic, expanding body of knowledge. It involves observing, exploring, hypothesising, verifying, analyzing and interpreting various phenomena occurring around us. It is common knowledge that except few, hardly does any Science teacher encourages a student to go beyond the content and concepts given in the textbook. This is making the subject boring and dull.

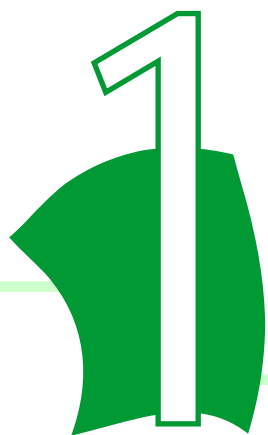
Science can be made lively and interesting by giving students hands on experiences and by encouraging them to ask questions, observe, explore, experiment and investigate. Learning should not remain confined to the classroom alone but it should be intricately woven into the experience of the daily lives of the students. This document "Learning by Doing" for class VIII is aimed at meeting some of these aspirations and expectations of the subject.

The activities included in this document are based on the content/concepts given in NCERT textbook in Science for class VIII. Effort has been made to keep the activities very simple easy to perform with minimum cost involvement. The activities are of different types involving observation, exploration, experimentation, investigation. Some of the activities are in the form of riddles, games and puzzles.

It is hoped that students and teachers will use this book in the right spirit and pave the way for better teaching-learning process in Science.

Dr. Srijata Das  
Education Officer, CBSE, Delhi

# FORCE & PRESSURE



## THE STORY OF MAGDEBERG HEMISPHERE

Long Time ago there was a man called Otto von Guerick who lived in the town of Magdeberg in Germany. One day he invited everyone in the town to come and watch a spectacular event. All the people who came to watch were very impressed with what he had done. Do you want to know what happened? He took two large copper hemispheres that fitted together. He pumped out air from in between these two hemispheres. He then tied sixteen horses, eight on each side of the hemispheres. But what was so spectacular about this? However hard they were made to pull, the horses were unable to pull the hemisphere apart! But as soon as Mr. Guerick allowed air into the sphere again, the hemispheres separated. Isn't that wonderful?

Many of you must be wishing that if only you had horses, rope and copper hemispheres to try it out again. Well! You don't need all these. You can repeat the Magdeberg experiment with very simple things too!

**You will need:** Two tins of the same size, filter paper, scissors, water, strips of paper and matchbox.

### What to do:

- Take two tins of the same size.
- Estimate the diameter of the mouth of the tin.
- Cut out a circle from the filter paper that has a diameter slightly larger than the diameter of the mouth of the tins.
- Draw a circle of radius about 2cm less than the radius of the circle cut out earlier.
- Cut along the inner circle so as to make a hole. (fig.1)
- Wet this filter paper circle by just dipping it in water. Now place it on top of one of the tins. (fig.2)
- Burn a few strips of paper and drop them in the same tin.
- Quickly place the second tin on the first so that the mouths of the two tins are one above the other and the circular sheet of paper is in between the two tins. (fig.3)
- Now pick up the upper tin. What do you find? Does the lower tin also follow the upper one? Do they seem glued together?

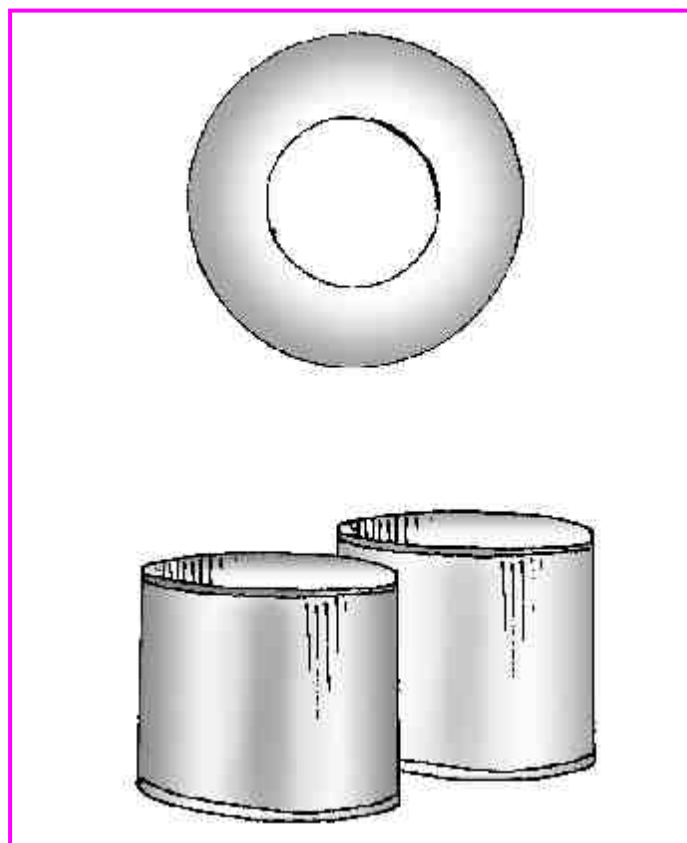


Fig. 1

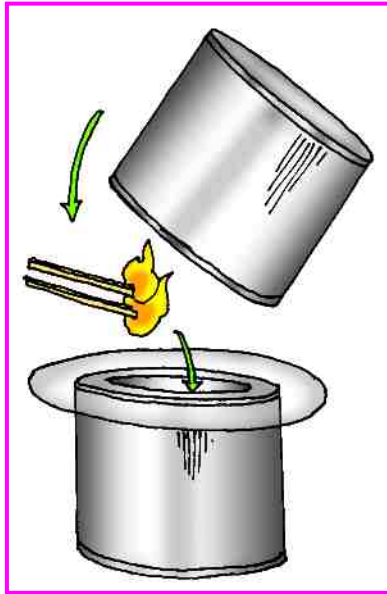


Fig. 2

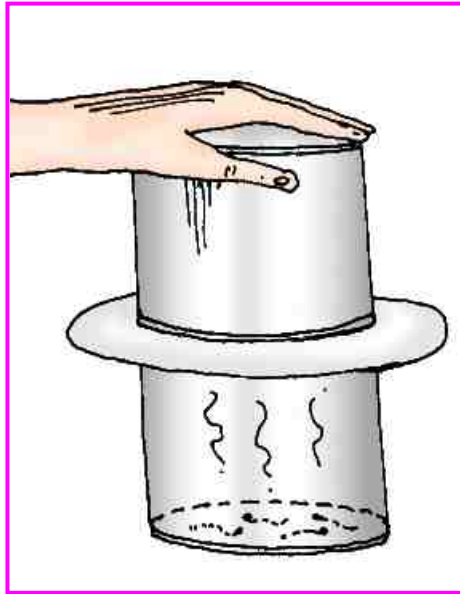


Fig. 3

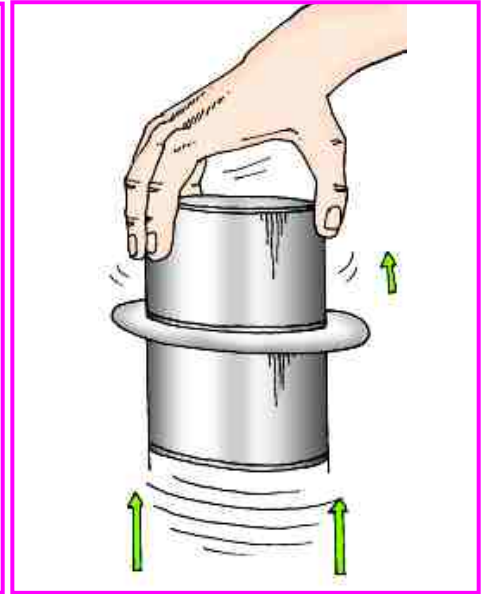


Fig. 4

### I have learnt:

The burning paper heats the air inside the tin. When air is heated, it expands and some of it escapes out of the tin. When the flame goes out, the air inside the tin cools and contracts, which takes up less space. This creates a low pressure inside the tin than outside. The greater pressure outside the tin keeps them glued.

### Something more for you to think about:

You have learnt that air exerts pressure. Then why is it that we don't feel the pressure of air around us on our bodies?

LIGHT



## MAKE YOUR LITTLE MOVIE

**Nayana:** Ha! Ha! Ha!

Nayana was reading a newspaper article and laughing loud.

**Palak (Nayana's sister) :** What is the joke? Share it with me too.

**Nayana:**

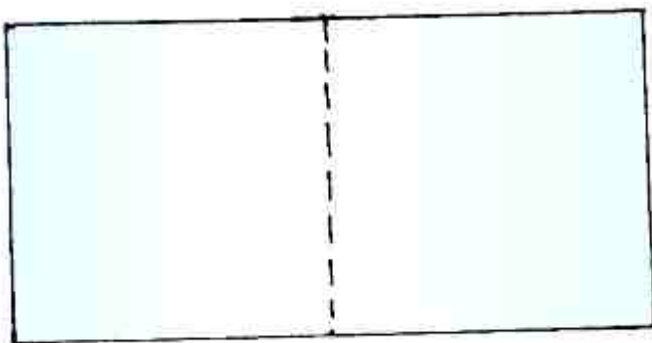
According to this article, in the 1890s when movies were new, people sometimes ran screaming from theatres when pictures of moving vehicles or ocean waves seemd to come at them on the screen.

**Palak:**

These looked like the real thing to them and they did not understand what was happening. Today, we know a movie isn't real. Its just a series of pictures that are made to move fast. Each picture on a movie or cartoon filmstrip is slightly different from the one before and after it. When the film is projected, all those images go by so fast you never get a chance to see each one separately before the next one comes along. Instead your eyes and brain "hang on" to each image for a moment, making all the pictures merge together in what looks like continous motion. This effect is called 'persistence of vision'.

Come let's make our own mini movie.

**You will need:** A piece of paper 20cm by 8cm.



**What to do:**

- Fold the paper in half so that it looks like a four page booklet.
- Insert a carbon paper in this booklet.
- Now draw eyes without eyeballs and smiling mouth on the top sheet as shown.



- Remove the carbon paper
- Draw the eye balls looking to the right on the top sheet and the eye balls looking to the left in the lower sheet as shown in the picture.



- Roll the top sheet tightly around a pencil.
- Move the pencil up and down quickly so that the top sheet rolls up and unrolls quickly on its own.
- Think of more such actions that can be shown in two simple pictures and share these mini movies with your friends.



Let us try something more challenging.

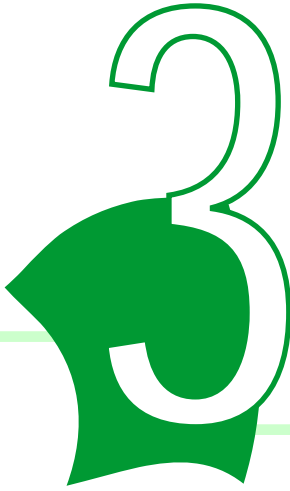
#### Make your flip book

**You will need:** a small notebook, a sketch pen.

**What to do:** First of all you must decide on a sequence of pictures, for example, a bouncing ball, a running horse or a moving clock.

The book consists of a series of sequential pictures put on a separate sheet of paper, one after the other. When the book is flipped through, the pictures provide the illusion of a moving picture.

LIGHT



## MAKE A PERISCOPE

James is very excited today. He is at the dockyard where his father works. His father had promised him to show the ships and submarine, if James stood first in class for his final exam. James did not know of the surprise that was waiting for him. His father had taken special permission to allow both of them to see the interiors of a submarine. James could not help but shriek in excitement when his father took him underwater inside a submarine.

'I don't feel as if I am under the water surface, said James.

'Come, have a look at this, said father pointing to an instrument.

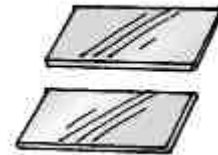
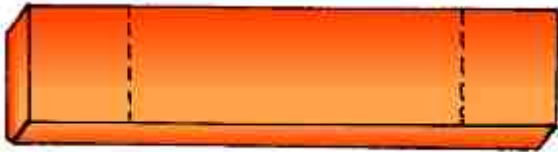
James looked through it and was delighted to see the objects above water. He could not believe his eyes. He could see the land around. He could see people walking around in the dockyard. I know this is a periscope, said James, who had read about it in books.

Seeing James so excited, father promised him that he will help make a periscope of his own.

When they got back home, both James and his father got down to making a periscope

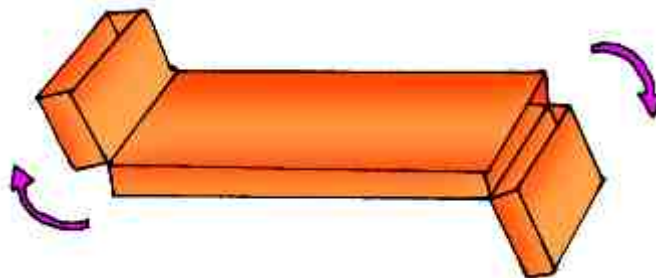
So, roll up your sleeves, and get going!! Make your own periscope.

**You will need:** Cardboard pencil box, or any other similar box, two rectangular mirrors, cello tape, paper cutter, scissors.



### What to do:

- Mark 2.5cm from each end of the box. Cut three sides only (one big and two small) at these ends. Bend the cuts at right angles as shown.
- Attach the mirrors using cello tape where the box has been bent.

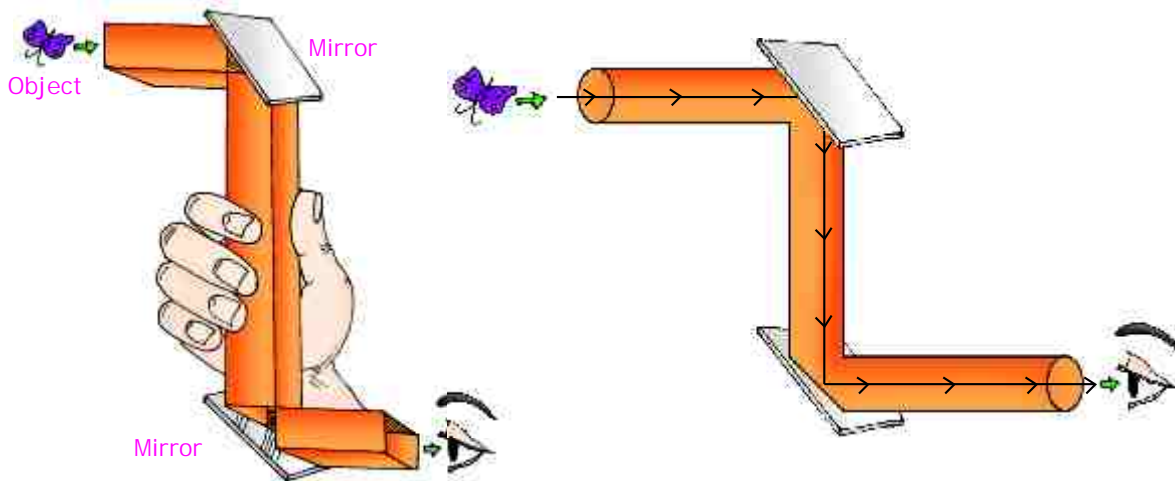


- This should be done in such a manner that the mirror surfaces are facing the box at right angles. \*



Ensure that both the bent parts of the pencil box are at right angles. You may attach a piece of cellotape for this.

- Now hold the periscope vertical and peep through the lower rectangular window. Are you able to see objects located at a higher level? How is that possible?



A periscope like the one you have made uses two mirrors. Look at the diagram of a periscope shown here. The mirrors are placed so that one mirror reflects the light from the object onto a second mirror. The second mirror then reflects the light beam to your eyes.





Ray diagram of a periscope.

A periscope is commonly used in submarines. The captain of the submarine uses it to see what happens above water and to detect enemies.

So now what are you waiting for? Get ready to peak around corners, over the fence and over tabletops and surprise your friends. HAVE FUN!

## SOUND



SUNO! SUNO!

"Suno! Suno! Can you all hear me?", shouted Nilu. 'If you shout like this the whole world can hear you', said Didi. 'I just wanted to feel my vocal chords vibrating. Our teacher told us that the vibration of vocal cords in our throat allows us to make sound. You are able to hear me because these vibrations from my mouth are then passed to you through air. I wish I could see these vibrations.' said Nilu, a little disappointed.

'Sometimes you cannot see them, but you can see their effect through these activities', said Didi.

### Feel the vibrations

**You will need:** a balloon and a friend



### What to do:

1. Blow up the balloon.
2. Hold it against your ear.
3. Ask your friend to press his/her lips against the balloon and speak.

You can hear the vibrations through the balloon and can feel them. One can feel his/her own voice through his/her lips as the balloon's skin vibrates creating sound waves.

### See the effect of vibrations

#### You will need:

a colourless polythene packet, a wide mouth tin can, a rubber band or string, a few grains of puffed rice, a metal tray or a steel vessel, a wooden stick or ruler.

#### What to do:

1. Cut the polythene packet and stretch it over the open mouth of the can.
2. Use the rubber band to hold the polythene in place.
3. Place few puffed rice on the polythene.
4. Hold the metal tray or the steel vessel near the can.
5. Tap it hard with a wooden stick or ruler. What happens to the rice grains?

The metal tray vibrates when it is hit with the ruler. These vibrations make the air around it vibrate too. The vibrations pass through air and make the stretched polythene start vibrating as well. This makes the puffed rice move.

#### I Have Learnt

Sound is created when an object moves and the air around it vibrates creating sound waves.

#### DO YOU KNOW?

When you cup your ears with your palm, you hear a dull roaring sound. That's the echo of the blood moving in your ear.



# SOUND



## LET'S MAKE MUSIC

"Well, that's the end of the lesson on sound. I hope everyone has understood the chapter, said Mr. Tarang, the science teacher. I have a wonderful idea to test how well you have understood the lesson, continued Mr. Tarang. Now that you have learnt the properties of sound, create your own musical instrument. Work carefully and try till your instrument can actually make music and not noise. Bring together your musical instruments and let's have a school band.

"WOW! What a wonderful idea", shouted the class excitedly in chorus. And they all got into their own groups to discuss their instruments.

I am sure you don't want to be left behind, do you? Then join everyone else. Here are some ideas for you.

### Instrument 1:

1. You will need: a paper cup, scissors, string

### What to do:

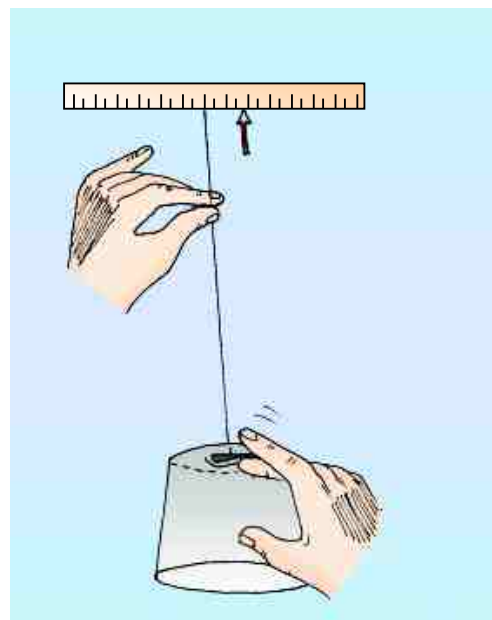
1. Tie a large knot at one end of a string about 35cm long.
2. Make a tiny hole in the middle of the bottom of a paper cup.
3. Run the unknotted end of the string through the inside of the cup and poke it through the hole. The knot should prevent the string from going completely through the hole.
4. Hang it from a hook.
5. Keep the string in stretched state by pulling the cup downward.
6. Rub your thumbnail down the string, while pulling the string tightly.

You will hear a roaring sound.

Vibrations in the string make the cup vibrate. The vibrating cup moves the air inside it and makes a louder sound. The same thing happens with a violin. The vibrating strings make the wooden body vibrate and the inside air, thus making a louder sound. Like a guitar, a violin makes sounds with vibrating strings. Sometimes a violin player will pluck the violin strings but mostly they'll make sound by rubbing the strings with a bow.

### Instrument 2 - A bottle organ

**You will need:** Eight glass bottles of the same size, water, pencil.



**What to do:**

1. Fill the first bottle almost completely with water. The water level in the second should be a little lower than the first bottle. Continue lowering the level of the water in each successive bottle.
2. Gently blow across the top of each bottle until you can make a sound. You will need some practise, but do not be disappointed if you don't get it the first time.
3. What do you notice about the sounds produced by the bottles?



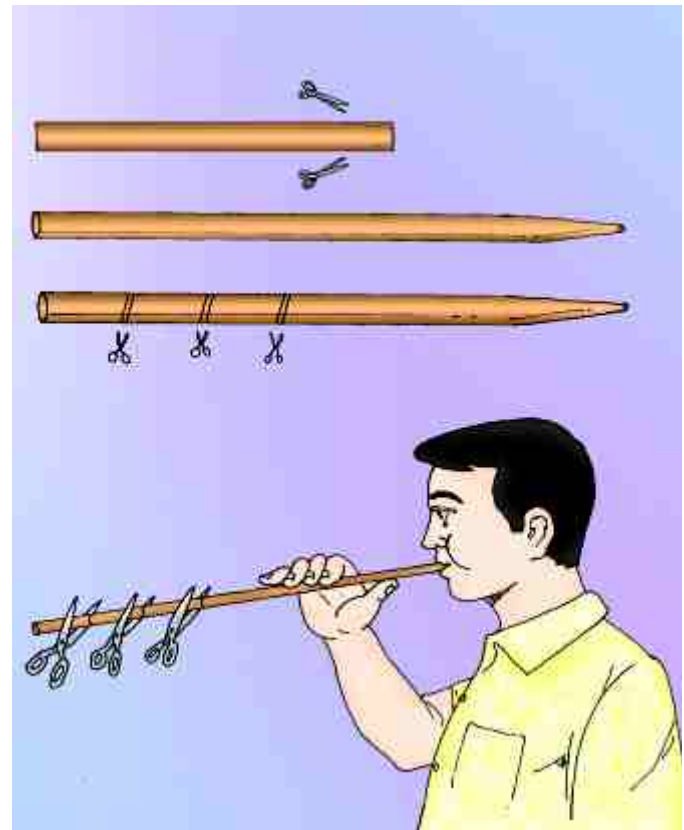
The air in the bottle vibrates when you blow across the mouth of the bottle, making sound waves. Which bottle produces sound of highest pitch or shrill sound?

**Instrument 3 - A straw flute**

**You will need:** a drinking straw, scissors

**What to do:**

1. Press one end of the straw flat.
2. Cut the sides to form a point as shown.
3. Put the pointed end of the straw in your mouth and blow hard. You may not find it easy at first but keep on trying.
4. Now cut off a small length of the straw. Blow again and see what happens?
5. Go on cutting off small lengths of the straw and blow through the cut end. What happens?

**Instrument 4 - A box Guitar**

**You will need:** empty shoe box, rubber bands of different thickness, ruler or stick.

**What to do:**

1. Make a circular hole of 4cm radius in the cover of the box.
2. Stretch the rubber bands around the box as shown in the figure.





3. Attach the ruler or stick to back of the box on one end to act as the arm of the guitar.
4. To play, pluck the rubber bands one by one. Which one produces the sound of lowest pitch? The thickest or the thinnest?

#### Instrument 5: Another string instrument

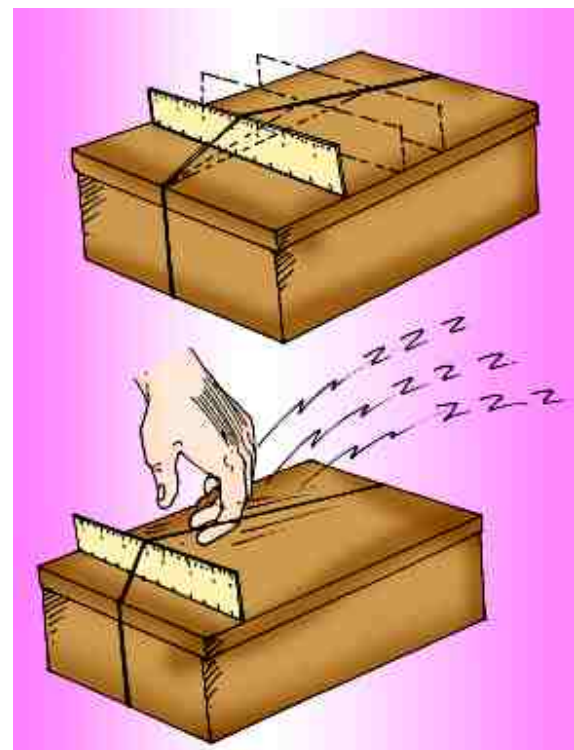
**You will need:** An old box, a rubber band and a ruler.

#### What to do:

1. Put the rubber band around the box.
2. Place a ruler vertically under the rubber band.
3. Pluck on both sides. Listen to the sound produced.
4. Repeat the process but move the ruler closer to one end of the box.

What difference do you notice in the sound produced?

Remember to decorate your musical instruments. Now, it's time to design an invitation for people to attend your concert.





### Instrument 2 - A bottle organ

**You will need:** Eight glass bottles of the same size, water, pencil.

**What to do:**

1. Fill the first bottle almost completely with water. The water level in the second should be a little lower than the first bottle. Continue lowering the level of the water in each successive bottle.
2. Gently blow across the top of each bottle until you can make a sound. You will need some practise, but do not be disappointed if you don't get it the first time.
3. What do you notice about the sounds produced by the bottles?

The air in the bottle vibrates when you blow across the mouth of the bottle, making sound waves. Which bottle produces sound of highest pitch or shrill sound?

# SOUND



## I CAN SEE MY SOUND!

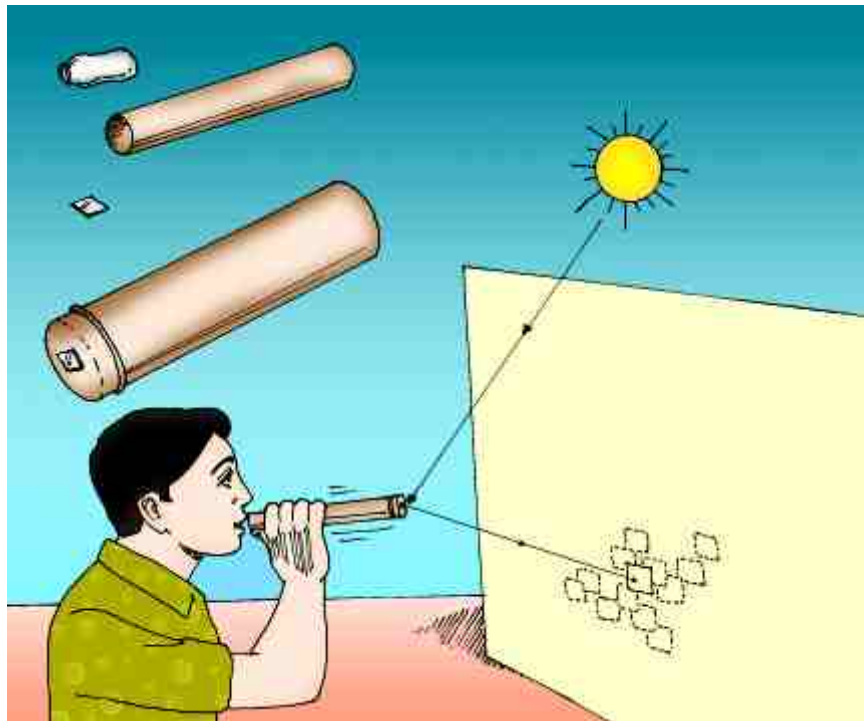
Its surprising isn't it. But, it's true. You can see your sound. Let's check out how.

### You will need:

A small tube of cardboard or plastic or a cylindrical plastic container, a balloon, some tape or rubber bands, a small square piece of aluminium foil.

### What to do:

1. Take a small tube shaped cardboard or plastic.
2. Stretch part of a balloon so that it covers one end of the tube.
3. Fix the piece of balloon to the tube with rubber bands or tape.
4. Cut a small square of aluminium foil.
5. Stick the foil onto the piece of balloon, near the edge of the tube.
6. Stand in front of a wall.
7. Allow the sun rays to fall on the foil. This will create a shining spot on the wall.
8. Speak into the other end of the tube, and watch what happens to the shining spot.





## What happens?

When you speak into the tube, your sound makes the piece of balloon vibrate. The vibrations make the foil move. The light reflected by the foil moves too.

## Something more for you to try out

Whisper into the tube. What happens? What do you think will happen when you shout or when you sing into the tube? Try it out and see the sound of your voice.

What else can you use instead of an aluminium foil in the above experiment?

# SOUND



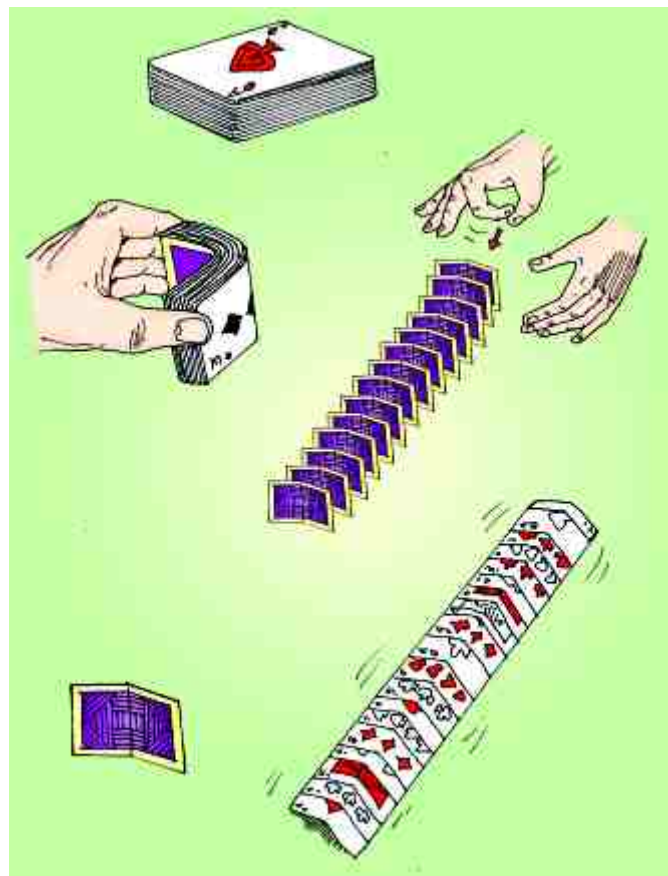
## HOW DOES SOUND TRAVEL?

'Sound is produced by vibrating bodies. When you pluck a stretched rubber band, it makes sound,' read Dhvani from her physics book. 'How does this sound reach our ears?', wondered Dhvani. Her father who was sitting nearby explained to her that the air molecules just next to the rubber band start vibrating. These in turn pass the vibrations from one part to another. The air molecules themselves do not move from the rubber band to your ears. Come let me show you how that happens.

**You will need:** a pack of old playing cards

**What to do:**

Fold the cards so that there is a crease between them. This allows them to stand upright. Stand these cards to make a long train. You can make a gentle U and S shape curves too as shown in the picture.



Flick the first card so that it falls on the next card. What do you see? Do you notice that the event of the first card tipping on the second card is repeated in sequence along the whole length of the cards? On tipping one card the impact travels until the very last card falls down. This is how a sound wave travels? The cards represent the molecules. They stay on at their positions but pass on the impact or pulse from one card to the other till the end.

Dhwani was thrilled to see this. It was such fun to see the cards falling one by one. She then recalled how once Suniyo, her friend had flattened all the cycles placed in the cycle stand in their school.

This activity raised several questions in Dhwani's mind. Will sound travel through vacuum? How differently does it travel through solids than in gases? She had learnt in an earlier class that the molecules are tightly packed in solids as compared to gases.

Since her scientist father seemed to have answers to all her questions, she went to him with all her queries. He just told her to collect a few things. Come on, you too join Dhwani.

**You will need:** two spoons or fork, string.

**What to do:**

Tie a spoon in the middle of a piece of string about 50 cm long and hold it as shown in the first diagram. Ask a friend to hit gently the spoon with another spoon or a ruler. Listen carefully to the sound. The sound lasts for a while.

Now hold the ends of the string in your ears. Look at the next picture to see how it is to be done. Ask your friend to hit the spoon again with another one. Is the sound louder or feeble than before?

How does the sound travel to your ears in the first case? What is the difference in the way sound now travels when you hold the strings to your ears.



# STARS AND THE SOLAR SYSTEM



## IS THE MOON GROWING OR SHRINKING ?

Fatima and Zubair kept running out to the verandah to check out the new moon. They were excited about the arrival of Eid. They were waiting for a new dawn, for new clothes and celebrations.

Suddenly they heard their father saying that the moon has been sighted. Zubair ran out to the verandah to have a glimpse of the moon. Fatima ran to her mother to apply henna on her hands and get ready for Eid. Zubair also went to get his new clothes ready as he would be accompanying his father to the mosque next day to offer prayers.

Do you know most Muslim festivals are linked with actual moon sightings? Fatima and her brother Zubair have been looking at the moon everynight and waiting for the new moon. Have you also ever noticed how the moon changes shape everynight?

Have you ever wondered why does this happen?

How many days does it pass between a full moon and new moon day? Be a young astronomer and study the moon. Who knows you might make a new discovery!



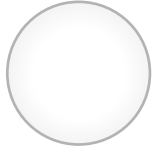
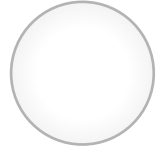
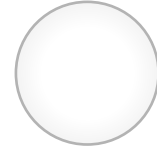
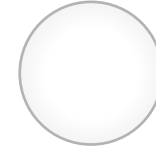
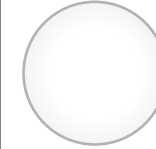
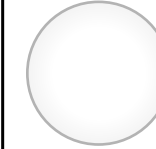
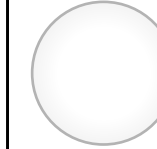
Take some time out each night and note the appearance of the moon.

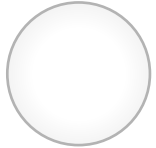
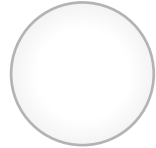
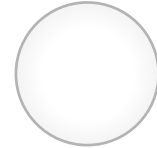
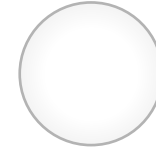
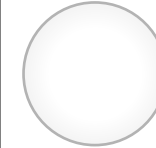
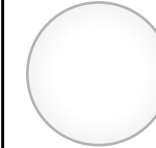
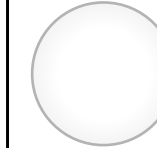
Draw the shape of the moon as you see it in the table below. Make a note of the time at which you make the observation. Also find out and note down the time of moonrise. You will find this information in your local newspaper. You may begin this observation on a new moon day.

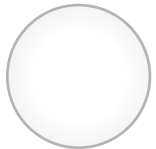
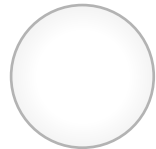
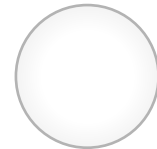
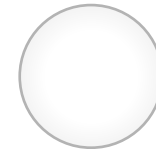
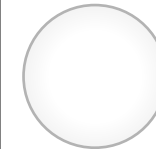
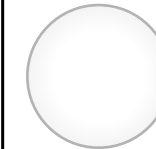
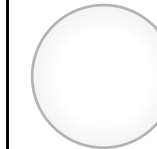
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# STARS AND THE SOLAR SYSTEM

## IS THE MOON GROWING OR SHRINKING?

						
Date: Time: Moonrise time:	Date: Time: Moonrise time:	Date: Time: Moonrise time:	Date: Time: Moonrise time:	Date: Time: Moonrise time:	Date: Time: Moonrise time:	Date: Time: Moonrise time:

						
Date: Time: Moonrise time:	Date: Time: Moonrise time:	Date: Time: Moonrise time:	Date: Time: Moonrise time:	Date: Time: Moonrise time:	Date: Time: Moonrise time:	Date: Time: Moonrise time:

						
Date: Time: Moonrise time:	Date: Time: Moonrise time:	Date: Time: Moonrise time:	Date: Time: Moonrise time:	Date: Time: Moonrise time:	Date: Time: Moonrise time:	Date: Time: Moonrise time:

You have seen that the shape of the moon keeps changing. These changes in the moon's appearance are called the phases of moon. The moon appears to change its shape because of the way Sun shines on it as the Moon circles the earth. When the Moon and the Sun are on the opposite sides of the Earth, the Sun shines directly on the moon's surface, resulting in a Full Moon. When the area of the lighted surface of the Moon is increasing, it is said to be waxing. As the lighted area decreases, it is said to be waning. Now that you finished studying the moon, find out the answer to these questions:

When did you see the Full moon and the New Moon?  
 How many days are there between the new moon and next full moon?

### Something more to find out

Find out what is a lunar calendar.

Several festivals celebrated in our country are based on the lunar calendar. They are determined by the sighting of the moon. Find out about them.

# STARS AND THE SOLAR SYSTEM



## MAKING A SOLAR SYSTEM MODEL

The eight planets of the solar system come in a wide range of sizes, with the Earth near the middle. From Earth it is difficult to understand the sizes of these planets. Do you know that it would take 1,300 Earths to make one Jupiter? Making this model of the Solar System will show you the sizes of the planets to scale. The Sun, the centre of the solar system, is not a part of this model because of its enormous size. If it is to be included here, it would need to be 4m in diameter! Get into groups as it will be fun to make it with your friends. So collect all the items you need and get started to create a solar system on Earth.

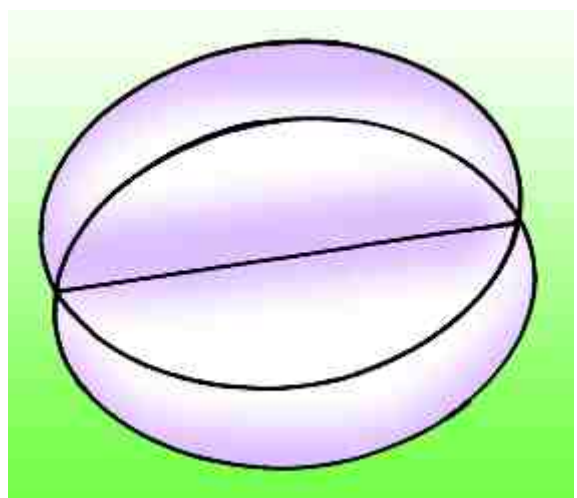
### You will need:

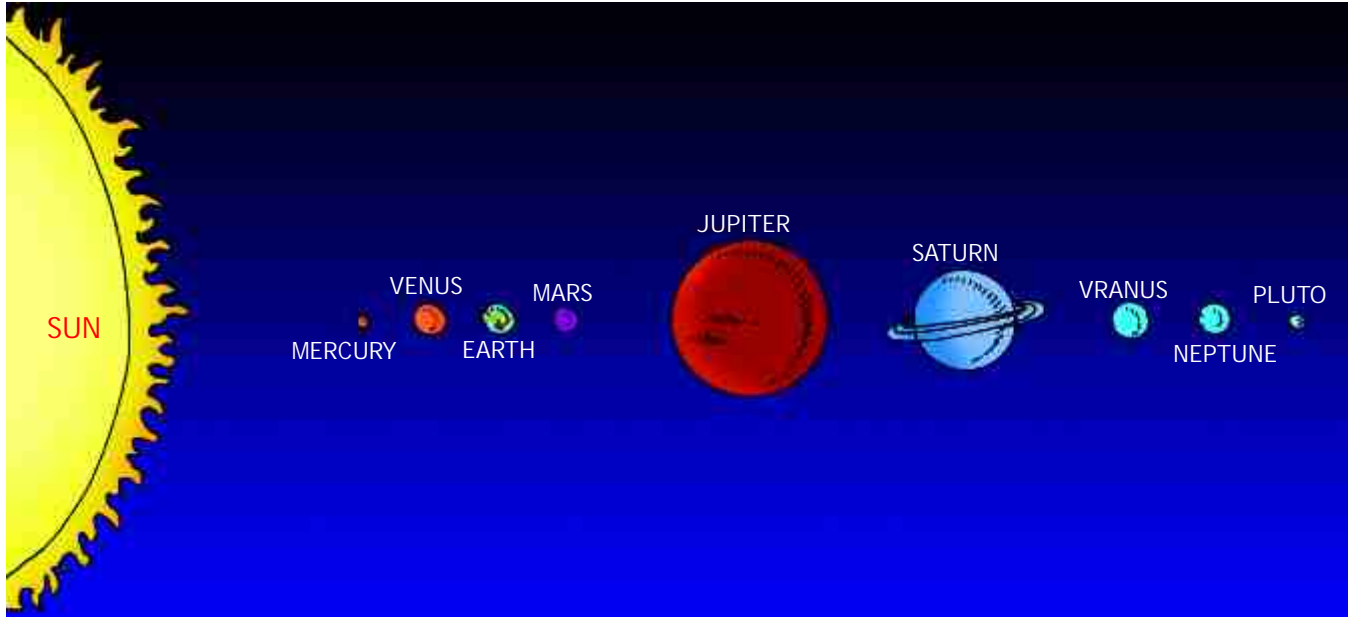
String, ruler, compass, pencil, scissors, thick chart papers(one colour each for a planet)..

### What to do:

1. Draw two circles for each planet, using a compass or a string and a pencil to make them the right size. The size that you need to take is as follows:  
Mercury-1cm; Venus-4cm; Earth- 4cm; Mars- 2cm; Jupiter- 48cm; Saturn- 38cm; Uranus- 20cm; Neptune- 20cm;
2. Cut out the circles you have drawn. You should have 16 circles in all. Make a cut from the edge to the centre point of each circle.
3. Take the two circles for each planet and slip the two circles along the slits so that they fit into each other at right angles.
4. Make a small hole at the top of each planet and tie a thread through it.
5. Tie a thick rope tightly across your classroom.
6. Tie these planets to this rope in the correct order of their distance from the Sun.

Leave enough space in between them.





Your solar system model is now ready. Isn't the difference in their sizes amazing? This model does not show to scale the actual distance of the planets from the Sun or from each other.



LIGHT

# 10

I CAN SEE IT, I CANNOT !

Have you ever seen a solid object that can be completely invisible? You see such an object everyday! Yet you pay no attention at all! Do you know what it is?

Try this interesting activity. Look through a window into a room at night while standing outside in the dark. Look for the glass on the window. You know it's there. You can feel it if you touch it. Yet you cannot see the glass at all!





Now look at a window of a dark room from the outside. You can't see a thing inside. But the glass may now be seen. Can you say how?

You all know that light is needed to see. In order to see something an object must 'bounce' or 'reflect' light to your eye. This bouncing of light is called reflection. When you stand in the dark outside the lighted room, reflection of light from the glass window is very weak as compared with the light coming straight through. So you do not see the glass at all!

Objects in the room are visible when the lights are on because they reflect light to your eye. Your eye then captures this light and you can see the objects.

If you look into the large windows of a store or office building during the day, you will see a reflection of yourself and any other people walking by. If you look into the same windows at night, however, the result will be different. At night you will see what is inside the store much better and there will be almost no reflection on the outside. But if the lights inside have been turned off and a bright light from a passing car strike you, you will be able to see your reflection once again. Depending on the time of day and how much light is present on either side of the pane of glass, glass windows can act like mirrors.

## FORCE AND PRESSURE



## EGG POPS INTO A BOTTLE

What's oval and wears a shellsuit? An EGG, of course!

For Kushal as long as it was only a riddle on eggs it was fine. He did not like eating them at all! Do you want to know what he did to the boiled egg that his mother gave him to eat?

One day, Kushal's mother gave him a boiled egg for breakfast.

"I will eat the breakfast in my room, ma", said Kushal as he carried the plate to his room.

"You must eat it and no tricks today" shouted mother from the Kitchen.

A little while later mother heard a "pop" sound from Kushal's room. She went in to find out.

"What happened, what was that sound?" enquired mother.

"Nothing, ma", said Kushal trying to hide something behind his back.

"What are you trying to hide? Show me at once", ordered mother. Mother was shocked to see the boiled egg inside a bottle. She took the bottle from Kushal and tried to take out the egg. But she couldn't. So, you have been upto your tricks again. How did you manage to do this?

Kushal meanwhile could not stop giggling. How naughty he was! He explained to his mother about how the egg went inside the bottle.

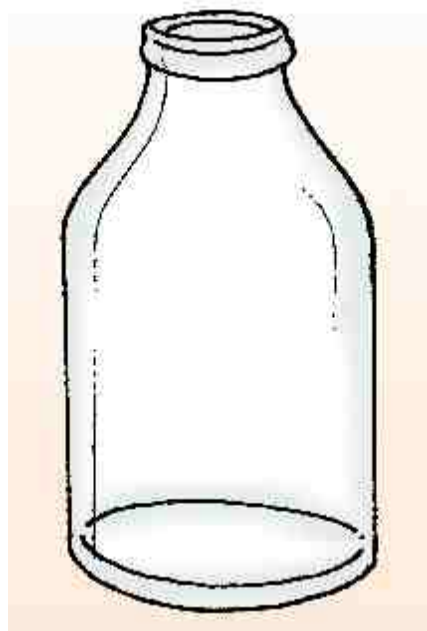
You too can try it, but be careful while using a matchstick.

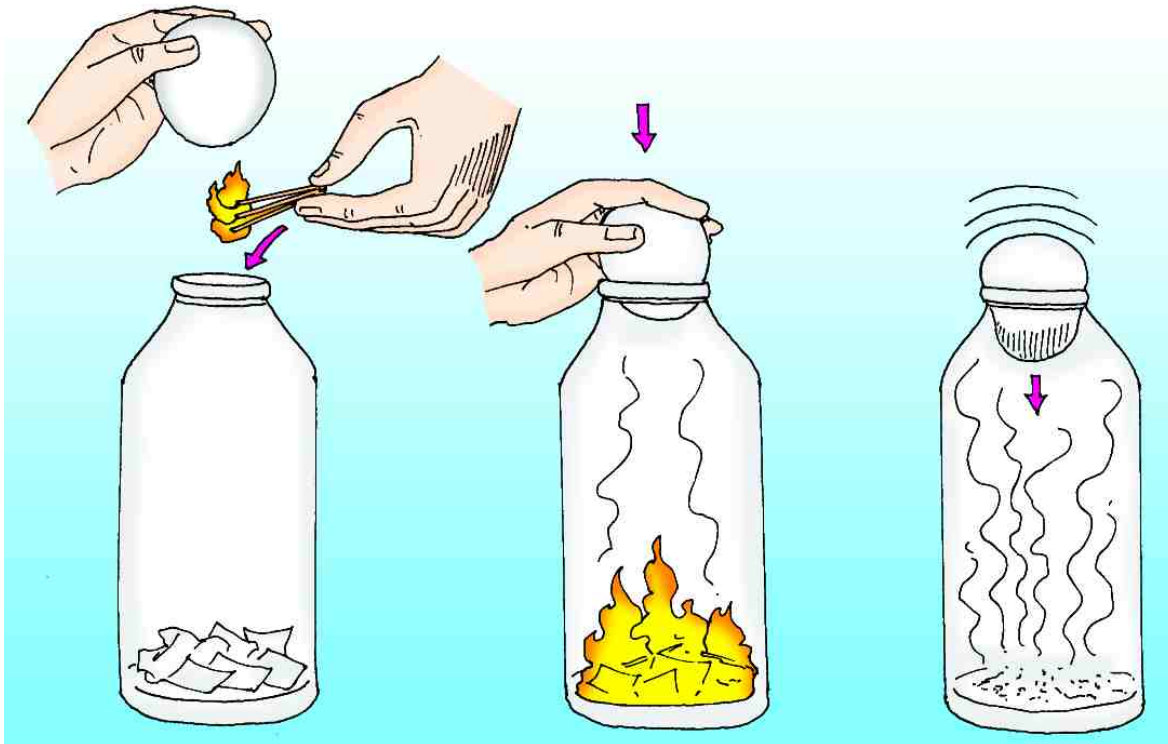
### You will need:

A boiled egg, empty milk bottle (or any glass bottle onto the mouth of which can be fitted a boiled egg), some paper strips and matchbox.

### What to do:

- Remove the shell from a hard boiled egg.
- Use a glass bottle with a mouth large enough through which an egg can be squeezed through without squashing it.
- Place the boiled egg with its small end down on the mouth of an empty bottle. Does anything happen to the egg? Does it move?
- Take the boiled egg off the bottle?
- Burn the strips of paper and drop these burning papers quickly into the bottle.
- Quickly place the boiled egg once again on the mouth of the bottle.
- What do you find now? Does the egg remain at the mouth of the bottle or is it sucked in?





### I have learnt:

The burning paper heats the air inside the bottle. When air is heated it expands and some of it escapes out of the bottle. When the flame goes out, the air inside the bottle cools and contracts, which takes up less space. This creates a low pressure inside the bottle than the outside. The greater air pressure outside the bottle forces the egg to get sucked into the bottle.

### Something more to do:

Now try to take the egg out of the bottle. How will you do that? Try it and share your findings with your friends.



# FORCE AND PRESSURE

# 12

## A FORCEFUL STORY

**Teacher:** What helps you to lift your school bag?

**Students:** Our muscular force.

**Teacher:**

(Drops a piece of chalk on the ground). And what makes this chalk fall down?  
"Gravity", shouted the students.

**Teacher:**

Good! All of you seem to have understood the different types of forces that we learnt last week. Now let us do something different and interesting. Write a story!

**What to do:**

Form groups with four students in each group. You have to create an action story where examples of different types of forces must be mentioned. Here is an example for you ---



Suraj and Iqbal spent an enjoyable day at the amusement park. They took part in a cycle race, pedalling hard (muscular force) to reach the finishing line. Iqbal was lucky and caught ten iron fish with his magnetic fishing rod (magnetic force). Meanwhile at the next stall, Suraj knocked down (impulse force) six wooden bottles with the balls he threw (muscular force). Each one won him a prize. He was less lucky at the bowling alley, where his balls slowed down (friction) too soon and could not get him any prizes. Tired but happy, they walked (muscular force) home.

Before you begin, remember that each one of you in the group has an important role to play. One of you will be the coordinator, who has to make sure that everyone in your group participates and gets to contribute to the story. Another member of your group will be the time keeper, who will keep a watch on the time and ensure that the story is written within the allotted time. One of you will be the recorder, who will write the story as it develops. Last, but not the least will be the reader, who will read out the story, loud and clear, to the rest of the class.

Remember to underline phrases in your story where examples of forces are mentioned.

Go on and let your creative ideas flow!

## SOME NATURAL PHENOMENA

# 13

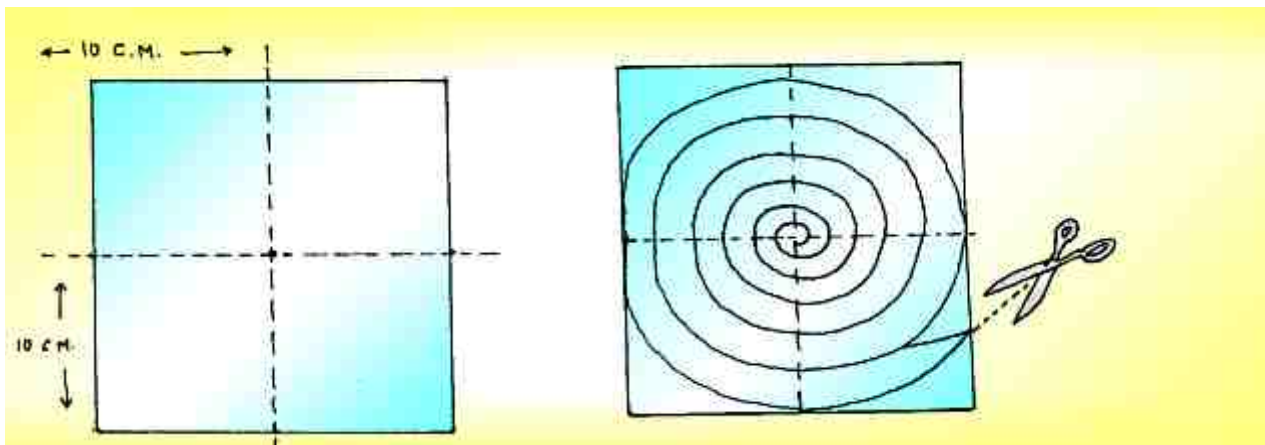
## WANT TO BE A SNAKE CHARMER?

One day while walking in a busy market, Subbu heard the music of a flute. He went closer to investigate. He saw an old man in a dhoti, playing his flute. In front of him was a large snake that looked like a cobra. It lifted its head and shook from side to side as the old man swayed before it while playing his flute (BEAN). He felt like becoming a snake charmer. But he was frightened of snakes. Moreover, he did not know how to play the flute. Can you help Subbu fulfill his dreams? Is there any way by which he can be a snake charmer for a while? Yes, there is! And that too, without a real snake and a flute. Don't you also want to try it out?

**You will need:** Some cellophane paper, scissors, plastic ruler, woolen cloth

**What to do:**

- Cut out 10cm by 10cm square out of the cellophane paper.
- Fold along the diagonal to get the centre of the square.
- Draw a spiral on the square paper starting outwards from the centre of the square as shown in the picture.
- Cut along the line from the outside to the centre. You will have a spiral resembling snake.



- Take a plastic ruler near the mouth of your spiral snake. Do you notice anything happening?
- Now rub the plastic ruler with a woolen cloth.
- Hold the plastic ruler close to the mouth (inner end) of your cellophane snake. What do you find?



It will lift up its head and rise with the plastic ruler. How high can you lift the snake? Can you lift the spiral snake with the woollen cloth also? Try it out.

**What happens:**

Both the plastic ruler and the woollen cloth gets charged on rubbing. The plastic ruler induces the opposite charge on the upper surface of the cellophane spiral. Since opposite charges attract each other, the cellophane spiral is attracted to the plastic ruler and moves with it.



# 14

## FRICTION

## THE BALL BEARING

Vidya lied down on bed to sleep. But sleep was nowhere near her. She kept staring at the ceiling fan. She wondered, "Doesn't the fan ever wear out?" Well! It never has in the last five years, since Appa fixed it on the ceiling. She went in search of her father with all these thoughts in her mind.

"Appa, I was wondering how is it that the ceiling fan has been rotating tirelessly without any wear and tear all these years", asked Vidya. Mr. Iyer, Vidya's father was very proud of his daughter and her never ending questions.

He showed Vidya the inside of an old fan. He pointed out small spherical balls in the fan and told Vidya that these are called ball bearings.

"It is these ball bearings that reduce friction in many machines and prevent them from wearing out quickly", said appa.

Vidya looked confused. "I don't understand how they work", said Vidya.

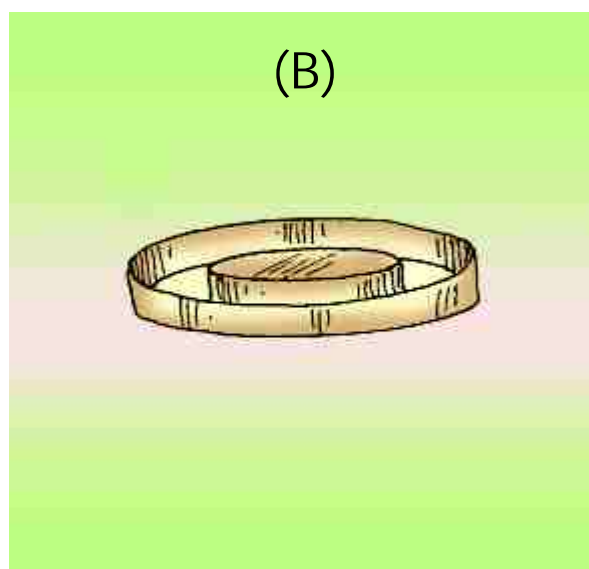
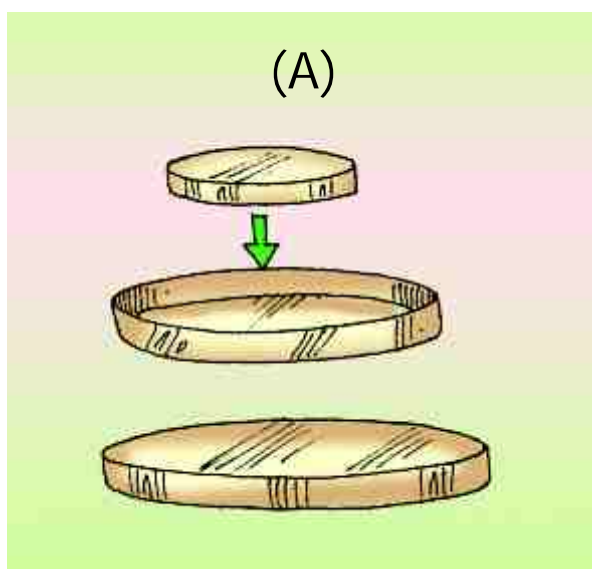
"Come, let me show you", said Appa. Why don't you also make the model with Vidya's father?

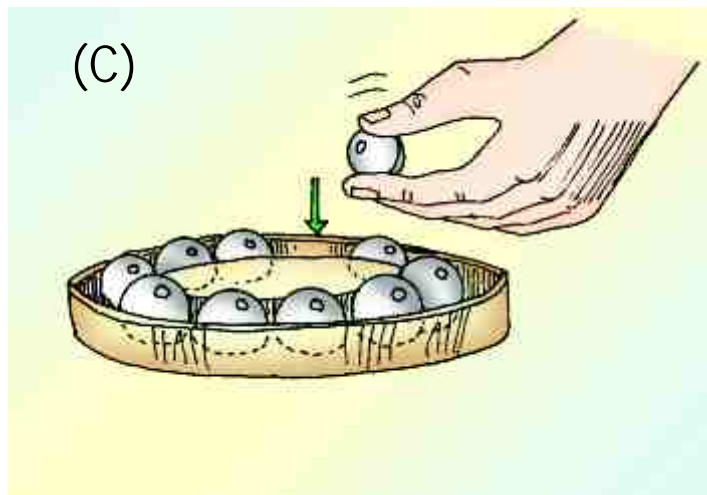
### You will need:

Glass marbles, three bottle caps (like those on jam jars) of different sizes, a book.

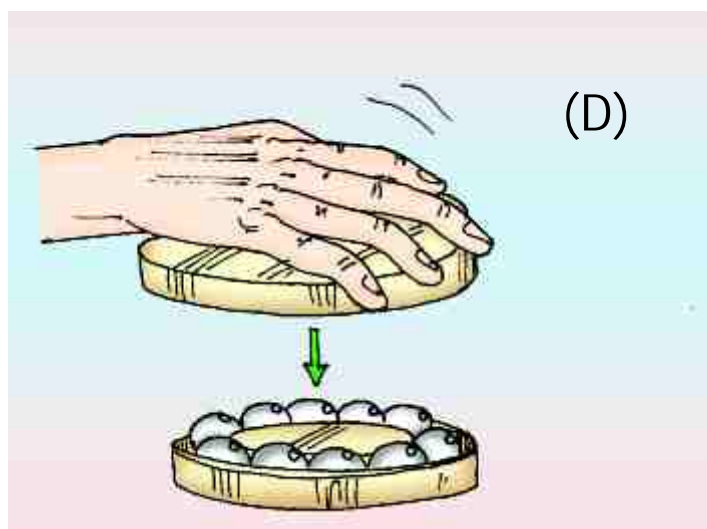
### What to do:

- Take three bottle caps of different sizes.



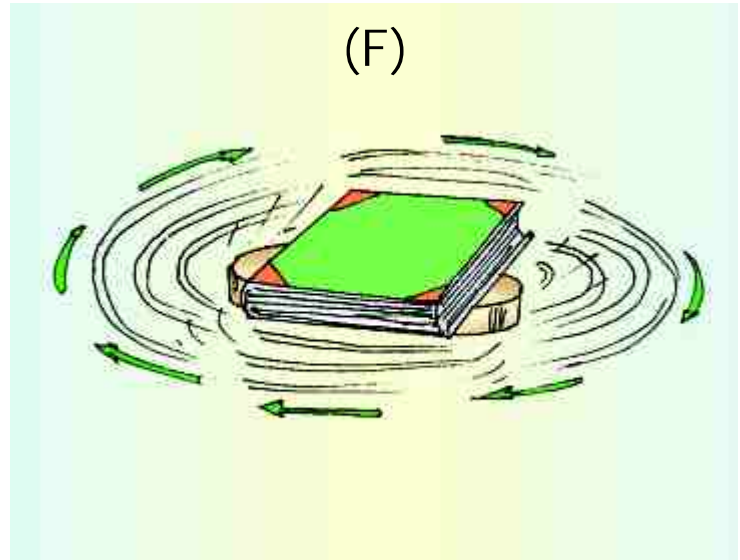
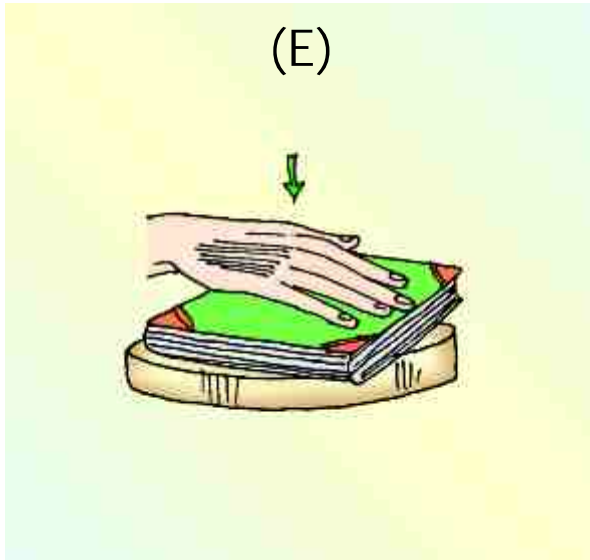


- Put the smallest cap inside the middle size cap.
- Take glass marbles of the same size and put them between the edges of the two caps. You now have a ring of marbles.



- Place the largest cap such that it rests on the marbles only and does not touch any of the other caps or the table.

You have made a model of a ball bearing. Keep a book on the largest cap and spin or rotate it. Does the book turn easily? Can you explain what happens?



Next take out the glass marbles. Keep the top cap back and place the book on it. Try to spin or rotate the book again. Does it move the same way as earlier? Why?

# 15

## FRICION

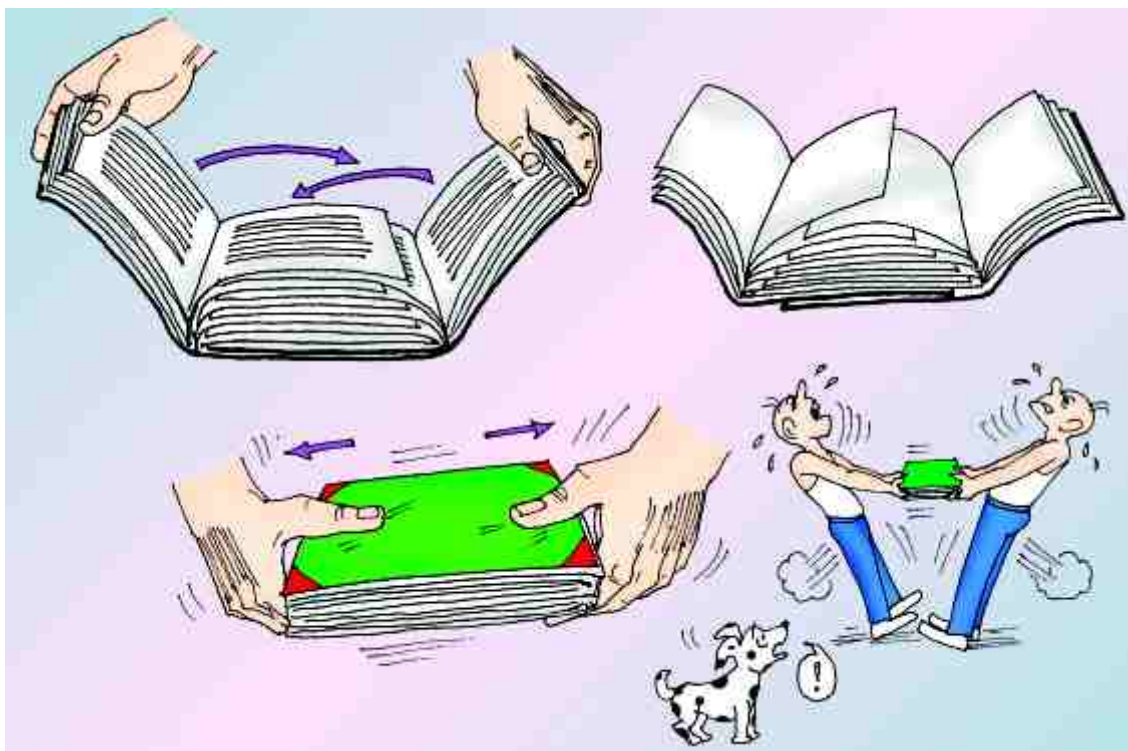
## THE TUG OF WAR

Robert was playing cricket in the park when he heard a commotion in the other end of the park. He went there to investigate. A crowd of children were gathered there. Some of them were cheering for Arun while some were cheering for Ashok. On enquiring, he was told that there was a tug of war going on. A TUG OF WAR! How is it possible? There were only two children involved and no ropes! Only books! What was happening? I am sure you too are curious by now. Let me tell you what Arun and Ashok were doing. You too collect the things needed and try it out:

**You will need:** Two similar sized books.

**What to do:**

- Interlock the two books by overlapping the pages as shown in the picture.
- Once your books are fully interlocked each person should hold the book by its cover.
- Now pull firmly to separate the books. (Remember to check around you to ensure that you won't hit anything in case you fall!)
- What do you find? Are you able to separate the books?



### I have learnt:

Friction holds the pages of the books together. The only way to separate them is to take them apart page by page. The same way you put them together. Since there large number of pages in contact, the total area of contact where friction is acting is also very large.

## SOME NATURAL PHENOMENA

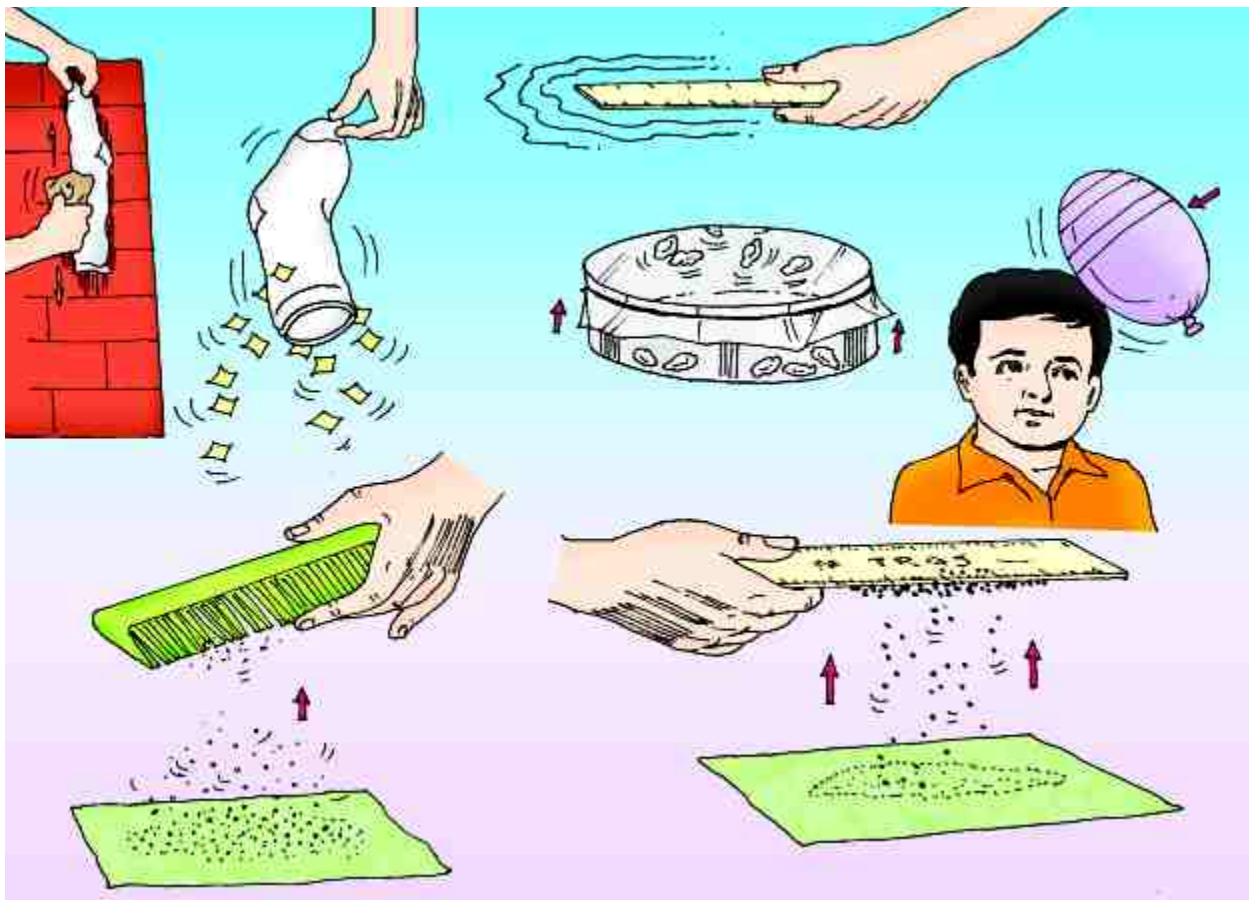
# 16

## MYSTERIOUS FORCES

There was a power cut. It was pitch dark in Soma's room. Soma was changing her woolen sweater, when she suddenly saw sparks flying from her sweater. What was that? She was too scared. Do you know that it is due to static electric charges developed on wool fibres due to rubbing with other cloth?

Let us perform some activities to discover more about these static electric charges.

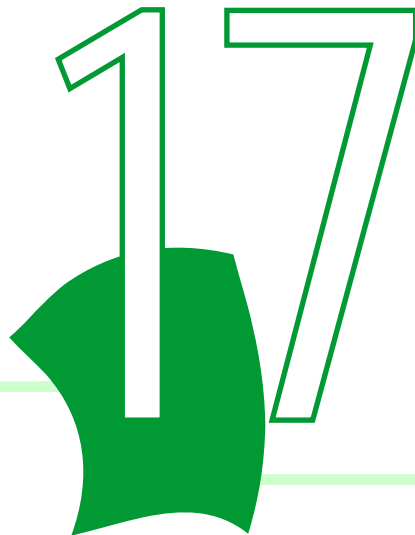
1. Can you fill up an old nylon stocking with absolutely nothing in it? Hold the toe of the stocking against the wall with one hand. With the other hand rub the stocking about 10 times with a dry, polythene bag or cellophane paper. Remove the stocking from the wall and let it hang freely. You will be amazed to see how it blows up as though filled with an invisible leg. It will also cling to the wall or to your body. On one hand, it is attracted to objects nearby, and on the other hand it seems to repel itself. Why does this happen?



2. Put small, light objects like puffed rice/rice flakes/sawdust/tiny bits of paper into a shallow transparent plastic or glass container. Cover it with rubber balloon sheet. Rub the cover with nylon, wool or fur. Some of the material will jump up and stick to the cover. Others jump up and down.
3. Charge a balloon by rubbing it with wool. Bring this charged balloon over the hair on your head. Watch your hair stand on its end!
4. Bring a charged plastic comb near some salt on a piece of paper. Watch the salt jump and hit the comb. Some of the bits of salt jump off almost immediately and cause faint sounds like the pitter-patter of raindrops. Other bits of salt stick to the comb.
5. Use these static electric charges to separate salt and pepper powder.
6. Pour some salt on a sheet of paper. Sprinkle some pepper on it. Can you separate the pepper from the salt? Bring a charged plastic ruler above the pepper and salt. The lighter pepper jump up more easily and most of the salt is left behind. Repeat this a few times and most of the pepper will be separated from salt.



## COAL AND PETROLEUM



## ITS CO<sub>2</sub> AGAIN

A discussion was going on in the classroom between Diesa, Coaly and their science teacher.

**Diesa** : Everyone these days is concerned about global warming.

**Teacher** : Yes, you are right. Global warming is due to increasing emission of carbon dioxide in the atmosphere.

**Coaly** : But how is it that the burning of all fuels, be it firewood, petrol or LPG release carbon dioxide.

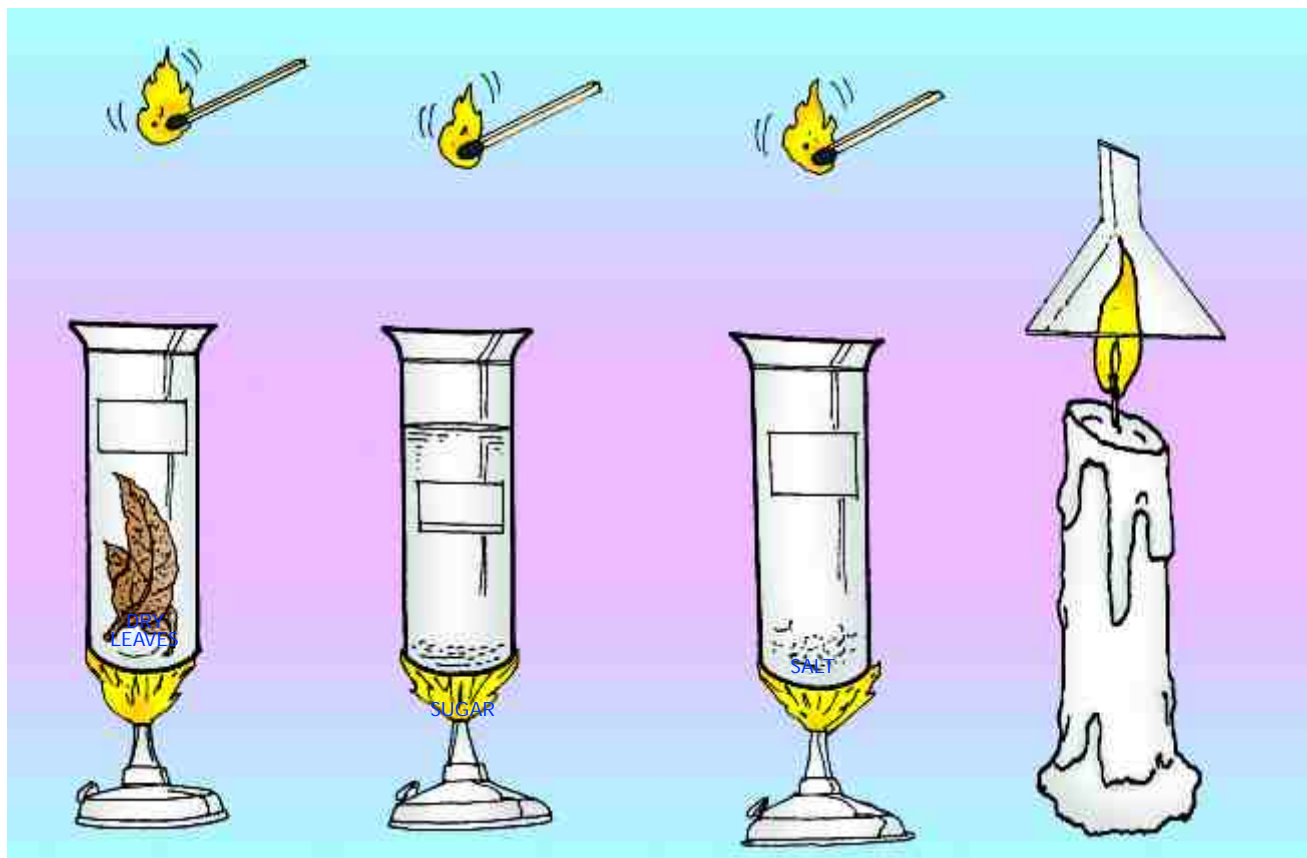
**Teacher** : Let us do an activity to find out the answer to your question.  
You too join in.

**You will need** : Dry leaves or wooden stick, 1g sugar, 1g common salt, a candle, three boiling tubes, a spirit lamp.

### What to do:

1. Label the boiling tubes A, B and C.
2. Put dry leaves in test tube A, sugar in test tube B and salt in test tube C.
3. Light the spirit lamp. Heat the three samples one after the other in each case.
4. Bring a lighted matchstick at the mouth of the test tubes one by one while heating. This is to test whether the gas evolved supports burning or not.
5. Record the observations made by you while heating the substances.
6. Light a candle. Hold an inverted funnel above it as shown. Now bring a lighted matchstick just at the tip of the funnel. What happens?

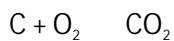




Does the matchstick extinguish in each case? What happens when you bring the lighted matchstick to the mouth of the test tube in which common salt is heated?  
 What is common in the heating of dry leaves, sugar and the lighted candle?

**I have learnt:**

Carbon is present in all organisms and their products. Candle wax also contains carbon. Carbon on burning produces carbon dioxide.



## COAL AND PETROLEUM



## THE PUZZLING LETTERS

Diesha and Coaly are on a train. They are going to tour South India. Uncle Petra has gifted them a game pack so that they do not get bored on the train. Don't you want to join them too? Come let us play.

### What to do:

Write the answers to the clues given below in the space provided.

### CLUES

- a. A gas produced by the anaerobic degradation of dead plants and animals.  \_ \_ G \_ \_
- b. An environment friendly gaseous fuel used in heavy as well as light vehicles.  \_ \_
- c. A fuel most commonly used in lighter vehicles like scooter, cars and motorcycles. \_ \_ T  \_ \_
- d. An exhaustible industrial fuel used in thermal power plants also. C \_  \_
- e. A gas produced by burning of fuels. \_ A \_ \_ \_  \_ \_  \_ \_ \_

Pick out the letters in the square and unscramble them to find the answer to the riddle given here.

I am present in all bodies, living or dead.  
I am called 'element of life', you can find me in bread.  
The burning of fuels adds my oxide in air,  
Excess release of which is not fair.

# 19

## METALS - METAL AND NON- METALS

### BRING BACK THE SHINE

Mitali's grandmother was upset about the blackening of her silverware. Mitali told her not to worry and that she knew how to bring back the shine on the silverware. You too join in to learn how it is done.

#### You will need:

A steel pan, a teaspoon each of baking soda and common salt, a silver object which has turned black, one litre water, gas stove.

#### What to do:

1. Take water in the steel pan and boil it.
2. Add baking soda and common salt in this water.
3. Put the blackened silver object in this water.
4. Allow it to stand for 30 minutes.
5. Take out the object from the pan using a pair of tongs.

Is the silverware shining now? Look at the steel pan? Do you notice any change in it?



## MATERIALS- METAL AND NON METALS



## LIGHTER OR HEAVIER?

Karan is a curious student. One day, he put some iron dust in a beaker containing dilute hydrochloric acid. He noticed fumes coming out of the beaker. He got worried and wondered what had happened? He picked up the beaker to throw away its contents. But, OUCH! It was so hot. His teacher will definitely scold him now for being careless.

Let us also perform a similar activity but differently.

### You will need:

Dilute hydrochloric acid, iron filings or zinc dust, two balloons, a narrow mouth glass bottle, baking soda, vinegar.

### What to do:

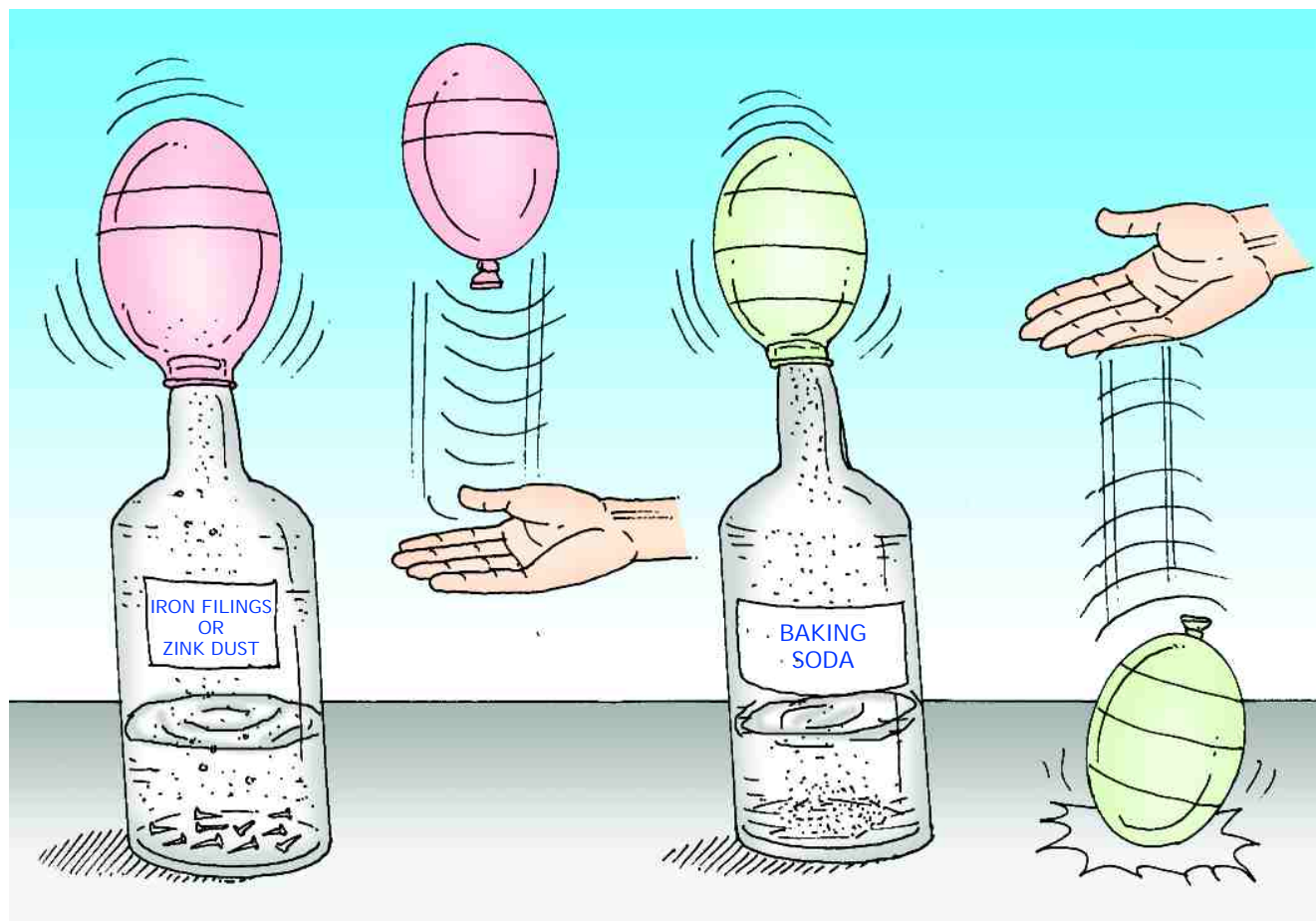
1. Take dilute hydrochloric acid in the glass bottle.
2. Put some iron filings or zinc dust in the balloon.
3. Fix the balloon on the mouth of the glass bottle so that the iron filings get dropped in the glass bottle.  
What do you notice? Does the balloon inflate?
4. Remove the balloon carefully and tie its mouth tightly without letting the gas escape.
5. Release the balloon. Does it rise and float away? What does this indicate? Is the gas trapped in the balloon lighter or heavier than air? Which gas could it be?

In the above activity you allowed metal iron to react with an acid. What happens when metal carbonates and bicarbonates react with acids? Let us find by doing an activity.

6. Take 2mL of vinegar in a glass bottle.
7. Take a pinch of baking soda in a balloon.
8. Fix this balloon on the mouth of the glass bottle so that baking soda gets dropped in the glass bottle. Do you notice bubble formation? What happens to the balloon? Remove the balloon and tie its mouth tightly without letting the gas escape.

Release the balloon. Does it rise and float away? Does it behave the same way as the first gas filled balloon in the first case? Is this gas heavier or lighter than air?

Find out from your science teacher how you can test for these gases?



## CHEMICAL EFFECTS OF CURRENT

# 21

## WHAT MAKES WATER?

Neera was reading a book on science experiments. It said that water was made up of two gases-hydrogen and oxygen. Neera got herself a glass of water and looked at it carefully. 'How is that possible?' Wondered Neera. Water is a liquid but hydrogen and oxygen are gases.

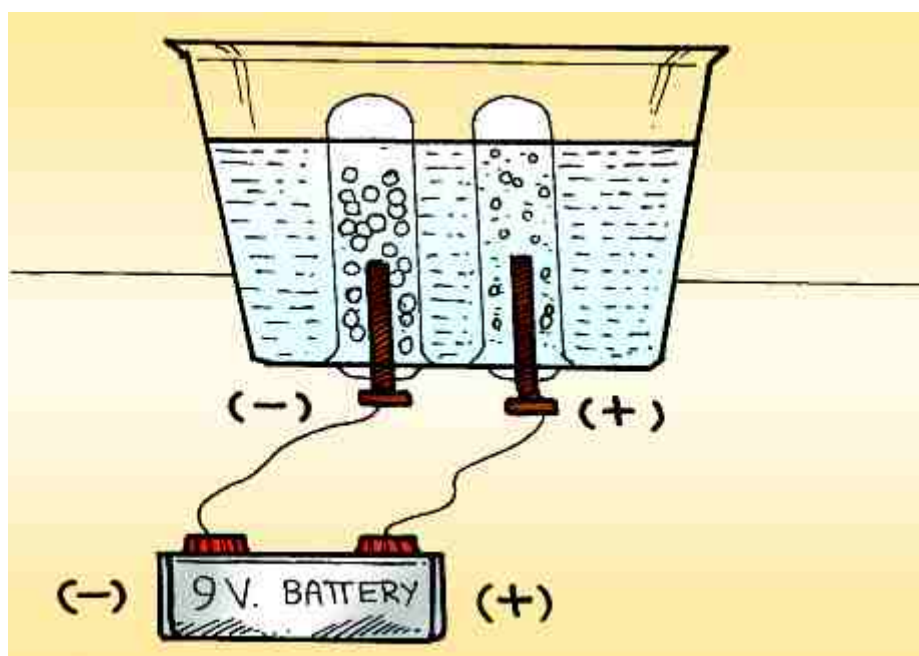
Next day she asked her science teacher about it. The science teacher asked her to collect a few things from home. The teacher told her that they will be doing an experiment to understand this better. You too join in to unravel the mystery about water.

### You will need:

Two used cells (torch cells), a 9V battery, two metre copper wire, plastic container, hammer, plaster of paris, two empty test tubes of equal size.

### What to do:

1. Remove the carbon rods from the used cells. (Ask an adult to help you with this)
2. Make holes at the bottom of the plastic container to fit the carbon rods.
3. Use plaster of paris paste (by mixing it in water) to block leakage of water where the carbon rods are fixed.
4. Fill the bowl upto 3/4th with water.
5. Connect the wire to the ends of the carbon rods below the plastic container as shown.



6. Fill two test tubes with water.
7. Carefully invert them over the carbon rods, one on each rod. This must be done in such a way that water does not escape out of the test tube and no air enters the test tube.
8. Now connect the two carbon rods to the 9V battery.
9. Watch carefully at the two rods. What do you notice?

### I have learnt

When electric current passes through water, it decomposes to hydrogen and oxygen. Hydrogen collects at negative terminal and oxygen at positive terminal. The volume of these two gases formed suggests that the water is formed by hydrogen and oxygen combined together in 2: 1 ratio.



## COMBUSTION AND FLAME



## A SURPRISING FACT

"Heating water in a paper pan!", It is not April fools' Day. How can anyone heat water in paper pan? Nina was getting agitated. Her brother was always trying to fool her. He will not succeed this time, thought Nina.

OK, if you succeed, I will give you my favourite pen that you have been eyeing for long. But if you lose, you will have to give me your new game set, challenged Nina.

Little did she know that very soon she was going to lose her favourite pen. This time her brother was right. You can heat water in a paper pan. Why don't you also try it out and watch your friends' eyes popping out with disbelief.

### You will need:

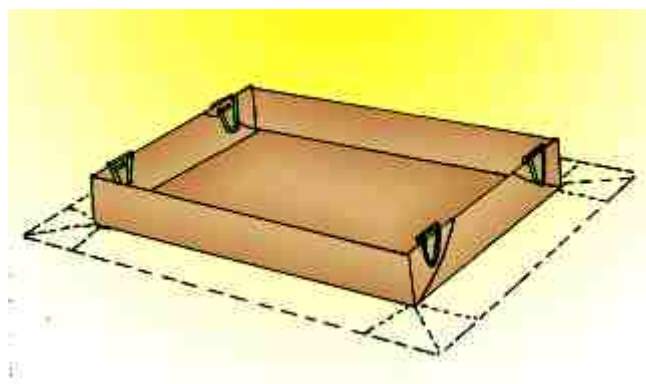
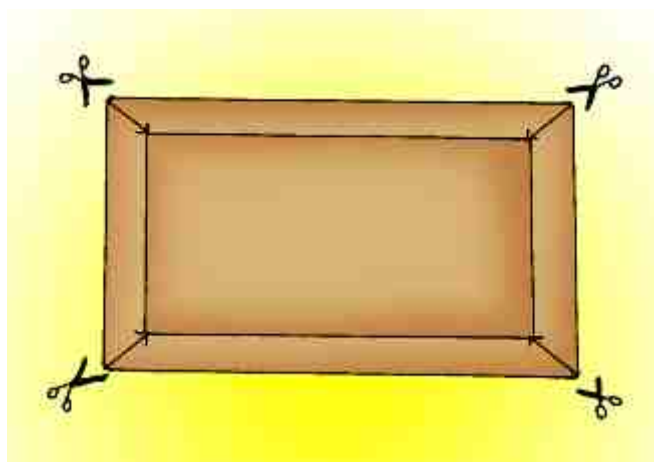
candle, matchbox, A4 size paper sheet, a plastic packet, water, cloth for cleaning in case water spills.

### What to do:

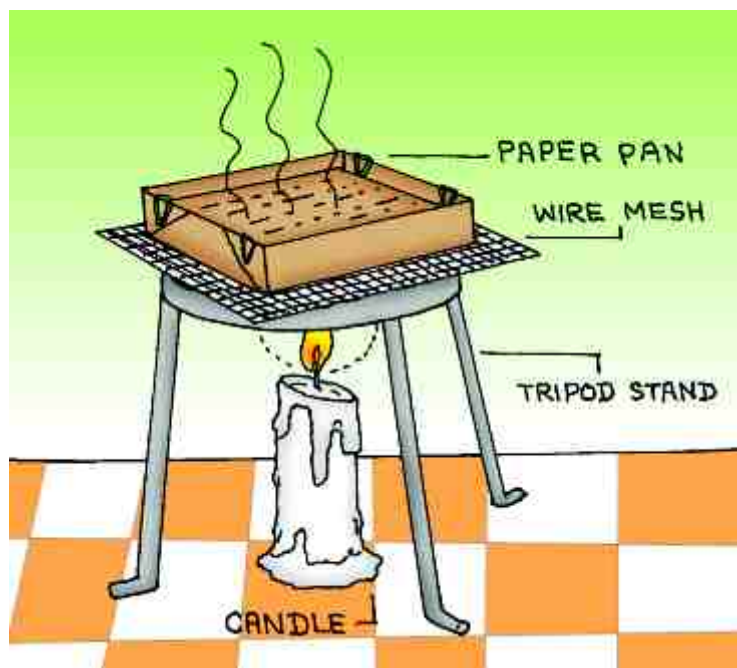
Measure one inch on all four sides of your paper. Mark with pencil. Fold the edges of the paper to form sides of an inch high. Fasten the corners with paper clips. Pour some water in the paper pan. Hold this paper pan over a candle flame.

After some time, ask one of your friends to dip finger into the water in the pan. How does it feel? Does it feel warm?

Now repeat the same experiment with a plastic packet instead of a paper pan. Does the plastic burn? Does the water get heated?







### I have learnt

Things do not burn unless they are heated to a certain temperature which is called the ignition temperature of a combustible substance. In the above activities, the water in the pan and the plastic packet absorbs heat from the candle flame and thus prevents paper and polythene to reach the ignition temperature.

## SYNTHETIC FIBRES AND PLASTICS



## INTERVIEW FOR MAKING MERIT LIST

An interview board comprising of the selectors namely Rachna and Guni was constituted to conduct interviews of different synthetic fibres and plastics and to make a merit list of the candidates based on their structure and characteristic properties.

The candidates appearing for the interview include- Rayon, Nylon, Polyester, Acrylic, Polythene, PVC, Bakelite and Melamine.

All the candidates appeared before the board in the order of their names as shown above.

The process began in the office of 'Science light'.

Rayon entered the room and greeted the board members with a smile.

**Rachna** : Rayon, Please tell the board about your background.

**Rayon** : I am made by man by the chemical treatment of wood pulp. Thus I am connected to a natural source.

**Guni** : What are your special features?

**Rayon** : I have properties similar to that of silk that is why I am also called artificial silk. I am cheaper than silk. I can be dyed in a wide variety of colours. I can be mixed with cotton to make bed sheets. I can also be mixed with wool to make carpets. Rayon leaves the room.

Nylon entered into the room with a shining appearance.

**Rachna** : Nylon! How are you made?

**Nylon** : I am also a man made fibre. I am the first fully synthetic fibre made from coal, water and air, as my source material. No natural raw material from plants and animal is used in my production.

**Guni** : What are your special features and uses?

**Nylon** : I am very strong, elastic, light, lustrous and easy to wash that is why I am very popular for making clothes. My thread is actually stronger than a steel wire by weight. I am used in making various articles such as socks, ropes, tents, parachutes, car seat belts, sleeping bags, curtains, toothbrushes etc.

Nylon leaves the room.

Some candidates with common background were interviewed together in groups:

**Group I** : Polyester and acrylic

**Rachna** : What is common to both of you?

**P and A** : Both of us synthetic fibres are produced by a number of processes using raw material of petroleum origin, called petrochemicals.

**Guni** : Describe your different properties and uses.

**Polyester** : I am used in making bottles, utensils, films, wires etc.

**Acrylic** : I am used as a substitute for wool, in making sweaters, shawls or blankets. Thus I am poor man's wool.  
Group I leaves the room.

**Group II** : Polythene and PVC entered the room very softly.

**Rachna** : What is your origin?

**P and P** : We are man made materials formed by the joining of several identical chemical units.

**Guni** : What are your characteristic properties and uses?

**P and P** : Both of us are thermoplastics and thus can be recycled, re-used, remoulded very easily by heating. We are used in the making of toys, combs, containers etc.  
Group II leaves the room.

**Group III** : Bakelite and Melamine:

**Rachna** : What is common to both of you?

**B and M** : We are thermosetting plastics because we cannot be softened by heating or remoulded.

**Guni** : What are your uses?

**Bakelite** : I am used in making of electrical switches, handles of various utensils because I am a poor conductor of heat and electricity.

**Melamine** : As I can resist fire better than other plastics, hence I am used in making floor tiles, kitchenware and fabric.

At the end the board concludes the following:

1. Rayon, nylon, polyester and acrylic are synthetic fibres and all of these have specific properties and uses in daily life.
2. Polyester and PVC are thermoplastics and these can be reused and remoulded by heating.
3. Bakelite and melamine are thermosetting material and thus these cannot be reused and remoulded.
4. All these materials are useful in daily life but efforts should be made to reuse and recycle the material, if possible.

Children in the class maybe assigned the names of these polymers. They should be asked to learn their formation and characteristics. Two students can be assigned the duty of interview board and the whole drama can be enacted in class.

## SYNTHETIC FIBRES AND PLASTICS

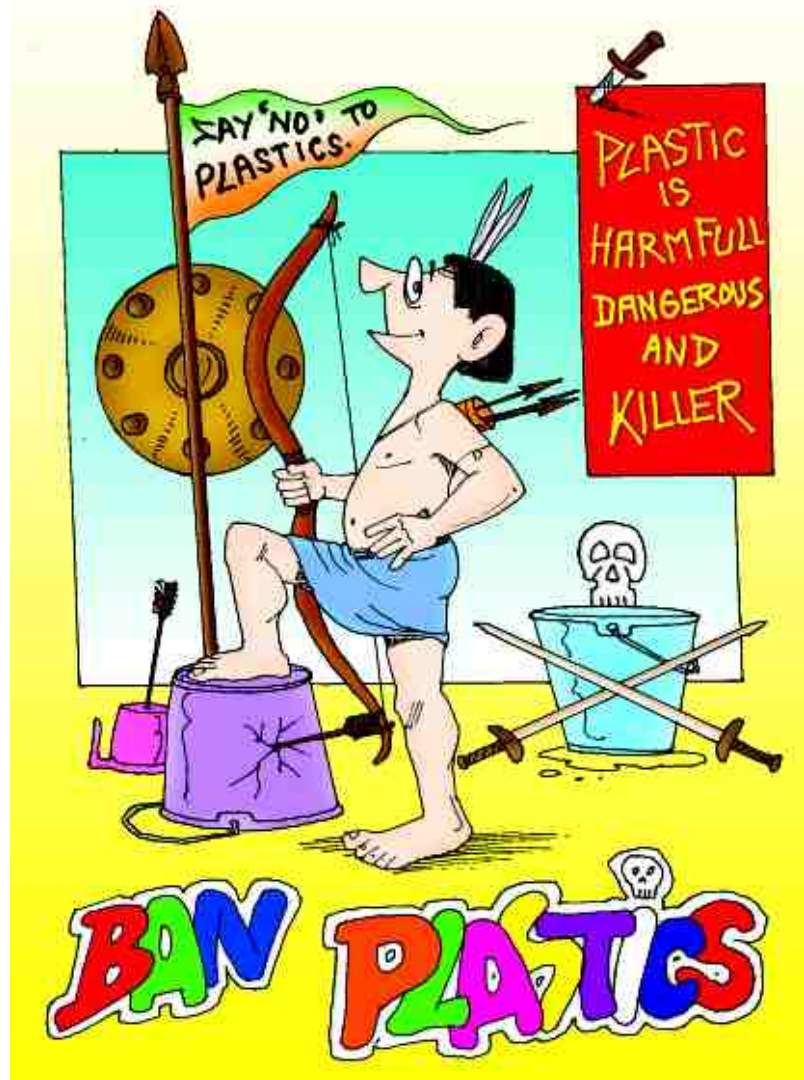
# 24

## POSTER MAKING

I am a plastic bottle filled with mango juice. I was placed here on this shelf along with many others yesterday. The shop owner had bought three crates full of bottles from the manufacturer. Children love to drink the juice in us. The other day, Nishant walked into the shop and picked me up. The shopkeeper wrapped me up in a plastic bag and sold me to Nishant. I was just about to make friends with the plastic bag when Nishant pulled me out of the plastic bag and threw it into the roadside dustbin.

It was my turn next. Nishant quickly finished the mango juice and there I landed in the next bin. The next day a huge truck came and picked me up. It dropped me at the nearest landfill. Oh! Whom do I meet here? The same old plastic bag that once carried me. Now this will be our home for the rest of our life. We do not decompose like many others. We are non-biodegradable.

When was the last time you used a bottled drink? Bottles and other items made of plastic have invaded our lives like never before. Not just that. You will find loads of plastic bags in every household. Over the last 50 years this wonder material has entered all aspects of our material life. Traditional substances like coir, cardboard, rubber, jute, clay have become things of the past. Isn't it time we break this plastic mould?



[Give up plastic bag campaign](#)

Get into groups of five. Imagine you have been asked by the government to develop a campaign to encourage people to stop using plastic bag. You have to think how you are going to convince people. Think of a slogan and design a poster for your campaign.

Here are a few points that you can consider while designing your poster:

Plastic once manufactured cannot be destroyed in any way. Because of this plastic has affected our lives in many ways. To list a few,

- Plastic waste accumulated in land fills causes a lot of soil pollution over the years since they are non-biodegradable.
- When plastic is burnt, the harmful fumes enter into the atmosphere and has direct effect upon someone who breathes it. And so, NO! we cannot eliminate plastic by burning it.
- Plastic also finds its way into drains and sewage pipes, clogging them; more often than not, this may lead to water pollution directly and/or indirectly.
- Animals sometimes, feed on plastic and die painfully as plastic chokes their digestive and respiratory tracts. This is a very serious concern in many countries worldwide.
- There have also been incidents of little children suffocating while playing with plastic bags and toys.

The 'facts' mentioned above are only a few examples of what plastic can do. It's time that we wake up and stop this menace. Since it is obvious that plastic cannot be eliminated completely, we must at least try and reduce our dependency on it. A little good deed to keep our planet clean and safe isn't too much of us asking, is it? We can take several measures to minimise the use of plastic. Let us try and practice them whenever possible.

- Avoid accepting plastic bags when you finish shopping. Instead, carry a paper or a jute bag with you when you go shopping.
- Avoid disposing of plastic along with organic wastes. Do not throw waste food in plastic bags or containers. You might just save a life.
- Avoid using plastic chairs or tables; you could use wood/metal instead.
- Plastic is made from crude oil. So lesser usage of plastic also means lesser demand for crude oil products.
- Do not dispose plastic which can be recycled. That's another means to reduce production of more plastic.
- You can use plastic bottles to store buttons, nails, coins and several such items.

Brainstorm with your friends and maybe you can come up with many more such ideas.



## CROP PRODUCTION AND MANAGEMENT

# 25

## PITCHER POWER

Last summer, Shashank visited his aunt in Jaisalmer. He was surprised to see the small kitchen garden his aunt had maintained. "Maasi, I was told Jaisalmer has very scanty rainfall. Yet, you have such a beautiful garden" exclaimed Shashank.

"You are right", said Maasi looking at the garden. "A lot of people here use very little water and conserve moisture by dry farming techniques. Infact I use a much simpler yet very effective method" added Maasi taking Shashank to the garden. Do you want to try Maasi's method of irrigation in your garden too?

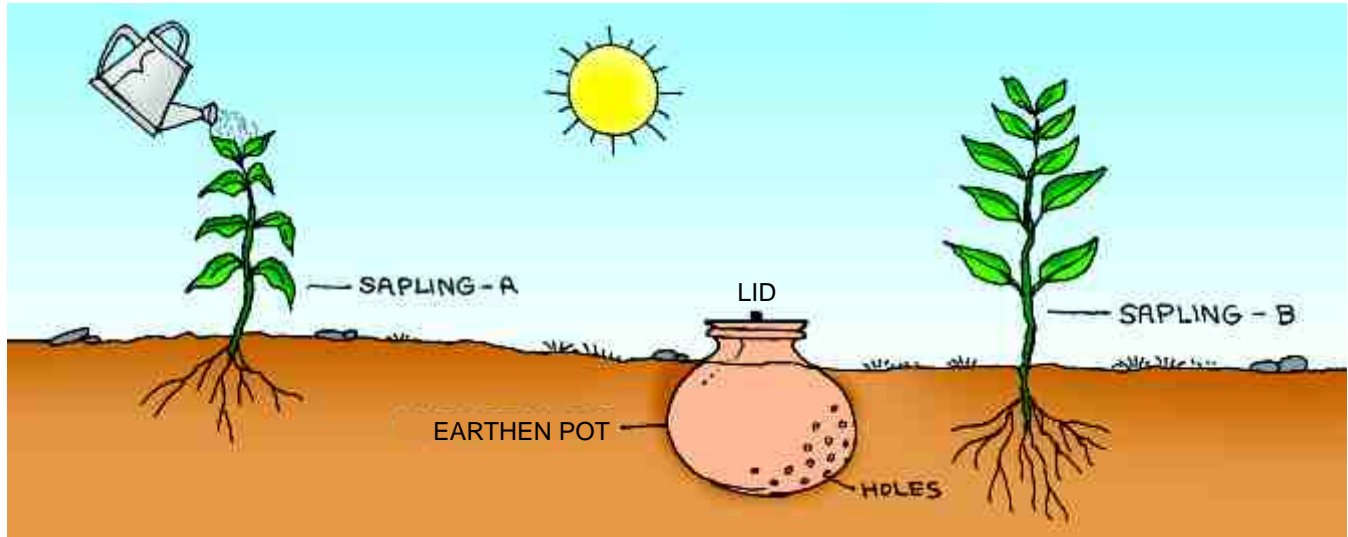
### You will need:

1. Two saplings of the same plant.
2. Earthen pot / surahi.
3. Nail / Any other pointed hard object to make holes.
4. Water
5. Khurpi
6. Measuring tape
7. Mixture of sand and loamy soil.

### What to do:

- Plant two saplings A and B at least a meter apart from each other in your garden.
- Take an earthen pot / surahi and make small holes on its base and on one side of it with a sharp nail.
- Bury the pot in such a way that its mouth remains above the pit and it is at a distance of about 30 cm from the base of sapling B.
- Fill the pot with water and cover its mouth with a lid.
- Let the sapling A be watered directly once a week while sapling B be watered only by filling the pot with water once a week.
- Do you notice any difference in the rate of growth of the two saplings? If so why?





**I Have Learnt**

When there is scanty rainfall, modern methods of irrigation if adopted, help us to conserve water. The drip irrigation method drips water directly near the root of sapling B. It is an attempt to minimise the loss of water by evaporation or seepage into the lower layers and make the water available to the roots directly.

**Note :**

- You can plant saplings in 10" pots also.
- Instead of Earthen pot, you can use Big sized plastic bottles also, making holes with sharp nails.

**Tabulate your observation in the format given below:**

S. No	Period	Sapling A (Growth if any ; increase in height)	Sapling B (Growth if any ; increase in height)
1.	At the end of week 2	cm	cm
2.	At the end of week 4	cm	cm
3.	At the end of week 6	cm	cm

## CROP PRODUCTION AND MANAGEMENT



JUST FOR FUN

Sudhir and Shamim were not able to remember facts about the lesson. They thought of devising a game which will help them in memorising and recollecting facts/informations.

With little preparation, any teacher could convert her period into an opportunity for revising, testing and reinforcing a variety of concepts from the lesson. The game of tambola is an excellent way to check not only the concepts but also test the listening skills of the students.

### You will need:

A list of around twenty words from the chapter along with their clues on a sheet of paper.

### What to do:

(Instructions for the teacher)

1. Write only the words from the list of words given below on the blackboard.
2. Ask the students to draw a 3x3 grid in their copy.
3. Write down any nine words from the list given on the blackboard.
4. Read out the clues one by one.
5. Ask the students to tick against word in their grid whenever its clue matches with it.
6. Declare the student who gets all the words in his/her grid ticked off as the winner like any tambola game. You could also acknowledge students who are the first to finish corners; first, second or third lines and/or complete the second full house. The student who gets the three words along the diagonals ticked off can also be acknowledged.

List of words	Clues
1. Crop	Cultivated plant
2. Paddy	Requires standing water
3. Fertilizer	Urea
4. Sickle	Harvesting
5. Weedicide	2 - 4,D
6. Plough	Tilling
7. Plank	Level ling

8. Hoe	Weeding
9. Winnowing	Separating grain & chaff
10. Silos	Storage
11. Combine	Threshing and harvesting
12. Animal Husbandry	Rearing of useful animals
13. Weeds	Undesirable plants
14. Rhizobium	Nitrogen fixer
15. Seed drill	Sowing

You can add on to the list and make other variations to the game if you wish.

## CROP PRODUCTION AND MANAGEMENT



## BACK TO THE EARTH

It was a bright Sunday morning. Working in the garden was the favourite pastime for the Malhotra family. It was great fun for little Snigdha to help her father clean up the leaves that were shed by the trees. Her father would then dump them into a pit and cover it.

“Now these leaves would rot and form compost after some time. We could use this compost in place of expensive fertilizers in our garden”, explained Snigdha’s father.

What causes the rotting of so many leaves? How do these dead leaves get changed into such useful compost? What happens to the millions of leaves that get shed from trees in forests? The list of questions that were bothering Snigdha seemed to be endless. Let us find out through this simple activity what exactly happens when leaves fall on the soil?

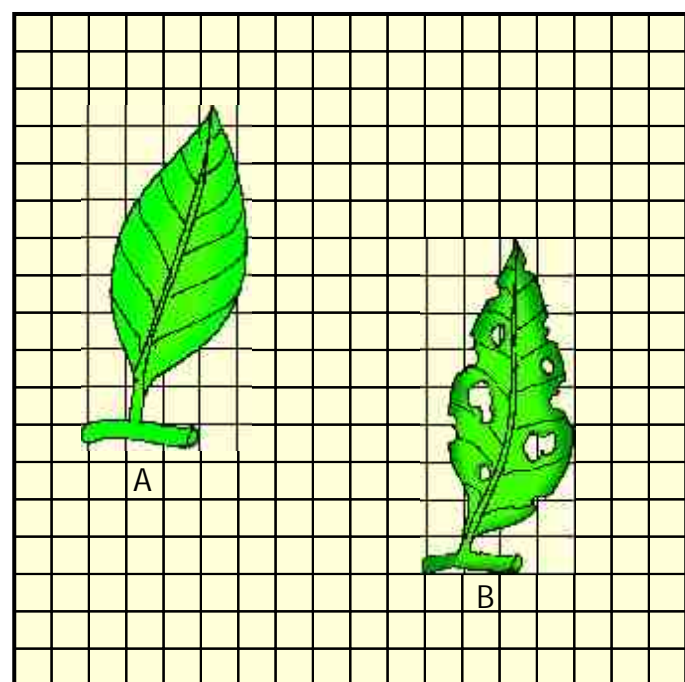
### You will need:

- a) Leaves of the same tree
- b) Graph Paper / Square grid
- c) Garden soil
- d) 2 Pots
- e) Brick Powder
- f) Magnifying glass
- g) Distilled water
- h) *Khurpi*

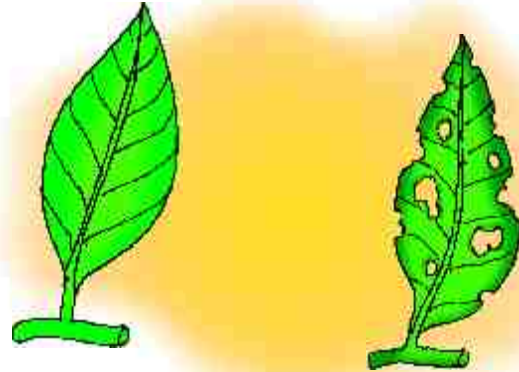
Take two leaves and attach a piece of paper to each of their petioles. Label them A and B. Draw their outlines on a graph paper. Count the total no of squares covered by the leaves to find their area.

Take two pots 1 and 2. Partly fill pot 1 with garden soil, place the leaf A flat on the surface and pour some more soil till the pot is full. Take some redbrick powder. Now partly fill pot 2 with brick powder. Place leaf B flat on this surface and pour the remaining brick powder on top of the leaf till the pot is full. Keep the contents of both the pots A and B moist by adding water boiled & cooled to room temperature.

Dig up the soil in both the pots every two weeks to see if there are any changes in the leaves.



Bury the leaves again. After two more weeks, dig up to take out both the leaves. Shake off any soil from the leaves. Dry both the leaves A and B by placing between blotting paper. Draw the outlines on graph paper, marking any holes that have appeared. Compare the area of each leaf with its original area. Replant the two leaves in their respective pots and repeat the above procedure at 2 week intervals till there is a clear difference between the two leaves.



Use a magnifying glass to look at both the leaves after regular intervals. Note your observations in a table as shown below:

Period	Leaf A	Leaf B
After 2 weeks		
After 4 weeks		
After 6 weeks		
After 8 weeks		

**I have learnt that**

When leaves fall onto the ground, they are gradually broken down into pieces by micro organisms called decomposers such as bacteria and fungi. This break down or decomposition brings the nutrients from the leaves back into the soil and makes the soil fertile. Plants use up these nutrients for growth. Heating the soil (Brick powder) in pot 2 killed these microbes in whose absence the leaf B did not show any change.



# MICRO ORGANISMS : FRIEND AND FOE



## A MOULDY PARTY

"My tummy is absolutely full !" declared Vijay putting away his plate. They had just finished having lunch at Raghav's Place.

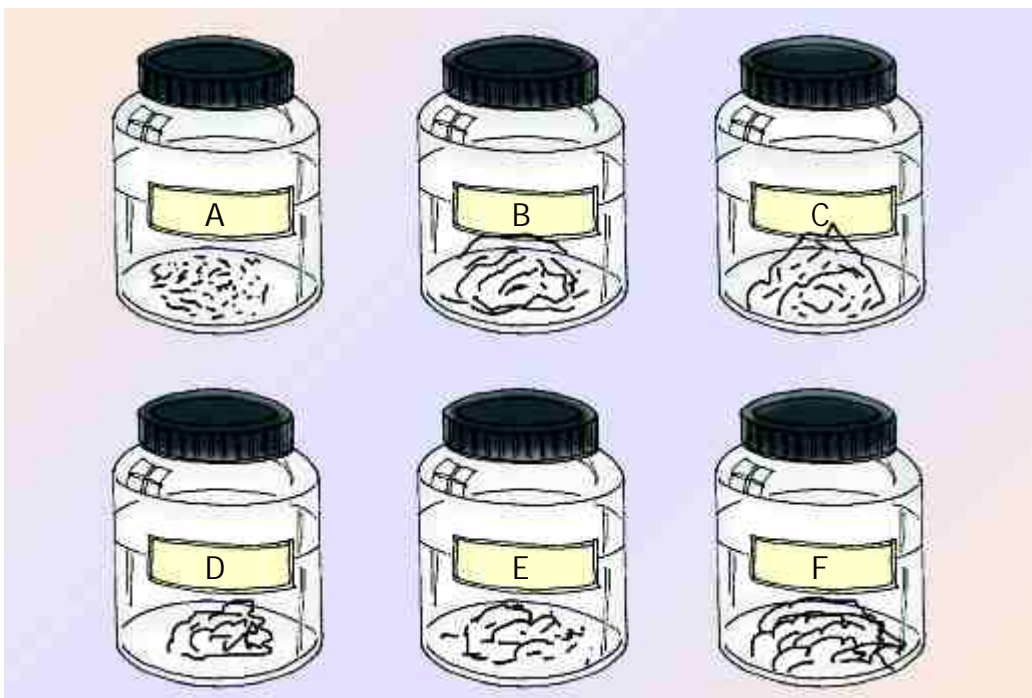
"What do we do with the left over food aunty?" asked Nupur while cleaning the dining table.

"Why don't you save them for a special party next week?" Suggested Raghav's mother with a mischievous smile.

"Another party"? thought Aditya. "It is too good to be true". He loved food. "Why not aunty. Same place. Same time. Right?" added Aditya.

A week later there was an unusual excitement in the air. All the children got together promptly at Raghav's house. "Aunty, you had promised us another party today. Didn't you?" enquired Aditya. "Yes, a special Mouldy Party, come see for yourselves" said aunty. Nupur and Vijay were eager to know how their left over food had transformed in one week.

If you have warm feelings for the fungi, you would love the mouldy party too. Do you want to know how did they set it?



### You will need :

Six empty clean glass jars, magnifying glass, food samples.

### What to do:

- Take six empty clean jam / pickle glass jars with lid.
- Label them A, B, C, D, E & F
- Put the left over food namely fruit chaat in bottle A, poha in bottle B, chips in bottle C, raitha in bottle D, bread in bottle E and biscuit / papad in bottle F and shut them tight.
- Keep the bottles in a corner for a week. (Remember to put them in a place from where nobody would throw them away, finding the contents disgusting).
- What changes do you think took place in those jars, after 3 days and a week later.

Tabulate your observations in the table given below:

Changes occurred after 3 days/one week							
S. No	Sample in of food	Smell		Colour		Cottony Growth	
		After 3 days	After one week	After 3 days	After one week	After 3 days	After one week
1.	Bottle A (Fruit Chat)						
2.	Bottle B (Cooked Poha)						
3.	Bottle C (Alu Chips)						
4.	Bottle D (Raitha)						
5.	Bottle E (Bread)						
6.	Bottle F (Biscuit or Papad)						

Based on your observations, Name the food materials in which :

1. there is change in colour
2. there is change in smell
3. fungus has been found

After 3 days	After one week

**Note:** This activity should be done during rainy season only.

### I have learnt :

1. Changes/decay 1 decay take place in some food items in the form of smell, colour and /or cottony growth.
2. These changes occur due to growth of fungus.
3. The growth of fungus takes place when nutrients, right temperature and moisture are available.
4. Remember not to consume such food items which have fungus growth on them.
5. It is important to preserve food properly to prevent growth of microorganism.

## MICRO ORGANISMS : FRIEND AND FOE



## SPORE MAGIC

Adi was very happy today. His brother had come home for his vacation. Life without him was so boring for Adi!

"Daada, Guess what has mummy prepared for lunch today"? asked Adi.

"Palak Parantha?"

"And .... and ??????" probed, Adi with a mischievous smile on his face.

"Matar Mushroom" guessed his brother.

"Absolutely right daada." remarked Adi.

"Adi, do you know ..... mushrooms actually grow from dust sized specks? They too are plants but instead of seeds, they grow from spores."

"What are spores dada?" asked Adi.

"Hmm.... let us pick some large sized mushrooms from our backyard garden". I will show you how to spot spores, May be we can get a spore print for you Adi!" said daada stroking Adi's back.

Let us join Adi and his dada create spore prints.

### You will need :

1. A large sized mushroom.
2. A square piece of cardboard covered with orange papers.
3. A glass bowl.

### What to do :

- Take a large sized mushroom (as large as possible)
- Cut off its stalk.
- Place it gently, face down on a cardboard covered with orange paper.
- Do not exert pressure on the mushroom and cover it with a glass bowl. Leave it for 3-4 days.
- Thereafter, remove the glass cover on the mushroom and lift the mushroom carefully.

### You will see :

There is an amazing pattern of rings formed by the fine sprinkling of mushroom spores.



**I have learnt that**

The fungi we best know are mushrooms. Spores of mushroom are always there in the air. When the wind blows, they settle on some damp place and start to grow into new mushroom. No wonder in rainy season it is a common sight to spot beautiful mushrooms spring up dramatically in different parts of the garden overnight.

**CAUTION :**

Remember never consume wild mushrooms as they are generally poisonous. Buy only edible mushrooms from the market for cooking.

# MICRO ORGANISMS : FRIEND AND FOE



## A FRIEND INDEED

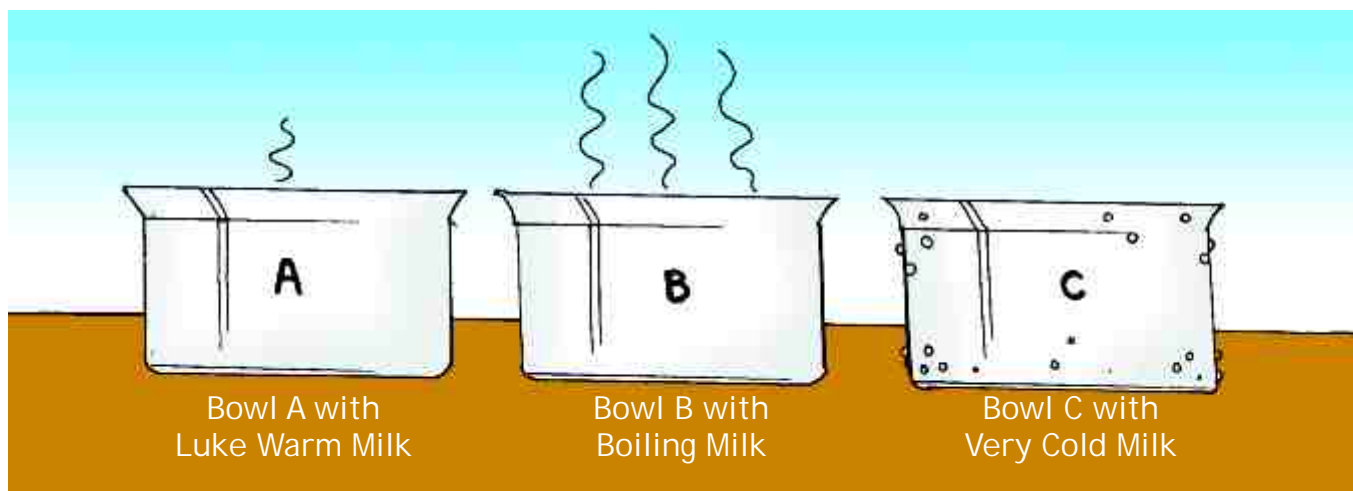
"Ma - you kept a bowl of milk in the kitchen last night - but now there is no milk". How did it turn into curd!". - exclaimed Vishnu. Ma smiled" 'Beta, I added a small amount of curd to milk last night - so it turned into curd". "But how did it happen?" - enquired Vishnu.

Vishnu's mother, a teacher of biology, explained how milk gets converted into curd by the action of friendly microbe called "Lacto bacillus bacteria". They multiply fast when a small amount of curd is added to lukewarm milk. She also explained that proper temperature (app. 30°C) has to be maintained for multiplication of the bacteria. She encouraged Vishnu to experiment it himself:

**Things required :** 3 bowls with lids, milk, curd

**What to do:**

- Take 3 bowls and mark them as A, B, C.
- Pour lukewarm milk (30°C) in Bowl A
- Pour boiling milk in Bowl B.
- Pour very cold milk in bowl C
- Mix one teaspoon of curd in all three bowls and cover them with the lids.
- Keep the bowls undisturbed and covered for at least 5 - 6 Hrs.



Record your observations after 5-6 hrs in the table given below.

1.	Bowl A	
2.	Bowl B	
3.	Bowl C	

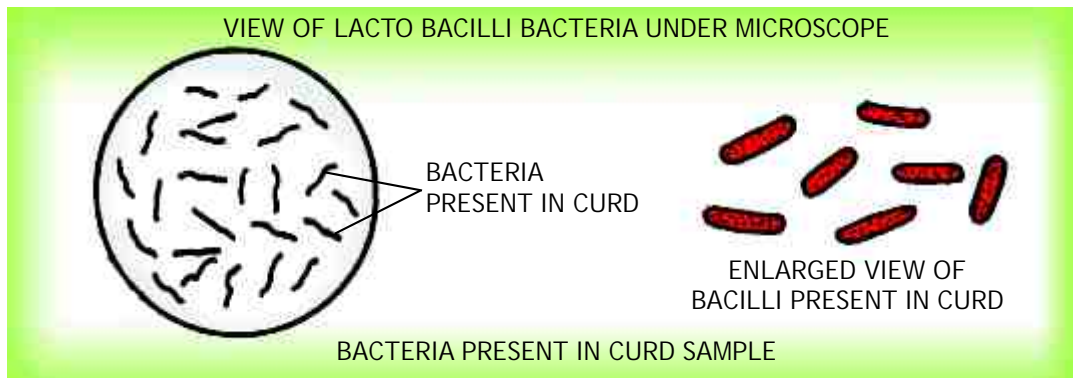
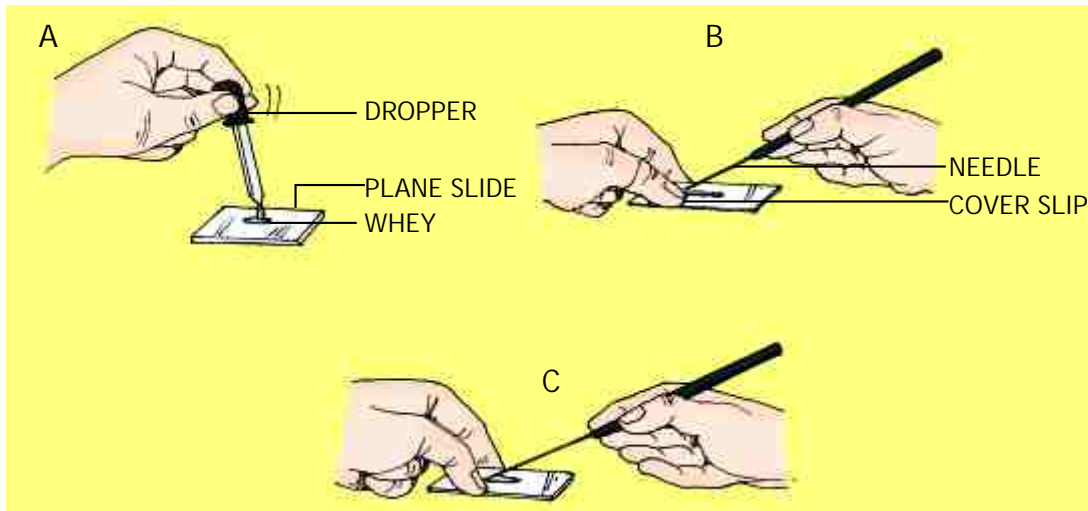
## To observe lacto bacillus bacteria under the microscope

### You will need :

Curd Sample, a compound microscope, slide, cover slip, needle, dropper, methylene blue stain, filter paper.

### What to do

- Take a drop of the 'Whey' i.e. the watery, part separated from the curd sample, on a clean glass slide.
- Add a drop of methylene blue stain and allow it to stand for 2-3 min.
- Lower a coverslip gently with the help of a needle on the material.
- Observe the slide under the low power of compound microscope.





### Observation :

Minute rod shaped blue coloured cells of lactobacilli bacteria are found under the microscope.

### What I learnt:

By adding a small quantity of curd or its whey to luke warm milk the lacto bacilli bacteria are introduced to curdle the sample of milk.

These bacteria ferment the milk sugar lactose into lactic acid and form curd.

### Variation :

You could add few drops of your favourite food essence like pineapple or strawberry and the relevant food colour to the sample of lukewarm milk before adding curd to it, to prepare flavoured curd.

## CONSERVATION OF PLANTS & ANIMALS

# 31

## A TREE STUDY

Last summer, Ankur visited his grand parents in a small village near Dehradun. He loved to go for walks every morning with his grand father who seemed to know everything about the flora and fauna of that place. Chasing the butterflies, squirrels and listening to the bird calls was a delightful experience. He wished his city was as green and closer to nature as that village.

“But there is no space left for any trees in my colony. With so many concrete houses and roads there is no soil left” Ankur thought to himself.

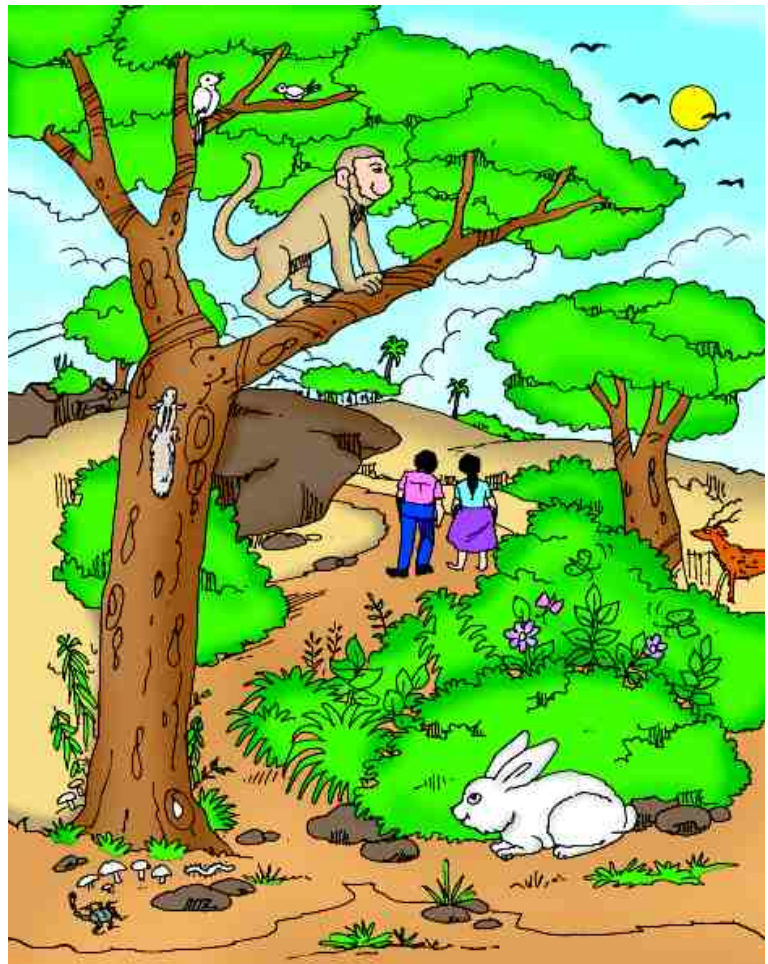
He discussed the problem of vanishing plants & trees in the city with his grandpa. His grandpa suggested. “Why don't you start 'Nature Club' in your colony? You can start saving existing plants and also plant new saplings”. Ankur is already an active member of the ECO Club of his school. He loved the idea and planned to start nature club in his colony.

Would you also like to start a Nature Club with your friends?

**Here is what you have to do:**

Select a plant or a tree such as Peepal, Jamun, Mulberry, Mango, Neem, Tulsi..... etc.

1. Take its photograph or make a sketch.
2. Feel the trunk, and note whether the bark is smooth or rough.
3. Make an impression of its leaf by taking its leaf rubbing. (you have learnt it in your previous class, do you recall?)
4. Collect the fallen leaves, flowers, fruits, bark & put them in separate packets with the related table.



5. Note the type of insects, butterflies, birds & other animals that visit the tree.
6. Try to observe them. Why do they come to the tree? Do they rob the tree or benefit it?
7. Collect information about the uses of the trees such as they :
  1. Give us shelter.
  2. Cool the air
  3. Have medicinal values
  4. Have ornamental use (leaves/flowers)
  5. We get fruits
  6. We use their leaves / bark / twigs etc.
8. After about a week's time present your collected information to the whole class. Take the help of your teacher in organising the presentation. Display it on the bulletin board.
9. This way with each member sharing the information about one plant (collected by him / or his group) the class can build an information bank about the plants. Discuss the need to protect the plants.
10. Let the activity continue with the help of your club.

### I have Learnt:

We should appreciate the importance of trees in our life.

Plants need to be protected and not damaged. We must conserve forests as they provide us with a lot of things we use everyday. Forests being renewable resources will ensure existence of both plants and animals and enrich the biodiversity.

# CONSERVATION OF PLANTS & ANIMALS



## WINDOW TO OUR RICH BIODIVERSITY

After listening to the rich experience of Dr. Ahmed working on Indian Biodiversity, Prakriti and her class mates were highly motivated and wanted to find more about wild life conservation. Vigyan wanted to explore the various factors that are threatening the survival of numbers of plants and animals. Saba wanted to know the future of Tiger in India. Dr. Ahmed seeing the enthusiasm of the class urged them to visit the nearby national park or sanctuary during their forth-coming holidays and collect first hand information.

After the break children met and were highly excited to show what they had collected from their visits. Some had visited the nearby national park sanctuary, others visited the agencies associated with conservation work and collected the literature and particulars relating conservation work. In that commotion all the photographs got mixed up and their identification slips were misplaced. Can you help Prakriti and her friends to identify these?

### What to do :

Below are given the photographs of plants and animals collected by Prakriti, Nistha, Pawan, Vikas and Saba. Identify the animals using the names in the central bubble given and also write the names of those places where you have found them.

1. Olive Riddley Turtle
2. Bustard
3. Gibbon
4. Orchid
5. Rhinoceros



- 1. Tahr Nilgiri
- 2. Orange Faced Monkey
- 3. Sandal wood tree
- 4. Lion tailed monkey

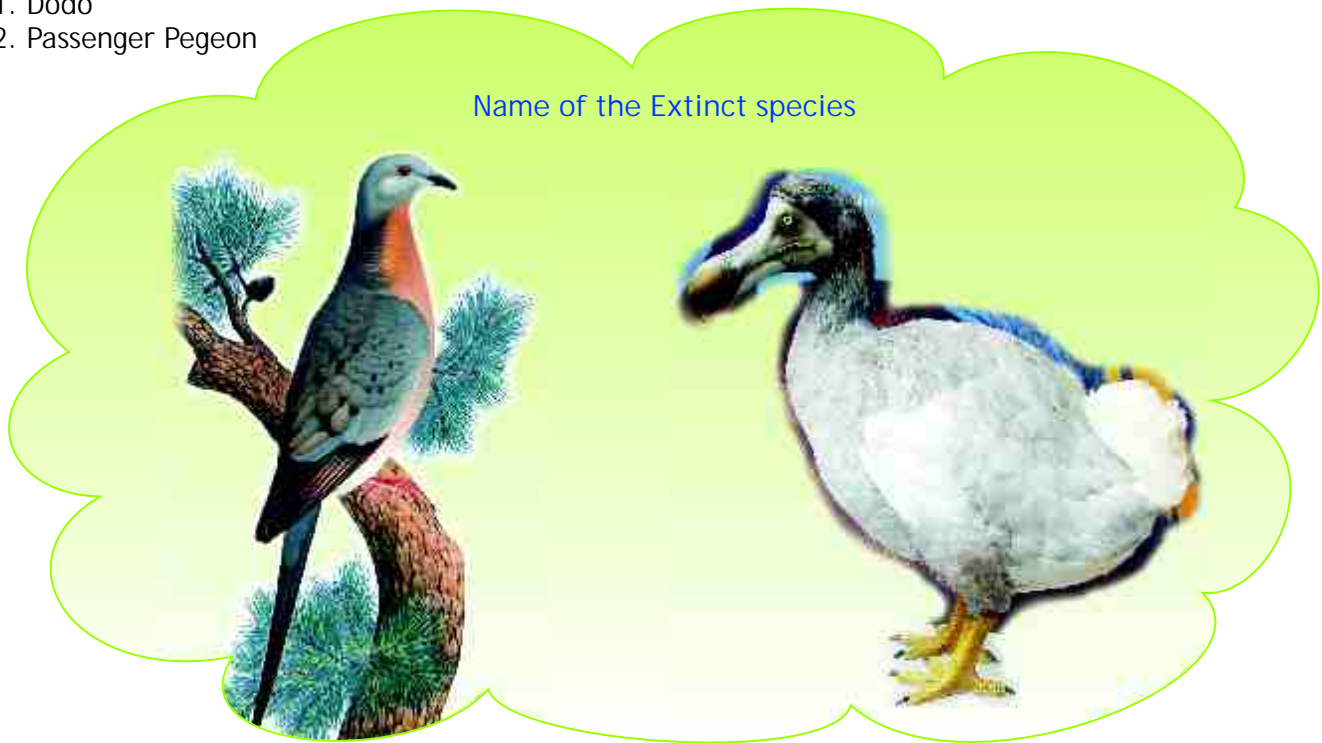


- 1. Black buck
- 2. Spotted Deer





1. Dodo
2. Passenger Pigeon



**Something more to do :**

1. List some of the causes that are threatening these plants and animals:
2. What were the causes behind the extinction of Dodo or passenger pigeon.
3. Given below is the outline map of India given the locations of the famous wild life Sanctuaries and national parks. Draw pointers from each of these and mention the animals protected in the boxes provided to you.

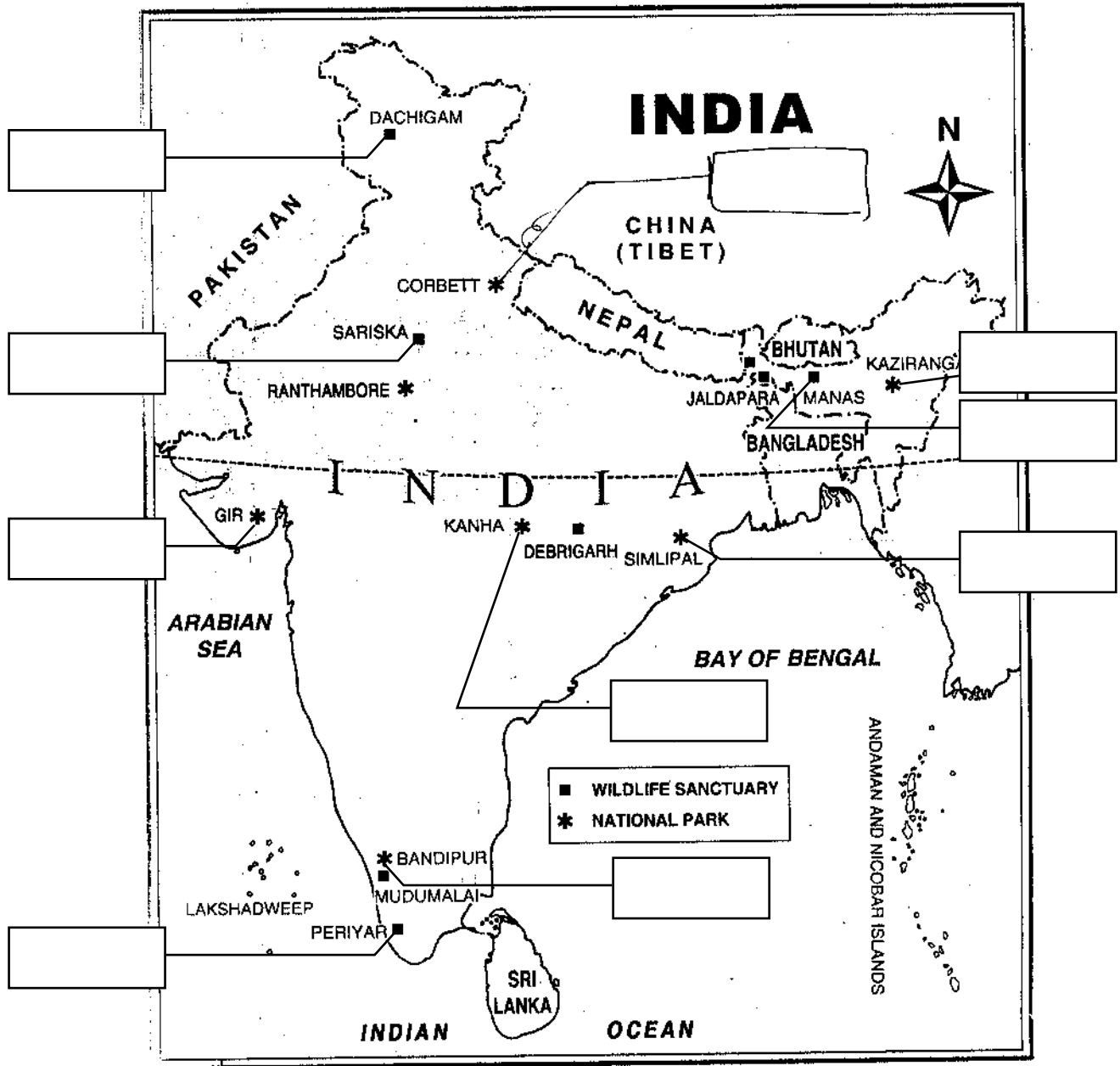
**A few national parks of India**

S.No.	National Park	City/State	Animals Conserved
1.	Kanha	Mandla, Madhya Pradesh	Tiger, Chital, Sambar, Black Buck, Barasingha
2.	Corbett	Nainital, Uttarakhand	Tiger, Panther, Elephant, Deer, Antelope, Python
3.	Simlipal	Mayurbhanj, Orissa	Tiger, Leopard, Sambar, Bison, Elephant, Chital, Wild Boar.
4.	Gir	Junagarh, Gujarat	Lion, Panther, Hyena, Chinkara, Crocodile
5.	Bandipur	Mysore, Karnataka	Elephant, Tiger, Jackal, Gaur
6.	Ranthambore	Sawai-Madhapur, Rajasthan	Tiger, Panther, Hyena, Nilgai, Green Pigeon
7.	Kaziranga	Jorhat, Assam	Rhinoceros, Wild Buffalo, Elephant, Tiger

### A few wildlife sanctuaries of India

S.No.	National Park	City/State	Animals Conserved
1.	Manas	Barpeta, Assam	Elephants, Tiger, Gaur, Golden Langur, Rhinoceros.
2.	Dachigam	Srinagar, Jammu and Kashmir	Leopard, Black Bear, Serow, Hangul.
3.	Periyar	Idukki, Kerala	Elephant, Tiger, Panther, Gaur, Sambar.
4.	Debrigarh	Bargarh, Orissa	Leopard, Gaur, Sambar, Bison, Hyena.
5.	Sariska	Alwar, Rajasthan	Tiger, Panther, Hyena, Chital, Chinkara.
6.	Mudumalai	Nilgiris, Tamil Nadu	Elephant, Gaur, Chital, Sambar.
7.	Jaldapara	Jalpaiguri, West Bengal	Rhinoceros, Elephant, Tiger, A Variety of Birds.





Location of national parks and wildlife sanctuaries in India

# CELL-STRUCTURE & FUNCTIONS



## INSIDE STORY

It was already late when Anny went to bed after revising the lesson, 'Cell structure and functions'. She fell asleep immediately. After some time she heard loud noises and lot of commotion somewhere and went to look for it. She peeped outside and what did she find? In a large open space a group of very different looking elements were moving around with banners in hand and shouting slogans "I am the best", "I am the best". "I am the most important part. I work so hard for the cell". "I should be called the 'Head Office of the cell.'" "The cell is doomed without me" and so on. All were very excited. The demonstration appeared somewhat familiar to Anny. Didn't she just finish studying about the cell & its organelles! What were they trying to say? What was the fight about? In midst of all this excitement came out a round bodied, well protected unit and addressed Anny, "we are the residents of the world called cell. Will you be kind enough to be our judge and decide who should be called the 'Head Office' of this world? You see this is the only place we can live in and this unrest is pulling apart our world. You too have a stake in saving us, don't you?"

Anny was seated in a high chair and the hearing of the arguments started. Each participant presented their case arguing what he did for cell, how important is its contribution to the survival of the world of cell is or how useful it is to the cell. Each one thought, no one else is more suitable for the post "Head Office" of the cell. First came cell wall followed by cell membrane, plastids, chloroplast, cytoplasm, vacuole and lastly came nucleus. Nucleus stood up and pleaded, "Am I not the one who is responsible for a bit of our fore fathers in us? and am I not the one who ....." he continued.

After hearing all the arguments Anny thought all parts are important but nucleus is the one who should be called the "Head Office" of the world of "Cell". She could barely pronounce her judgement when she heard her mother calling her to wake up and get ready for the school. She quickly got up, got ready and went to school. She was looking forward to the assignment in science class. She was happy & very sure that she could do well. After all she was the judge and she remembered all the argument put forward by the organelle so well. Could you join Anny and recall the argument presented by different parts of cell? Why did they think they alone should be considered to be the most important component? Here is the outline. Complete them.

1. Cell wall - I am -----  
My Job is -----  
I am useful to the cell because -----

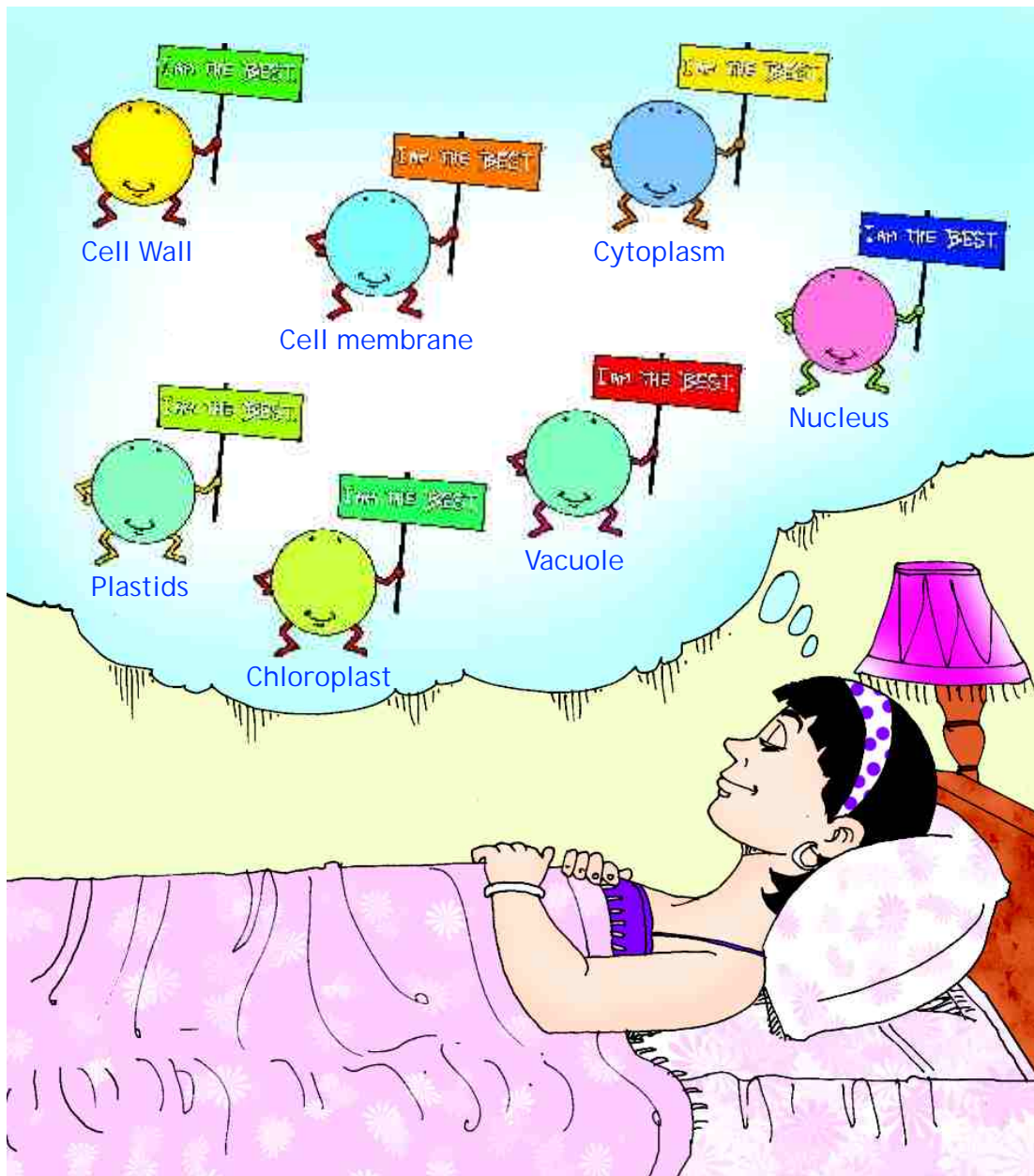
Do the same exercise with each of the following :

2. Cell membrane
3. Cytoplasm
4. Plastids
5. Chloroplast.
6. Vacuole
7. Nucleus

II. What were the reasons for the nucleus being as the head office of the cell? Write in the space given below:

1. \_\_\_\_\_
2. \_\_\_\_\_

III. Draw the diagram of a plant cell and show all the parts



## REPRODUCTION IN ANIMALS



## STORY OF GRANNY AND HER CHILDREN

Vigyan was passive and deep in some thought.

**Teacher -** What is it that is worrying you?

**Vigyan -** Sir, we learnt that amoeba divides by binary fission during asexual reproduction.

**Teacher -** Yes, that's right. But what is in your mind?

**Vigyan -** That means the baby amoebae have no mother to care for them.

**Teacher -** This is correct. Mother amoeba divides into two daughter cells by fission.

**Vigyan -** Is it true for all unicellular organism?

**Teacher -** No, not in all organisms. I will show you some unicellular organisms that do not divide by fission. Let us carry out an experiment. Yeast is a unicellular organism and reproduces by budding. Let us try and see for ourselves.

### Material required:

Yeast Powder, Warm sugar solution (2 spoons of glucose in 50 mL warm water), microscope (with high power), glass slide, coverslip, dropper, forceps.

### What to do:

- Take the warm sugar solution in a test tube and shake well. Add a pinch of yeast powder and shake. Keep in a warm place for 24 hrs. (use a thermocol box).
- Using a dropper, take one drop of this solution and put it on the glass slide. A drop of methylene blue may be used to stain the yeast for better view. Put a cover glass on the yeast drop and focus under the microscope. Take help of your teacher to focus.
- Repeat the above mentioned activity after 24 hrs.

### Observation :

You will see large number of small oval or round yeast cells at initial stage. After 24 hrs. many in budding stage as shown in the diagram. The buds in the slide may be seen attached to the parent cell. While still on the parent cell, these buds grow and in turn produce buds. Thus a chain of cells are formed. Observe the diagram carefully and then make sketch of your own slide.

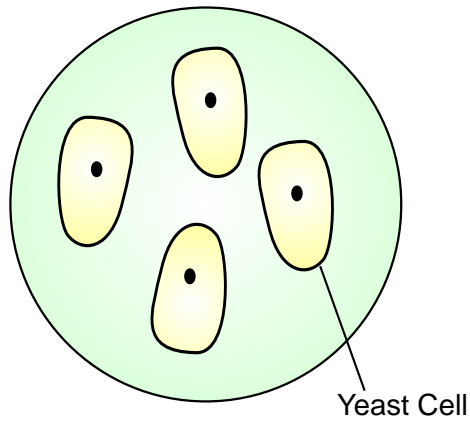


Fig. 1 : Initial Stage

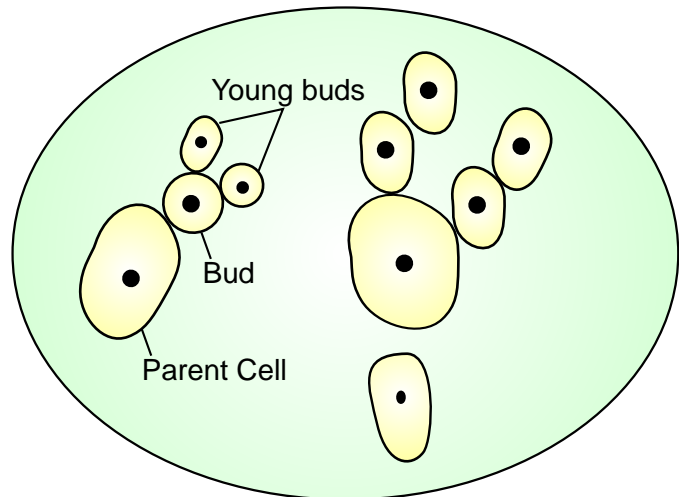


Fig. 2 : After 24 Hours.

**I have learnt :**

Yeast is a unicellular organism.

Yeast reproduced asexually by budding.

The daughter cells may not separate and remain attached to the parent cell. These in turn grow and give rise to buds. This form chain - grandmother, mother and daughter all linked together.

# REPRODUCTION IN ANIMALS

# 35

## STAGES OF HUMAN REPRODUCTION

Reproduction is the most fascinating & unique property of all living organism. Shristhi, Prakriti and Vigyan were trying to recollect the process of reproduction in animals. Let us revise the stages of reproduction in humans.

- a. Observe the picture given below. Do you find something common in all of these? What are such animals called?

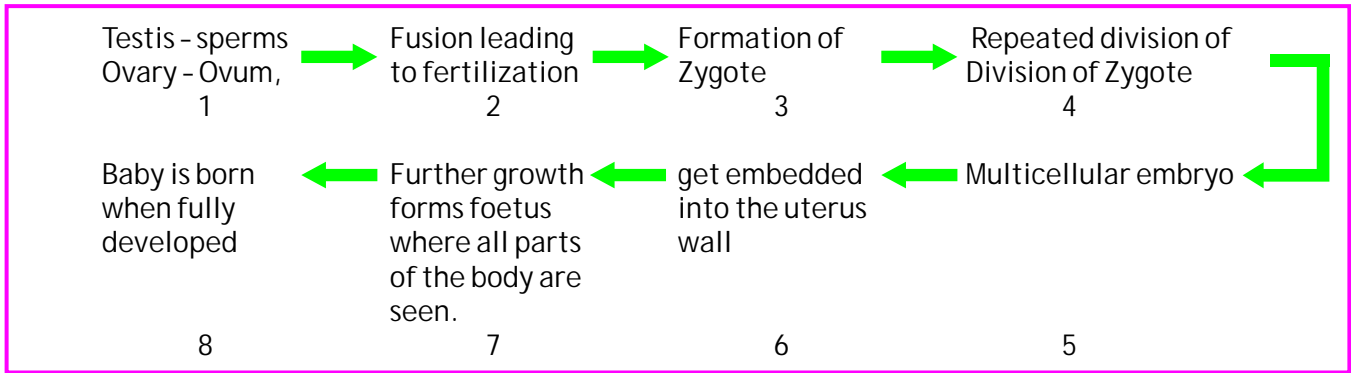




# REPRODUCTION IN ANIMALS

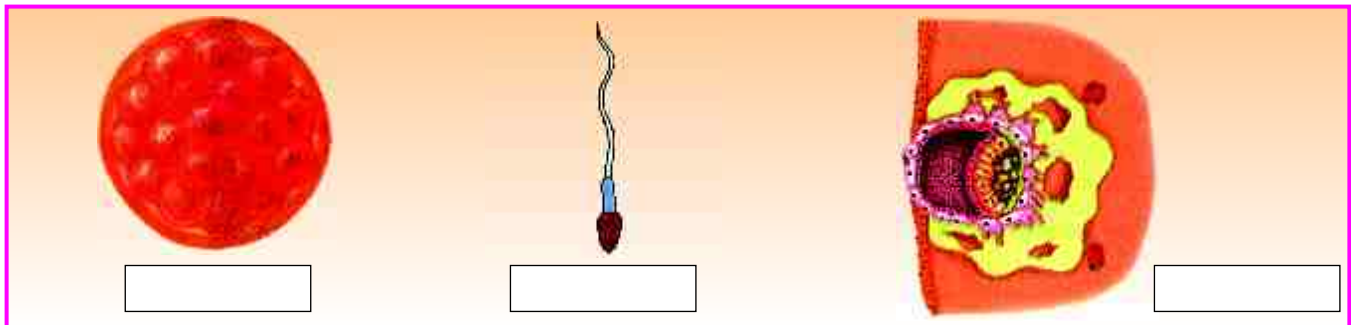
## STAGES OF HUMAN REPRODUCTION

b. Given below is a summary of sequence of events that occur in humans during reproduction (and also in all those that you have identified in section A). study the flow chart care fully.

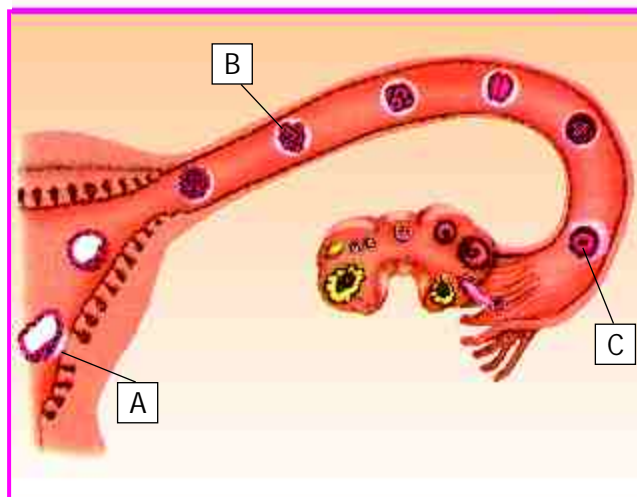


### What to do:

A set of diagrams representing various stages of human reproduction are given below. Select the diagram representing the stages between 1 to 8 in the flow chart given above & put the correct number in the boxes below each diagram.



c. Your next challenge is to identify the correct place within the uterus for some of these stages of development. Given below is the diagram of human uterus where three sites are marked as A, B, and C, select the correct site (out of A, B, and C) for stages 4, 7 and 8.





### What I have learnt

1. Animals sexually may be egg laying or oviparous or viviparous, Cats, Dogs, Humans give birth to young ones.
2. Fusion of sperm and Ovum results in the formation of zygote.
3. Fertilisation is internal in viviparous animals & the embryo develops within the uterus.
4. When fully developed the young one is born.

## REACHING THE AGE OF ADOLESCENCE

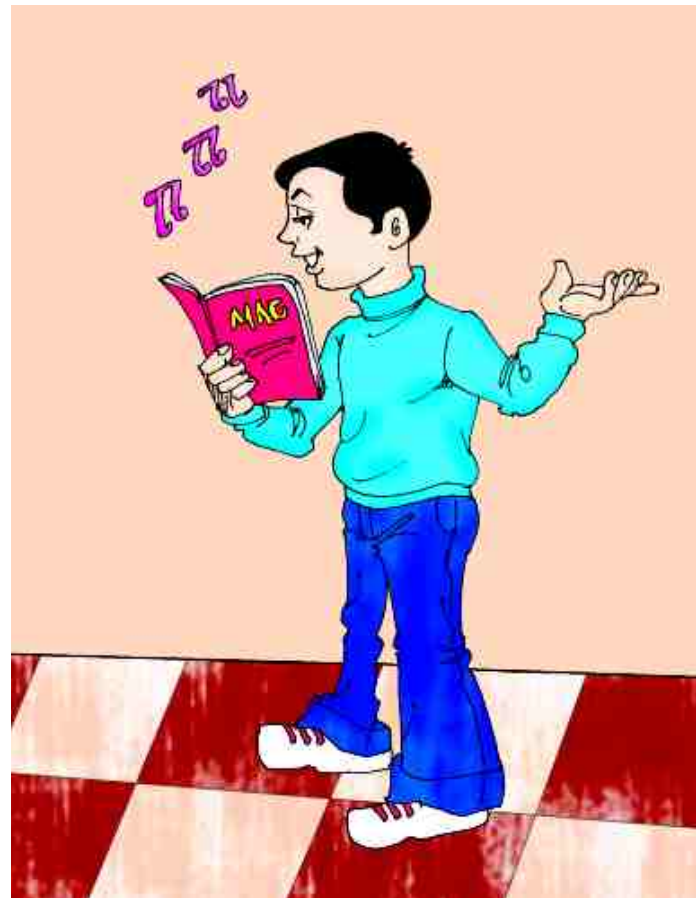


## PLEASE HEAR WHAT I AM NOT SAYING

Don't be fooled by me,  
don't be fooled by the face I wear.  
For I wear a mask a thousand masks,  
masks that I am afraid to take off.  
But don't be fooled,  
for God's sake don't be fooled.

I give the impression that I am secure  
that all is sunny and unruffled with me  
that confidence is my name and  
coolness is my game.  
That the water is calm and I am in  
command and that I need no one.  
But don't believe me, please  
my surface may be smooth but  
my surface is my mask  
Beneath dwells the real me,  
in confusion in fear.

But I hide this, I don't want any one  
to know this.  
I panic at the thought of my weakness  
and fear of being exposed.  
That is why I frantically create a mask  
to hide behind,  
a nonchalant, sophisticated facade.



"How appropriate are the lines" thought Arjun as he put away his school magazine after reading the poem as though the poet could actually read my mind.

Arjun was feeling very low today. His music teacher preferred Varun to him to be in the lead in the music chair. "Why does my sound voice sound so horrible these days". Arjun wondered. As it is, it was embarrassing to go to school everyday with his acne ridden face. His friends told him he was getting to be very irritable off late. They were right. He didn't want to do anything but stay in his room all day.

The changes Arjun seems to be undergoing are the changes any one experiences during adolescence. It is a complex stage when the child enters to emerge as an adult by attaining reproductive maturity. Let us see how adolescent wise are you.

# REACHING THE AGE OF ADOLESCENCE

PLEASE HEAR WHAT I AM NOT SAYING

Solve this word search, to find words associated with adolescence. The letters are arranged in several different ways - horizontally left to right and right to left, vertically, upside down, diagonally etc. Identify the terms, the clues for which are provided below:  
(Clue No 1 is solved for your convenience)

## CLUES

1. Female Hormone
2. Controls blood glucose level
3. Its deficiency causes goiter.
4. Found on oily skin.
5. Stoppage of menstruation.
6. Male reproductive Organ
7. Voice box
8. Male gametes
9. Master endocrine gland.
10. Results from imbalanced diet
11. Female gametes

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

## REACHING THE AGE OF ADOLESCENCE



## DELIGHTFUL DAYDREAMS

*Swapna got out from her bed with a start when she heard the alarm clock ringing. To her surprise, her bed got tidied on its own. Swoosh! flew the tooth brush to her teeth and cleaned them before she could realise what was happening. She found her shoes had got polished on their own. What a relief! she sighed. She couldn't believe her good luck when she went to her study. Her six page history assignment had got completed by itself.*

*"Swapna! where is your assignment?  
Swapna got up shivering when she heard her history teacher's piercing voice.*

*So..... she had been day dreaming once again. How she wished her history assignment had really got finished on its own!*

Who wouldn't want to go to the dream land once in a while to get one's wishes fulfilled. With adolescence come a lot of expectations, insecurities, aspirations and sudden responsibilities. Let us now perform a small activity to have some imaginary solutions to some things Swapna aspires to do.



### What to do :

Divide the class into four groups A,B,C and D. Give each group a chart paper and sketch pens. Make eight chits of papers with an issue concerning adolescence written on it and give 2 chits to every group. Each group chooses:

- A facilitator who would initiate the discussion on the issue mentioned on the chit and ensure all members get a chance to speak.
- A time keeper to minimise waste of time and try to cover both the issues in 20 minutes.
- A recorder who would enter and present the views of his group in the format mentioned below i.e.

- 5 Plus points
- 5 minus points
- 5 interesting points about the issue.

Topic:

	Plus Points	Minus Points	Interesting Points
1			
2			
3			
4			
5			
Participants:			

Members:

Some of the issues that could be discussed are as follows :

- a) If I could have fizz drinks every time I feel thirsty.
- b) If I could chat with friends endlessly.
- c) If I could have a pair of foot wear to match every dress I have.
- d) If I could have snacks for breakfast, lunch and dinner everyday.
- e) If I could change my mobile every time a new one gets launched in the market.

## REACHING THE AGE OF ADOLESCENCE



## GROWING UP

I feel low when  
This boy in my class says  
"Hey shorty, when would you wear long pants".  
When some smart bean pole asks me  
"Hey how does it feel to be so close to the ants?  
When the school nurse asks me to tell her again  
How tall I am, after having told her the same.  
It is tough being short you see.  
something my parents just don't agree.  
My father does cheer me  
"don't you worry my son  
every one else is a giant  
you are just fine this way son"  
There is really no hurry" adds my mom  
you will grow soon enough  
all good things as you know  
come in small packages my son.



Boys and girls in their teens sometimes get concerned about how they are growing. They wonder if some doctor can do something to help speed up their growth.

When someone focusses on the negative aspects of his body and ignores the positive aspects of his personality, he may develop poor self esteem. Self esteem is how a person feels about himself. One way of helping a child develop positive self esteem is to initiate a discussion on how to reframe our negative attitude and transform them into positive attitude.

	Negative	Positive
1.	I have no friends. No one likes me.	I will smile and look at people in the eye.
2.	I am not good looking.	My teacher tells me honest labour bears a lovely face and I am proud to be hardworking.
3.	I am short and so don't stand any chance of being chosen for my school basketball	I can be a good table tennis player and still represent my school team.
4.	I think my friends are smarter as they always wear branded shoes.	Who cares what my friends think, I will wear what I feel is comfortable for me

**Variation**

Keep 40 blank drawing sheets, one on each desk with a child's name written on top (if a child gets his own card, let him exchange it with that of another child.)

Every student then takes turns to write one positive trait that can be associated with that child and passes it to the next student. By the end of the exercise, all students would have entered one positive trait on that card. When all 40 cards get filled up, the child whose name is written on top gets his/her card back with a positive feedback from all his class mates.

**I have learnt:**  
 I must focus on my strengths and not on my weakness. Self awareness helps us to improve our self image. By choosing friends who share our values, we can feel less pressurised. One must never indulge in self pity. By feeling nice about ourselves we not only develop a positive self image but our performance levels also shoot up and enhance our confidence levels.





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